

**Nippon Steel Carbon Neutral Vision 2050 Briefing
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Summary of Q&A¹**

Presented by

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◆ **General planning**

Q Is the target of 30% CO₂ emission reduction in 2030 and carbon neutral in 2050 a plan for Nippon Steel Corporation or for the entire Nippon Steel Group?

A It is Nippon Steel's non-consolidated plan. At present, the Company alone accounts for most of the total CO₂ emissions of the Group. So it may be fine to assume that the targets for 2030, for example, would roughly cover for the entire Group, albeit there are subtle differences of a few percentage points. In the meantime, we intend to exchange opinions with the Group companies so that they will also work toward the target of carbon neutral in 2050.

Q Nippon Steel has a global group-wide vision of 100 million tons of crude steel production. So I think you should include global reduction of CO₂ emissions through the use of your technologies, such as Eco Solutions, i.e. transfer of energy-saving technology, and Eco Products, i.e. environmentally-friendly steel products, in addition to reducing the domestic CO₂ emissions.

A At this time, Nippon Steel is not the controlling stakeholder of most of our overseas group companies with relatively high CO₂ emissions, and we are not in a position to take the initiative in making a plan of them. However, in the future, if we become a major stakeholder of them, it would be highly possible that we work at the reduction of their CO₂ emissions by transferring technology from Japan.

Our Eco Products and Eco Solutions initiatives are continuing. The Japan Iron and Steel Federation has also announced the reduction of carbon emissions by taking the initiatives. These climate actions have also been disclosed in our Integrated Reports and Sustainability Reports. We will continue to proactively report such activities.

Q Are the captive power plants subject to the current Carbon Neutral Vision? Also, please explain how you plan to reduce CO₂ emissions from these facilities.

A The captive power plants are also subject to the Carbon Neutral Vision. As stated in the roadmap, we will work hard to reduce the CO₂ emissions resulting from power generations. Specifically, we will reduce CO₂ emissions by increasing the efficiency of power plants and shifting the fuel to low-carbon energy. We also

¹ Based on information as of the date of the briefing.

aim to achieve carbon neutrality utilizing carbon offset with CCUS and net-zero emission energy.

◆ **Electric arc furnace (EAF) route**

Q Why not to install small size EAFs instead of one large size EAF?

A It is inefficient in productivity to install small size EAFs. If we implement an EAF of 300 tons per charge, the same size as Basic Oxygen Furnace (BOF) we now use, we can efficiently continue to use the current subsequent process facilities without any change. There might also be an idea to implement two 150-ton-per-charge EAFs, but these two EAFs have to properly work in accordance. Therefore, one 300-ton-per-charge EAF fits best on the existing lines.

Q You mentioned restrictions caused by impurities in the challenge of high-grade steel production with scrap. Does the challenge mean to develop a steelmaking method that does not rely on high-quality scraps? Please explain the meaning or significance of Nippon Steel, not an EAF steelmaker, to take up this challenge?

A In North America, the application of EAF steel to automobiles is limited to an inner part of the vehicle, not the outer panel where high quality is required. In addition, about 60% of direct reduced iron (DRI) is used, resulting in the scrap content of about 40% to reduce impurities and to maintain the quality. However, for example, if we can develop a technology to eliminate impurities in scrap as much as possible, we can make a greater volume of higher-grade steel. This is the kind of challenge we hope to achieve. We believe our process technologies, not the EAF steel producers', will work very well in solving the challenge. I think it is just us who have to take this up, as we believe we have the highest technology for this solution.

Q What is the point of making only high-grade steel in EAF? Isn't it better to expand the EAF products into commodity-grade products?

A As part of the structural reform of our domestic steelmaking business, we plan to increase the portion of high-grade steel products in sales in order to increase marginal profits. Also, Japan's production capacity for commodity-grade products produced by conventional EAFs have already satisfied domestic demand, and there are sufficient EAF steelmakers in Japan. If we make commodity-grade products with EAF, we will make little profit and will need little technology development.

Q How do you decide which blast furnace (BF) to switch to EAF? How much will be the ratios of production by EAF, BF, and hydrogen direct reduction in 2030 and 2050?

A The selection of the BF switching to EAF will be decided by factors such as products, production scale, refurbishing timing of BF-related equipment, and reduction in reproduction investment.

At this moment, we have no idea of the ratios of EAF, BF, and hydrogen DRI in 2030 and 2050. The ratios can change depending on future technological developments, such as how much we will be able to use hydrogen DRI, what size of EAF we can install, and how high the quality of the steel produced by the EAF will be.

◆ **BF and BOF route**

Q When will the COURSE50 be implemented? Will other Japanese BF steelmakers engaged in this project be able to implement the technology?

A We hope to implement at least one or two COURSE50 BF(s) by 2030. Since this technology development is being carried out as a national project, other Japanese BF makers can also implement the technology.

Q You target 30% reduction in CO₂ emissions in 2030 compared to 2013. How many COURSE50 BF's need to be implemented to achieve the target? How much does it cost to implement it to a 5,000 m³ furnace, for example?

A We'd like to implement the COURSE50 technology in at least one BF by 2030. If installed in two, further reduction in CO₂ emissions can be achieved. We do not comment with regard to the cost for implementation.

Q How much hydrogen can be blown into the Super COURSE50 BF? Will the use of coking coal remain?

A The percentage of hydrogen that can be blown into the Super COURSE50 BF depends on future technology development. We will try to maximize it, but it cannot be 100%, so the use of coking coal remains.

In order to keep a certain level of production, the conventional BF route will remain. Then the Super COURSE50 with hydrogen will be needed. Even then, the use of some coking coal will still be necessary. When coking coal is used, we must also rely on carbon capture, utilization and storage (CCUS).

◆ **100% hydrogen use in direct reduction process**

Q Do you plan to develop your own process or use the existing MIDREX or other processes?

A We plan to develop our own process. Hopefully we will take up the challenge of making an excellent one. We are asking the government for assistance as well. However, we also have options such as cooperation with other Japanese steelmakers or hydrogen use in a shaft furnace that usually uses natural gas, including the HYL and MIDREX processes.

Q With regard to the 100% hydrogen use in direct reduction, Nippon Steel seems to be rather behind European steelmakers which are building pilot plants. Are you concerned about it?

A It is not yet clear whether Europe's trials using existing shaft furnaces will work well. The project in Sweden requires to use high-grade iron ores, but our challenge is to use general iron ores for the use of 100% hydrogen direct reduction. Our challenge is extremely difficult and the technological development is different from theirs.

◆ CCUS

Q The separation and capture of CO₂ is stated as required external conditions but Nippon Steel is also working on this. You seem to be in an advantageous position, as you are coming close to realizing the capture cost of 2,000 yen per ton of CO₂. Please elaborate about your positioning in this field, which also has chemical companies as players.

A We believe that our CO₂ separation and capture technology is the best one in Japan. We should apply the technology to our business.

Q With regard to CCS, the storage capacity in areas around Japan where the shielding layer is well-secured is said to be around 8 billion tons according to a survey. As Japan emits 1.1 to 1.2 billion tons of CO₂ per year, the storage capacity is estimated to last for about seven years. The cost of exploration of the site and the injection cost are also required. How will Nippon Steel be involved in CCS showing a leadership, representing the BF steelmaking industry which emits a large amount of CO₂?

A Out of the 1.1-1.2 billion tons of CO₂ currently emitted in Japan, those from the carbon used as a fuel will decrease as they are replaced with electric heating and the power source is decarbonized. The CO₂ emissions therefore will be reduced. In the future, the remaining CO₂ emissions will be hundreds of millions of tons emitted by the steel, chemical, and cement sectors. Furthermore, since the steel industry is planning to further reduce CO₂ emissions by using hydrogen, the amount of CO₂ for CCUS in Japan in 2050 is likely to be decreased considerably.

In CCS, we will contribute with our high technology for drilling pipes, but we do not have technology for drilling or gas injection. We must thereby depend on the outcome of development by other specialized companies or national projects.

◆ R&D and capital investment

Q Please give us a breakdown of your planned capital investment of 4-5 trillion yen.

A The breakdown will be determined internally, considering the future BF relining schedule, the commissioning and decommissioning of production lines, the product mix, and other factors. We do have a rough plan, which, however, is likely to be changed many times in the future. So the breakdown cannot be disclosed at this time.

Q As for technological development, there is an aspect of winning and losing in global technology competition, but there is also a concept to have alliances with the leading companies in various countries, thereby accelerate the speed of technology development, share the cost burden, and strive to realize the goal. What do you think about cooperation with other companies globally?

A We may cooperate with overseas companies if technical synergies can be expected, for example. In fact, we are planning joint R&D with Rio Tinto.

Most of the companies have just launched their plans for the first time since last year. We are willing to exchange opinions in a variety of ways and consider international cooperation if it is promising.

◆ **Other**

Q How much is the need for low-carbon steel increasing from customers?

A The need for low-carbon steel is not so strong at the moment, but some customers, especially Europeans, have asked us to supply lower-carbon steel products. We need to consider a strategy for our competitive products, i.e. low-carbon products, and to develop a new price strategy.

Q Nippon Steel's position on carbon pricing and carbon tax need to be understood by society. Do you think that you are to be understood while you have been explaining it to the government and society?

A We need to make more efforts from now on to explain our position on carbon pricing and carbon tax. So far, we discussed with related persons including Prime Minister Suga, Minister of Economy, Trade and Industry, Minister of the Environment. We believe they have mostly understood the policy of the steel industry. There are a lot of people, so we will continue to do our best to get their understanding.

End

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