

## Interview with an Executive Officer | Mazda's Commitment to Carbon Neutrality



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## Mazda's Commitment to Carbon Neutrality

In 2015, the Paris Agreement was adopted as a treaty for proceeding with climate change measures throughout the world including developing countries. Today, climate change is causing a wide variety of natural disasters in a tangible manner. Since the term "climate change" is no longer sufficient for indicating the current situation, the term "climate crisis" has been coined. Various initiatives and the development of new technologies are being accelerated around the world toward realizing a carbon neutral (hereinafter, "CN") society by 2050, and it is expected that this trend will further gain momentum in the future. The role to be played by an automotive manufacturer before and after the production phase is truly significant. In these circumstances, here is an interview with Director and Senior Managing Executive Officer Takeshi Mukai about Mazda's commitment to Carbon Neutrality.

### Important Responsibility to Be Fulfilled by Automotive Manufacturer toward Realizing a CN Society

— Tell us about the significance of Mazda's commitment to carbon neutrality (CN).

Mazda's vision is to bring about a beautiful planet and to enrich people's lives as well as society. With the climate crisis growing year by year, we believe that the achievement of CN, which is closely related to the earth, people, and society, in the future, is a responsibility for the automotive industry that has large impact on CO<sub>2</sub> emissions.

With this background, last January, we announced our ambitious commitment to endeavoring to achieve carbon neutrality (CN) throughout the supply chain by 2050. This aligns with the common target set by many countries and regions including Japan to be achieved by 2050. In addition, we declared this June that we will take on the challenge of achieving CN at our factories around the globe by 2035 as a milestone to the target. To that end, we should not take the perspective of working alone for further efficiency and productivity as we have done so far, but expand our viewpoint to cover every process of vehicle production, including

manufacturing, transport, vehicle usage, and recycling, in the entire supply chain. On top of that, we need to understand the *genba* (actual place) and *genbutsu* (actual thing) correctly, involve all those concerned, including employees, the management, suppliers, and other business partners, in active discussions on CN, and ensure that not only the production but also all the other departments, such as planning, development, purchasing, and logistics, have higher awareness of achieving the target by 2035.

We believe that the first step that we should take is to reduce the use of energy and eliminate wastes throughout the supply chain. Specifically, we will review and optimize not only the processes and equipment usage at our factories, but also the locations of our suppliers and the style of our logistics, thereby striving to contribute to realizing an ideal world without energy loss. This approach will lead not only to the reduction of CO<sub>2</sub> emissions and the elimination of wastes, but also enabling us to respond more effectively to the recent enhancement of the regulations on energy, material procurement, etc., geopolitical risks, and environmental regulations. We believe that we can achieve both the reduction of the use of energy and the increase in efficiency.

### Monotsukuri Innovation for Contributing to Achieving CN in the Area of Production

— Tell us about Mazda's previous initiatives and the current challenges to CN.

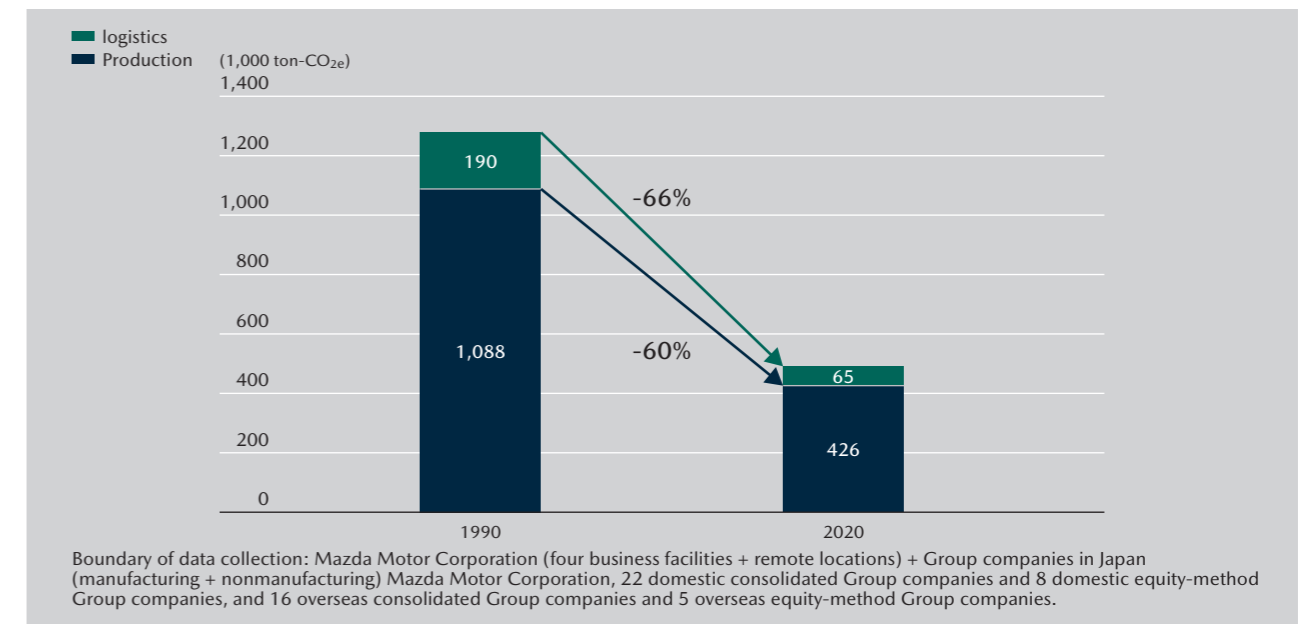
Prior to the Paris Agreement, the Kyoto Protocol was adopted as the first step for an international society to implement measures against climate change. With social call for action against climate change growing by this adoption, we set environmental targets in our business activities as our Medium-Term Environmental Plan, we steadily proceeded with our initiatives toward reducing our impact on the environment. Under the Medium-Term Environmental Plan whose final year was FY March 2021, we reduced the CO<sub>2</sub> emissions from all the Mazda Group's factories, offices and other facilities in Japan by 60% from FY March 1991. In the

area of logistics, including transportation, we made a reduction of CO<sub>2</sub> emissions by 66% from FY March 1991.

These results are underpinned by all-out efficiency ensured in the production process. In this process, painting and casting that is a phase where melted metal is poured into a cast, cooled, and hardened, generate particularly high CO<sub>2</sub> emissions, because they consume much energy. While focusing on the two phases, we have developed unique technologies for all the other phases and continued many innovative measures so far. For painting, we introduced the Three-Layer Wet Paint System in 2002. Previously, each of the three layers of paint (primer coat, colored base coat, and clear top coat) was dried in each process. Under the new system, however, the three layers of paint are applied in succession while wet, before the painting is finished with one-time drying. This system has reduced the energy consumption by approximately 15% compared from the conventional painting method. In 2009, we developed and introduced the Aqua-Tech Paint System. The improved paint and paint application technology have enabled primer coating, one of the above-mentioned three coating phases, to be omitted, resulting in a further reduction of the energy consumption by approximately 10%. Moreover, the system has considerably reduced volatile organic compounds (VOC) emissions and realized an improvement in quality by providing an even better finish for the paintwork. We think that the system contributes not only to reducing the impact on the environment, but also to making improvements in terms of costs and quality.

For casting, we have reduced the thickness and weight of cast items by leveraging our technological assets that we have accumulated by making an effective use of computer-aided engineering (CAE). Consequently, we have reduced not only the use of raw materials, but also the production cycle time (actual time for a single cycle from the beginning of the production process to the end), partly due to the decrease in the material cooling time in the casting phase, and the energy consumption. The benefits from the reduction of the thickness and weight of cast items do not lie only in the production process. The use of less thick and lighter items contributes to the weight reduction of the vehicles for which the items are used, ultimately contributing to increasing the vehicles' fuel economy.

Results of the Medium-Term Environmental Plan (Mazda Green Plan 2020)



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We are proceeding with *Monotsukuri* Innovation with its cornerstone placed not only on the above-mentioned technological innovation in each phase, but also on *monotsukuri* (engineering and manufacturing), including our dedication to improving the efficiency of the entire production process. This innovation is an integrated commitment of highly-efficient development and production. For example, we have established an efficient and flexible production framework. Featuring a Flexible production process, the framework is intended to produce vehicles designed based on a Common architecture concept for sharing the development philosophy across the boundaries of segments (model classes). Specifically, by realizing the modulation of jig and equipment so that they can be used for assembly of various components depending on the model, we have made it possible to produce different types of models on the same production line. Put simply, whether the product to be produced is an internal combustion engine vehicle or an EV, and even if there is difference in the body size or engine layout (longitudinal or transverse engine layout), the same production line can be used for assembly. This enables the operating rate of each production line to remain high, which contributes to enhancing not only production efficiency but also energy efficiency, thereby reducing the impact on the environment. At the same time, this helps to minimize the replacement of the assembly lines to address changes in models and evolutions of materials and production methods, resulting in the minimization of disposal of resources and equipment and loss of energy. These measures are so flexible that they are effective not only for the vehicle production today, but also for an expected EV production in the future. They are technological assets that can serve as the cornerstone for manufacturers when they commit to CN.

We understand that our future challenge is to share and develop the above-explained energy-saving technology together with many business partners and to further accelerate our integrated efforts in entire supply chain. To do so, it is important to establish relationships between individuals so that they can understand and cooperate with one another, regardless of the differences in their companies, fields, positions, etc. As a result of continuing the *Monotsukuri* Innovation internally, we have cases where a development team and a production team have overcome differences in their views by understanding each



other deeply and finally establishing close relationships. We would like to extend such formation of in-house partnership to involve suppliers and sales partners.

### Achievement of CN toward Reducing CO<sub>2</sub> Emissions throughout the Supply Chain and Invigorating Local Economy

— Tell us about Mazda's Medium-Term Management Plan toward CN and the Company's contribution toward realizing a decarbonized society.

To achieve CN, it is never sufficient to make efforts only in the field of production or make improvement only for products themselves. In addition, it is also never sufficient for only individual automotive manufacturers or business partners to make commitment. CN can never be achieved without cooperation of all those involved. To realize CN throughout the supply chain by 2050, we will proceed with initiatives based on the three main themes. The first theme is to make all-out efforts for reducing the use of energy. The second is, while reducing the use of energy, to make a shift to renewable energy sources for the remaining necessary energy. The third is to expand the introduction of CN fuels and consequently curb CO<sub>2</sub> emissions generated not only at the time of manufacturing but also at the time of component transportation. Based on these three main themes, we will make the necessary efforts not as in-house commitment, but as initiatives involving outside business partners, thereby striving to realize CN in the entire supply chain.

For the first theme, the reduction of the use of energy, we will leverage the technological assets that we have built up so far as mentioned before, to further raise efficiency in painting, material, processing and all the other phases. At the same time, we will share our technology and know-how regarding the reduction of the use of energy with local suppliers and other business partners. An in-depth consideration of the structure of the supply chain itself shows that the reduction of CO<sub>2</sub> emissions can ultimately lead to the elimination of wastes in the entire supply chain, covering logistics, and result in the improvement of the operating efficiency. The elimination of wastes will contribute not only to the reduction of costs, but also to the reduction of the impact on the environment through an effective use of materials and other resources and an improvement in energy efficiency, and even to an increase in the quality of the relevant products in some cases. We believe that the elimination of wastes is, thus, beneficial in terms of both the reduction of the environmental impact and management.

For the second theme, the shift to renewable energy sources, we will implement a wide variety of measures, such as low carbonization or decarbonization in power generation at our factories and procurement of power from renewable energy sources. The power output of renewable energy sources, such as solar power, varies greatly from day to day and from day to night. In addition, power is difficult to store. In the manufacturing industry, where a stable energy procurement is needed, it is important to take measures from various perspectives in order to complement the shortfall of each measure, for example by introducing an in-house power generation scheme. Moreover, to procure renewable energy, it is essential for us not to work alone, but to ensure local cooperation with power companies, local governments, and other renewable energy suppliers, as well as with manufacturers, service providers, and other power consumers who need to make a shift toward renewable energy for power generation as we do. In November 2021, the Chugoku Region

Carbon Neutrality Promotion Council was established by the Chugoku Economic Federation as a framework involving both power suppliers and consumers, such as the above-mentioned businesses and governments, toward expanding the supply and demand of CN power in the Chugoku Region. Set as one of the special subcommittees under the Council was the Carbon Neutral Electricity Promotion Subcommittee. Since the establishment, Mazda has been a member of the subcommittee and engaged in various initiatives for making active contribution. We believe that this framework will facilitate match-making between not only local power companies and governments, but also other power generators supplying renewable energy, including households doing so through solar power generation, and power consumers including companies like Mazda, that wishes to procure renewable energy on a stable basis. In other words, the ideal is to establish a good interaction between "secure generation" by those generating power from renewable energy sources and "secure use" by those using such power, thereby ensuring that economic circulation will benefit not only the companies concerned but also households. For global development, since the situation differs depending on the country and region, we would like to provide support for the establishment of the optimum energy cycle model, with consideration given to the region's situation.

For the third theme, the introduction of CN fuels, we are conducting joint research with universities and companies regarding a practical use of next-generation biofuels made from microalgae oil. We are also working with the local consortium Hiroshima Council of Automotive Industry-Academia-Government Collaboration. By doing so, we are verifying CN fuels toward a widespread use of them. There is a global trend of spreading electric vehicles (EVs). As of now, however, EVs have problems with their driving range, charging infrastructure, etc. For an effective achievement of CN, we think that CN fuels, whose chemical properties are equivalent to those of petroleum-based fuels, present an attractive solution because CN fuels can contribute to reducing CO<sub>2</sub> emissions while allowing the existing infrastructure and engines to be used as they are. If such fuels are placed in practical use, they are expected to have great contribution to



CN in corporate activities throughout the supply chain, including transportation of vehicles and components by trucks and other means. Furthermore, in the Super Taikyu, the racing series which we joined last year, we use next-generation biofuels to verify that such fuels are practical enough as a substitute for petroleum-based fossil fuels. We, of course, understand that CN fuels have problems in terms of mass-production, supply infrastructure, etc. Accordingly, we will continue to work with business partners toward achieving a future in which CN fuels will be used by many people.

As explained in each article, our measures for realizing CN are directly connected to the reduction of CO<sub>2</sub> emissions not only at Mazda, but also at those of local companies and other various businesses. In the age to come, when CN serves as the key to business growth in any industries, Mazda strives to realize both the reduction of CO<sub>2</sub> emissions and local economic growth and create a sustainable society together with partners sharing the same vision.

Carbon neutrality plan to be achieved by 2035 at our factories around the globe

