

T I E R R A ^{plus}

HITACHI

Reliable solutions

Tierra Plus
Number 135

This page is the English version of a special issue in TIERRA+, an information magazine published by Hitachi Construction Machinery for the Japanese market.




[Special Issue]

Connecting Earth to the Future with

Carbon Neutrality



Hitachi Construction Machinery Group



Connecting Earth to the Future with Carbon Neutrality

Natural disasters that occur on a scale of once every few decades are happening almost every year. Most of these disasters can be said to be largely due to the impact of global warming, and the reduction of greenhouse gases has become a global issue now.

What does carbon neutrality mean? What can we do?
Let's take a look at the initiatives that Hitachi Construction Machinery is taking.

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It's now or never!

Protecting the Earth from Climate Change with Carbon Neutrality

In the first place, what does carbon neutrality mean and what should be done to achieve it? We asked Mr. Kenji Fuma, who is familiar with sustainability management and ESG investments, about the current state of on the construction industry, and what domestic and overseas initiatives, the impact companies and individuals can do.



Mr. Kenji Fuma

CEO, Neural Inc. Founded a sustainability management/ESG investment advisory company in 2013 before taking up his current position. Author of "Carbon Neutral Beginner's Guide" (Kodansha Ltd.), "Understanding with Data how the Earth will be in 2030" (Nikkei Business Publications, Inc.) and other books. Editor-in-chief of the sustainability management/ESG investment advisory news site "Sustainable Japan". Besides being a member of ESG-related committees in the Ministry of the Environment, Ministry of Agriculture, Forestry and Fisheries, and the Ministry of Health, Labour and Welfare, he has also served as an expert at international conferences.

For decarbonization measures, it's becoming clear that a target of 2050 may not be soon enough

Natural disasters are happening one after another due to climate change, and sea level rise is also becoming a serious risk. Rising temperatures have caused damage to the agriculture and fishing industries, and infectious diseases have also increased due to changes in the ecosystem, which exert an enormous impact on society and the economy.

In August 2021, the Sixth Assessment Report was released by the Intergovernmental Panel on Climate Change (IPCC). In the Paris Agreement, it is stated that we should strive to keep the rise in the mean temperature to 1.5°C compared to before the industrial revolution, but in the same report, it is written that the rise will reach 1.5°C by around 2030. In the world of meteorology, a rise of even 1°C is a major change, and it is also said that the temperature will rise by 4°C if we leave the problem alone without doing anything. A sense of impending crisis that this will lead to the occurrence of disasters at an unimaginable level has become a common consensus among scientists working on climate change.

Carbon neutrality is an initiative to keep the amount of greenhouse gases

as exemplified by carbon dioxide (CO₂) to "plus or minus" zero. "Minus" means to reduce the amount of greenhouse gases by plants absorbing the carbon etc., but since it is difficult to absorb all greenhouse gases, we have to bring the amount emitted, that is the "plus" side, close to zero.

The Japanese government released a declaration aiming to be carbon neutral by 2050. However, in the aforementioned report, it is stated that this should be brought forward as there is a possibility that it will be too late to avoid a global crisis by 2050. In response, movements by international society will probably also accelerate in future.

Hearing the government's declaration, I felt a sense of relief that Japan has also taken action at last. Nonetheless, in contrast to Europe moving quickly to enact laws on carbon neutrality and China also setting ambitious targets, Japan has been slow in taking action. Globally, we belong to the group of late starters. As the image of Japan as an environmentally advanced country is strong in the first place, concern has been expressed overseas at our tardiness.

The delay in making the declaration could possibly be due to previous environmental measures imposing a cost burden

and becoming a drag on growth, so the reality is that the government was not in a position to say so. However, carbon neutrality has attracted attention not only as an environmental issue but also as an economic issue. If companies are slow in taking action, they might end up paying other costs and costs to deal with disasters and a rise in the sea level. These costs are huge. This is because global corporations have come to realize that when you weigh the pros and cons, the costs incurred in taking measures against climate change are rather tiny in comparison.

Many things can be done by individuals and companies

So, are there things that individuals can do for this global issue? Although the amount of greenhouse gases emitted by industries is way higher as a whole, there are also many things that individuals can do. The amount of CO₂ emitted by the electricity and gas used in homes is surprisingly large, and a lot of CO₂ is emitted when producing automobiles, electrical products and foodstuffs, so we can contribute to a reduction in emissions if we are aware of all these one by one. Individuals can contribute in a variety of ways depending on their efforts, for example, they can change their household appli-

ances to run on a plan that has a higher proportion of renewable energy, or they can take the train instead of driving the family car.

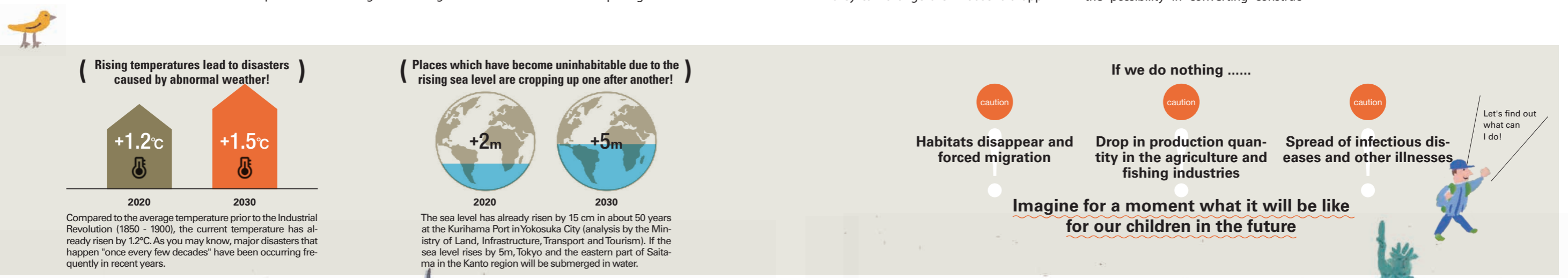
More than anything else, the biggest effort that individuals can make is to having the will to accept changes. A catastrophic collapse will come if we were to maintain our current lifestyle. More severe disasters may be waiting in store. In other words, I believe the most important thing is to realize that some things must change, and to have the will to accept these changes.

There may be differences in such a way of thinking depending on the country, but I feel the differences among generations are even larger. The emergence of Greta Thunberg from Sweden was sensational, but the 2050s will undoubtedly will be an era for the younger generation like Greta to play an active role. Therefore, it is important to value the opinions of the younger generation, and also for corporations to come face to face with young people.

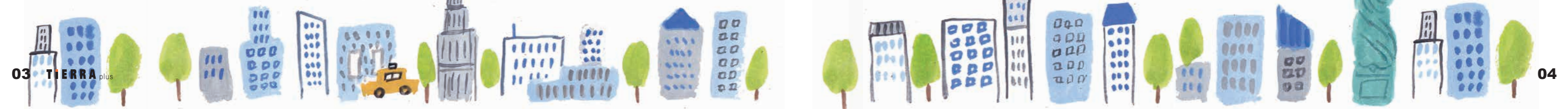
The Ministry of Economy, Trade and Industry enacted a green growth strategy in association for a carbon neutral 2050, and presented an action plan for each field. In the construction industry, I feel the possibility in converting construc-

tion materials that emit a lot of CO₂ in the manufacturing process. Interest in wooden buildings is also growing throughout the world, and construction techniques that are earthquake-proof are evolving. Therefore, the significance of pursuing wooden construction in Japan where there is a culture of using wood is probably also great.

I look forward to the further promotion of zero emissions by the electrification of construction machinery in the carbon neutral initiatives of Hitachi Construction Machinery. What is required in future is being carbon neutral throughout the entire value chain from manufacturing to operation and disposal, so there is probably a need to look closely at changing the materials used in construction machinery, using batteries efficiently, and reusing batteries that have dropped in performance. Nonetheless, since it takes time to do everything by manpower, including searching for raw materials and recovering batteries, incorporating digital technologies to realize DX (digital transformation) will also be essential. While the goal we aim for may be high, I hope we will consider all means to realize it.



*Source: "Understanding with Data how the Earth will be in 2030" (Kenji Fuma, published by Nikkei Business Publications, Inc.)



Low-carbon construction machinery holds the key

Q What kind of features are available with the low-carbon construction machinery?

The key word in pursuing a low carbon footprint in construction machinery is "electric". Hitachi Construction Machinery has been pursuing the development of electric construction machinery from the early stages by developing its first electric hydraulic excavator in 1971, and by releasing in 2006 a battery-powered mini shovel equipped with a lithium ion battery. In 2019, two new models of battery-powered mini excavators the

"ZE85" and "ZE19", were exhibited at an international construction machinery trade fair (bauma 2019) held in Germany. Subsequently, more efforts have been made into further development. Besides these, Hitachi Construction Machinery also sells hybrid excavators, wheel loaders, wired electric excavator and mining machinery that can be operated by connecting a power cable.



Mining development that leads to decarbonization

Q What are the measures that Hitachi Construction Machinery is taking to reduce CO2 emissions to zero at mining sites?

Initiatives towards the decarbonization of mines are being advanced by mainly major resource companies. In mines where the scale is larger compared to urban construction works, the reduction in CO2 emissions due to large mining machinery moving around is also an important theme to Hitachi Construction Machinery. Although we already have wired and trolley-type mining machinery in our line-up, considering the productivity and constraints posed by places where work can be carried out, battery-powered mining machinery will serve as an effective answer for decarbonization. In March

2021, Hitachi Construction Machinery signed a memorandum of understanding with the Swiss company ABB, which possesses electric and battery technologies, for the realization of "net zero emission mining", which aims to essentially reduce greenhouse gas emissions from mining machinery to zero. In June, we concluded an agreement on the joint development of a fully electric dump truck in which battery charging is performed with a trolley. Going forward, we will continue to promote initiatives with the aim of achieving the same goals.

Q Is the introduction of low-carbon construction machinery progressing well?

The demand for low-carbon construction machinery is particularly growing in Europe where environmental regulations are strict. In Europe, the needs for such construction machinery are also following the same trend due to a ban on the sales of automobiles having internal combustion engines by 2035. In addition to the "ZE85" being adopted in the zero-emission construction site pilot project by the Norwegian government, the use of ICT construction machinery, including those running on engines, that raises work efficiency and contributes to low carbonization through automatic control is increasing. In response to the 2050 carbon neutral declaration by the Japanese government, the interest by construction and other companies in Japan is increasing, and movements to introduce low-carbon construction machinery in future using the trends in Europe as a reference can be seen.

How is it progressing? Efforts toward

The Hitachi Construction Machinery carbon neutrality, but how Here's a look at the current decarbonization construction machinery, mining



carbon neutrality

Group is accelerating its efforts toward far has it actually progressed? state from the perspectives of low-carbon solutions, and digital utilization.

Q Is it possible to reduce emissions to zero at construction sites?

Regarding mines, we have embarked on initiatives to realize "net zero emission mining". In 2020, a zero emission construction pilot project to perform an urban construction works using only electric construction machinery was carried out in Oslo, Norway. In this project, a battery-powered excavator "ZE85" that was jointly developed by the German company KTEG and the newly established company EAC was employed. However, there are also many issues. There are far more types of construction machinery used at urban construction sites. As battery-powered construction machinery effective in decarbonization are currently high in cost, first of all, there is a need to advance mass production in future to lower the cost. Moreover, although a large



number of machinery has to be employed on site, it is a fact that the hurdles in replacing all the units on site will be high unless national and other subsidies are prepared. Although the support of the Norwegian government in the current pilot project is comprehensive, the current situation is that there are differences in the level of enthusiasm towards zero emissions depending on the country.

Carbon neutrality x Digital technology

Q Will the use of digital technology also provide an impetus for decarbonization in the construction industry?

There is no doubt that digital technology will accelerate decarbonization. For example, work efficiency can be raised by the autonomous operation of construction machinery using ICT and IoT technology. With "ConSite Mine" launched in 2021, the driving and operation of operators can be visualized even in mines to raise productivity. As a result, CO2 emissions associated with machine op-

eration can be reduced, imparting a positive effect on decarbonization. Monitoring is also important. If "ConSite" is introduced to monitor the operating status of the machinery, this can be useful in raising the operating efficiency and reducing the life cycle costs, thereby contributing similarly to decarbonization.



Q How is operating information being used to reduce the environmental burden?

The replacement timing of parts can also be made visible by "ConSite". Although CO2 is emitted during the production process of the machinery, by managing the operating information with "ConSite" and replacing the parts at the proper timing, in essence this can reduce the manufacturing of new machinery, leading to a reduction in CO2 emissions. That is, it is possible to contribute to a reduction in the environmental load by extending the life of the product. Hitachi Construction Machinery is also focusing on recyclable parts, allowing it to contribute to the recycling of resources. Of course, this will lead to a reduction in the number of new units sold. However, as Hitachi Construction Machinery is also focusing on the sales and rental of used machinery, we believe we will be able to effectively achieve our company's business goals together with proper consideration for the global environment.

Zero-emissions construction sites

Q How user-friendly is battery-powered machinery?

In the construction site in Oslo, Norway where "ZE85" is used, the machinery is normally operated for 4 to 6 hours in the morning and then charged for an hour during lunch time, after which it is usually run for another 2 hours in the afternoon. As the batteries are depleted in 2 to 3 hours at full operation, the machinery is run effectively by inserting breaks or other works in between etc., thereby allowing it to be operated for 4 to 6 hours. While the "ZE85" itself can be charged easily, securing the power supply is an issue as all the machinery have to be charged at the zero emission site. On the other hand, apparently it is preferred by local residents and local government because no noise is generated, and also rated highly by operators because they feel less tired than before after working.



Sustainability Promotion Leader talks about Decarbonization:

"It is an Essential Business indispensable to the Present and Future of Society"

Although the Hitachi Construction Machinery Group has been actively involved in reducing CO₂ emissions previously, we have further accelerated the move towards decarbonization in response to the increasing needs of customers and society.



Adopting a new resolution to reduce CO₂ emissions in response to the 2050 declaration

In October 2020, the Japanese Prime Minister at that time, Yoshihide Suga, made public the "2050 Carbon Neutral Declaration". The Hitachi Construction Machinery Group has been involved in a variety of environmental initiatives before that, launching the Sustainability Promotion Group in April 2019. Although we have been putting our efforts into the promotion of sustainability activities as exemplified by our SDGs (Social Development Goals), the impact of the carbon neutral declaration was still great, and with this as an impetus, the number of opportunities to hear about construction machinery from government agencies and customers such as general contractors also increased.

Previous product development was focused on complying with emission regulations. In May 2019 before the declaration was announced, numerical targets to reduce the CO₂ emissions from products by 33% compared to 2030 and the CO₂ emissions from production processes by 45% compared to the same year were set, and certification was also received from SBTi (Science Based Targets initiative). However, since these targets alone will not be sufficient to achieve carbon neutrality by 2050, we will incorporate a variety of technologies focusing on electrification to develop construction machinery that do not emit CO₂, with a new resolution being adopted to supply them

to our customers as soon as possible.

The Group has been involved in initiatives to create environmental value in the 3 fields of "Creation", "Usage" and "Challenge". In the pursuit of these 3 goals, we believe we need to have a good understanding of how customers use our products and what they expect, and to resolve their issues and concerns.

For example, in terms of mining, major resource companies endorsed the Task Force on Climate-Related Financial Disclosures (TCFD), and started promoting initiatives to reduce their environmental footprint earlier than us. For customers to choose us, with regards to the "Creation" of products, first we will naturally have to create products to reduce CO₂ emissions from the machinery themselves. Regarding "usage", it has been suggested that CO₂ emissions can be reduced by making use of monitoring tools such as "ConSite". Furthermore, under "Challenge", we are putting our efforts not only in products but also the systems surrounding these in order to understand the issues involved in improving safety and productivity, reducing life cycle costs and so on. Besides helping customers to attain their goals, we aim to help them resolve general social issues that they will further face in future.

Creativity and imagination will be important in addressing the issues that they will further face in future. Instead of simply listening to the feedback of customers and the industry and adopting a "market-in" attitude to meet their needs, the Sustainability Promotion Group is



Besides our customers, we aim to further resolve the issues of society as a whole

required to understand general social issues in and conceive what actions to take to resolve these issues with an "outside in" attitude.

When it comes to decarbonization initiatives, actions on stringent laws and regulations have been taken as countermeasures against climate change in Europe. Regarding automobiles, mainstream hybrid cars in Japan will also no longer be allowed to be sold from 2035 onwards. Observing this movement, the Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, and Ministry of the Environment in Japan etc. are also trying to create a legal framework for this. This is to uncover issues with a long-term perspective looking over the entire society while quickly latching onto such a trend. We believe the role of the Sustainability Promotion Group is to incorporate this in an accurate and timely manner within the company, and to promote initiatives by group companies in Japan and overseas acting together as one.

Aim for high goals by collaborating to reducing CO₂ emissions from mines to substantially zero

Two and a half years have passed since its inception, but since sustainability is socially in the spotlight now, we feel that we have built a foundation for better understanding within the company compared to previously.

Amid such a background, we have raised an ambitious and lofty goal known as "Net Zero Emission Mining" in which we aim to essentially reduce greenhouse gas emissions to zero jointly with the Swiss company ABB. This is something we believe we must and can achieve. However, this will probably take quite a while, so we have to tackle the issues continuously by combining our strengths with various relevant parties. Towards this end, we will



President, Sustainability Promotion Group
Atsushi Tamane

actively apply solutions that contribute to a reduction in CO₂ emissions as they are developed.

Due to the spread of the novel Coronavirus infections in 2020, people working in a variety of positions including all medical practitioners have attracted attention as "essential workers". To me, the work of Hitachi Construction Machinery is also considered an "essential business".

Our company does not just design, develop and sell construction machinery, but also provide solutions that contribute to an improvement in the safety and productivity of customers handling machinery, and reduction in cost. Our customers are involved in fields that are indispensable to our lives, including those in the civil engineering, construction, agriculture and forestry industries. In addition, flood damage due to torrential rains has increased recently, and our company's hydraulic excavators have also been used in the restoration work. The fact that our company's machinery and solutions are shouldering a part of the foundation for such a world is precisely the reason why we think it is an essential business.

Going forward, we will continue to tackle these challenges while feeling a huge sense of worth and remaining strongly conscious of our work in contributing to the present and future of the earth and society.