

## ENDEAVOR FOR CARBON NEUTRALITY BY 2050

Mazda announced that it would endeavor to achieve carbon neutrality by 2050. To accomplish this objective, the Company will promote efforts to reduce CO<sub>2</sub> emissions over a vehicle's entire life cycle through its products and business activities.

### Efforts Regarding Product and Technology Development

#### Approach to Product Environmental Performance

As vehicle ownership continues to expand around the world, automobile manufacturers must redouble their efforts to achieve cleaner exhaust emissions, and improve fuel economy in order to cut CO<sub>2</sub> emissions and help reduce the world's dependence on increasingly scarce fossil fuels. Mazda considers it necessary to develop a multi-solution approach to automobile-related environmental issues that takes into account various factors such as regional characteristics, vehicle characteristics and types of fuel.

#### Addressing Global Warming

Mazda sees reducing emissions of CO<sub>2</sub> and other greenhouse gases over the vehicle's entire lifecycle — including manufacturing, use and disposal — as one of its top priorities and a duty of automotive industry. The Company wants to maximize its contribution by considering not only "tank-to-wheel" emissions that occur while driving but also "well-to-wheel" emissions, including fuel extraction, refining and power generation (well-to-tank). Offering a number of powertrain options in consideration of each region's energy sources and power generation methods will allow Mazda to make the optimum contribution to CO<sub>2</sub> emissions reductions by region.

#### Life Cycle Assessment (LCA)

Life Cycle Assessment (LCA) is a method for calculating and evaluating the environmental influence of vehicles across their entire life cycle through the purchase of materials, manufacture, use, recycling, and final disposal. Since 2009, Mazda has adopted LCA as a means of determining the time required to reduce the environmental impact of vehicles in their life cycle, and has been actively working to reduce the environmental impact at each stage of the life cycle. The Company is also promoting evaluation of the practicability and reliability of new technologies for environmental performance in compliance with the methods specified in the international standards (ISO14040 and ISO14044).

#### Multi-solution Oriented Technology Development from the Perspective of LCA

In FY March 2019, the Company assessed the life cycle CO<sub>2</sub> emissions from internal combustion engine vehicles and electric vehicles (EVs) in five regions of the world. The results revealed that the significance of CO<sub>2</sub> emissions from internal combustion engine vehicles and EVs during their life cycles depends on the electric power supply status, fuel/electrical power cost, total mileage, and other factors in each region. In FY March 2020, these LCA results were compiled into academic papers and presented at academic conferences.

#### The Building-Block Strategy

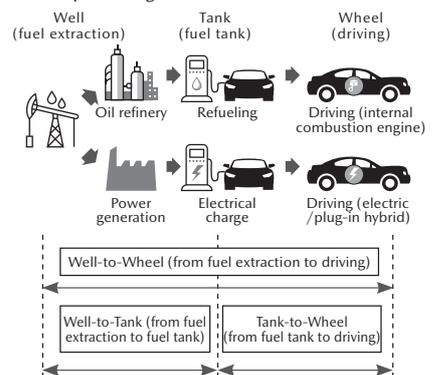
Mazda adopts the Building-Block Strategy to realize its goal of reducing CO<sub>2</sub> emissions and raising the average fuel economy of Mazda vehicles sold worldwide. The Building-Block Strategy calls for the commercial introduction of electric, plug-in and other electrified vehicles (EVs) with the combination of optimal control technology and efficient electrification technologies in consideration of each country or region's energy resources, regulations, power generation methods, infrastructure, and so on. Through this Building-Block Strategy and advances in process innovations, such as Model-Based Development (see p. 94), and Monotsukuri Innovation (see p. 93), Mazda will, despite limited management resources, offer products and technologies that exceed customers' expectations.

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#### The "Well-to-Wheel" Perspective

Make efforts to reduce CO<sub>2</sub> emissions from the perspective of "well-to-wheel," with the aim of reducing emissions over a vehicle's entire lifecycle.

##### Conceptual diagram of Well-to-Wheel\*



\* Where fossil fuel is extracted and used to drive a vehicle.

b

#### Conference presentation/Publication of paper on Mazda's LCA

##### Conference presentation:

The 9th International Conference on Life Cycle Management (August 2019)

Subject: Estimation of CO<sub>2</sub> Emissions of Internal Combustion Engine Vehicle and Battery Electric Vehicle Using LCA

##### Publication of academic paper:

Sustainability magazine, 2019, Volume 11, Issue 9, p.2690

Subject: "Estimation of CO<sub>2</sub> Emissions of Internal Combustion Engine Vehicle and Battery Electric Vehicle Using LCA"

<https://doi.org/10.3390/su11092690>

## Continuous Evolution of Skyactiv Technology

The term Skyactiv Technology covers all Mazda's innovative technologies. Mazda redesigned these technologies from scratch, enhancing the efficiency of powertrain components, such as the engine and transmission, reducing vehicle body weight, and improving aerodynamics. The number of models featuring Skyactiv Technology has steadily increased since the first Skyactiv-G engine was introduced in 2011 in the Demio (known as Mazda2 overseas). Following the adoption of the technology in the CX-5 in 2012, the number of models that fully incorporate Skyactiv Technology has increased. Starting in 2019, Mazda has been introducing new-generation technologies, including the Skyactiv-X engine, set to become the world's first commercial gasoline engine to use compression ignition.\*<sup>1</sup> This unique new-generation engine combines the advantages of gasoline and diesel engines to achieve outstanding environmental performance and uncompromised power and acceleration performance. In FY March 2021, Mazda introduced vehicles newly equipped with its electrification technology, e-Skyactiv. The Company will also continue development of Skyactiv Multi-Solution Scalable Architecture, a platform that supports electrification technology.

## Improving Fuel Economy

Mazda is working to improve fuel economy in order to help our customers save money and reduce the use of fossil fuels, which is a cause of global warming. Prioritizing improvements in real-world fuel economy, the Company has adopted cylinder deactivation and other technologies that suppress fluctuations in fuel consumption rooted in the way the car is used and environmental factors such as air temperature. Mazda has also employed the mild hybrid system, Mazda M Hybrid, which realizes enhanced fuel economy and a pleasant driving experience by maximizing performance of the engine that has been improved in pursuit of ultimate efficiency, through pairing with efficient electrification technologies.

## Development of Electrification Technology

After taking into account the appropriate power source for vehicles, the energy situation, the power generation mix, and other factors in each region, Mazda is promoting the development of electrification technology to provide customers in each region with the best solution. The Company assumes that, through this initiative, 100% of its products will have some level of electrification, and its EV ratio will be 25% by 2030. In the development of electrification technology, Mazda follows its unique "human-centered" approach that sets priority on human characteristics and sensibilities in order to make the most of the advantages of electric drives.

## Electric Vehicles

Mazda is also committed to developing electric vehicles (EVs) in line with its "Sustainable Zoom-Zoom 2030" vision. Based on the Well-to-Wheel perspective, the Company believes that its electric driving technology for EVs is the optimal solution for a region with sufficient clean energy resources or a region with air pollution control norms. Mazda is promoting the commercialization of EVs full of driving pleasure in these regions. In addition, from the perspective of a vehicle's life cycle, Mazda desires to contribute to substantive reduction of the global environmental impact by installing appropriately sized batteries. In October 2019, the Company unveiled its first mass-production EV, the Mazda MX-30, which was launched globally starting in September 2020.

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## C Features of the Skyactiv-X

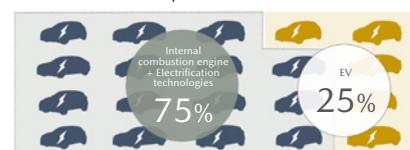
	Gasoline engine	Skyactiv-X	Diesel engine
Fuel economy	Fair	Good	Good
Torque	Fair	Good	Good
Response	Fair	Good	Good
Output (expansion)	Good	Good	Fair
Heating	Good	Good	Fair
Exhaust purification	Good	Good	Fair

## d SKYACTIV TECHNOLOGY

Name	Features
SKYACTIV-G	Highly efficient direct-injection gasoline engine
SKYACTIV-D	Highly efficient clean diesel engine
SKYACTIV-X	New-generation gasoline engine
SKYACTIV-DRIVE	Highly efficient automatic transmission
SKYACTIV-MT	Highly efficient manual transmission
SKYACTIV-VEHICLE ARCHITECTURE	New-generation vehicle structural technologies
SKYACTIV-VEHICLE DYNAMICS	Vehicle dynamics control technologies
e-SKYACTIV	Electrification technologies

e

## e Globally 100% electrification in 2030 25% of total production consists of EVs



f

## f Mazda MX-30 EV Model



\*1 As of August 2017, according to Mazda data.

## Virtual Power Plant Demonstration Experiment for Reuse Technology of Electric Vehicle (EV) Drive Batteries

Mazda, together with Chugoku Electric Power Co., Inc., and Meidensha Corporation signed a joint research contract to build a stationary-type storage battery system, which reuses driving-force batteries of electric vehicles (EVs), and conduct a demonstration experiment on a virtual power plant (VPP)\*<sup>1</sup> based on the system. The aim of the demonstration experiment is to verify the possibilities of reusing EV drive-force batteries and utilize them as VPP resources. As part of the experiment, the three companies will build a system to aggregate and control several such batteries and integrate them with other distributed energy sources, including renewable energies, to evaluate the VPP's responsiveness and the degradation properties of storage batteries, among other aspects. Through this experiment, they intend to gain technologies to optimize the use of renewable energy and control the balance between the power demand and supply. Mazda will continue these undertakings in order to develop technologies that will lead to new services derived from the fusion of vehicle elements and energy, and contribute to the global environment and local communities.

## Promoting Technology Development for Alternative Fuels

One of the ways Mazda is addressing global warming through its products is by promoting the research and development of technologies compatible with alternative fuels, including biofuels and synthetic fuels, so that countries and regions can use energy sources that suit their circumstances.

### Compatibility with Bioethanol and Bioethanol Mixed Fuel

Mixed fuels, which include bioethanol or biodiesel (fatty acid methyl ester [FAME]) made from plant materials, are attracting attention for their effectiveness in reducing CO<sub>2</sub> emissions. Mazda sells vehicles that are compatible with these fuels.

### Efforts for the Spread of Next-generation Automotive Liquid Fuel

Mazda believes that, in some regions, liquid fuel will be an efficient and useful energy source for automobiles and other movable bodies equipped with internal combustion engines even in the future. Notably, next-generation automotive bio-liquid fuels (hereinafter "next-generation biofuels") and other renewable liquid fuels made from microalgae oil and waste edible oil have excellent sustainability since they do not compete with food production and do not cause deforestation, unlike conventional biofuels made from food crops such as corn. For this reason, the Company considers next-generation biofuels to be promising energy sources that can completely replace petroleum-based fuels.

In April 2017, Mazda opened a joint research course called the "Next-generation Automotive Technology Joint Research Course—Algae Energy Creation Laboratory" at a graduate school of Hiroshima University. With support of the "Program on Open Innovation Platform with Enterprises, Research Institute and Academia (OPERA)" started in 2016, sponsored by the Japan Science and Technology Agency (JST), the Laboratory advanced various research projects, including improvement in algae performance using genome editing technology, in order to create renewable bio-liquid fuel from micro algae.\*<sup>2</sup>

Since June 2018, Mazda has participated in the Hiroshima "Your Green Fuel" Project, a demonstration project for next-generation biofuels jointly run by the Hiroshima Council of Automotive Industry-Academia-Government Collaboration and Euglena Co., Ltd.\*<sup>3</sup>

Mazda strives to establish an entire biofuel value chain—from material manufacture and supply to the use of carbon-neutral next-generation biodiesel fuels—as a "local production for local consumption model" within the Hiroshima area. In August 2020, the Company confirmed that such fuels had the same performance as petroleum-derived diesel oil, and began to use them for company-owned vehicles equipped with diesel engines.\*<sup>4</sup>

In December 2020, Mazda became a member of the Institute of Microalgal Technology, Japan (IMAT), which is conducting a NEDO project on bio-jet fuel derived from micro algae on Osaki Kamijima Island, as part of efforts to resolve issues related to the commercialization of algae biofuels based on the Company's research to date.

Mazda will continue to proactively promote industry-academia-government cooperation and tie-ups between companies to provide technical support for the spread of next-generation biofuels (see pp. 98-102).



### Sales Status of Vehicles Compatible with Bioethanol/Biodiesel Mixed Fuels\*<sup>1</sup>

Japan: Compatible with B5\*<sup>2</sup> - Mazda2, Mazda3, Mazda6, CX-3, CX-30, CX-5  
 Thailand: Compatible with E20\*<sup>3</sup> - Mazda2, CX-8  
 Compatible with E85\*<sup>4</sup> - Mazda3, CX-3, CX-30, CX-5

\*1 Subject to variation depending on specifications

\*2 Diesel mixed with 5% biodiesel fuel

\*3 Gasoline mixed with 20% ethanol

\*4 Gasoline mixed with 85% ethanol

\*1 A VPP gathers the numerous dispersed power sources owned by general households or factories, such as renewable energy, EVs, and batteries, and integrates and controls them as if they were a single generation plant.  
<https://newsroom.mazda.com/ja/publicity/release/2019/201910/191017a.pdf> (Japanese only)

\*2 <https://newsroom.mazda.com/ja/publicity/release/2017/201704/170428c.html> (Japanese only)  
 Ended March 2021

\*3 <https://newsroom.mazda.com/ja/publicity/release/2018/201806/180613a.html> (Japanese only)

\*4 <https://newsroom.mazda.com/ja/publicity/release/2020/202008/200804a.html> (Japanese only)

## Development of Resin Material for Auto Parts for Weight Reduction

In addition to Skyactiv Technology, which is developed with the whole concept of weight reduction, Mazda actively adopt new technologies for reducing weights in detailed parts. Mazda will continue to pursue weight reduction by using resin, aluminum, ultra-high tensile steel and other materials having both lightness and strength.

### Offers a Bumper Which Is One of the Lightest in Its Class

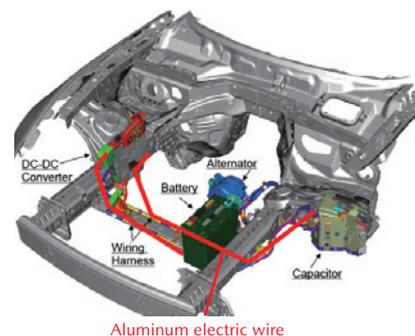
Mazda has developed a new resin material for auto parts that can maintain the same level of rigidity as conventional materials while trimming vehicle weight. Because the new resin enables the manufacture of thinner parts and thus a significant reduction in the amount of material used, when used for front and rear bumpers, this resulted in the reduction of weight by around 20%. In the manufacturing process, thinner parts have enabled the shortening of cooling time upon shaping and halved the shaping time of bumpers partly due to the utilization of CAE analysis techniques. This resulted in a drastic reduction of the amount of energy used in manufacturing. Mazda further reduced the specific gravity of this new resin bumper by around 4%. The resultant bumper, one of the lightest in its class<sup>\*1</sup>, has been mounted on a series of new-generation models. The new bumper was attached to the CX-30 in FY March 2020 and to the MX-30 in FY March 2021.

### Development of Light Weight Wiring Harness Using Aluminum Electric Wire

Mazda has developed a lightweight wiring harness using aluminum electric wire, which enables the Company to achieve vehicle weight reduction while maintaining connection reliability (quality). Since equipping the Roadster/MX-5, launched in 2015, with this lightweight wiring harness, the Company has been increasing the number of models<sup>\*2</sup> that incorporate the material. In FY March 2021, the lightweight wiring harness was adopted in the MX-30.

h

h Aluminum electric wire of the Roadster/MX-5  
 Connection between capacitor and DC-DC converter  
 Connection between DC-DC converter and battery



<sup>\*1</sup> 1,500 to 2,000 cc class, as of March 2017, according to Mazda data

<sup>\*2</sup> Models adopting the lightweight wiring harness (as of June 2021): Roadster/MX-5, Mazda3, CX-30, Atenza/Mazda6, CX-5, CX-8, CX-9, and MX-30

## Efforts Regarding Manufacturing and Logistics

Mazda promotes the efficient use of energy while aiming to reduce CO<sub>2</sub> emissions in the areas of manufacturing and logistics.

### 【Manufacturing】Energy-Saving / Measures to Reduce CO<sub>2</sub> Emissions

#### <FY March 2021 Results (compared with FY March 1991)>

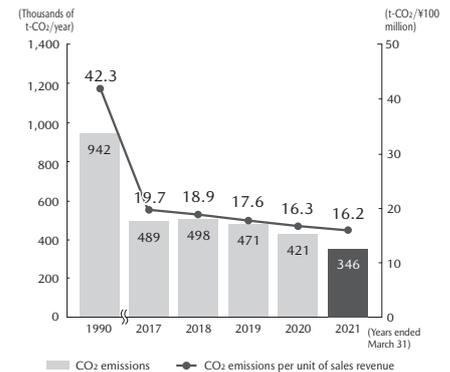
- Total CO<sub>2</sub> emissions from Mazda's four principal domestic sites\*<sup>1</sup> reduced by 63.3% compared with FY March 1991 (346 thousand t-CO<sub>2</sub>)
- Emissions per unit of sales revenue reduced by 61.7% (16.2 t-CO<sub>2</sub>/100 million yen)  
Production sites in Japan and abroad promote activities to improve the facility operation rate and shorten the cycle time, and take measures to cut losses at each step from production to consumption of energy.

Under "Monotsukuri Innovation," Mazda strives to reduce per-unit energy consumption. The "Monotsukuri Innovation" is the initiative to achieve a breakthrough in "sharing a completely new concept beyond the boundaries of models," in order to improve quality and brand value, as well as to increase profit margins, while flexibly responding to the requirements for the manufacture of several models and changes in production volume (see p. 93).

- Material: Reduced material weight by using thinner casted and forged parts, and reduced energy consumption by shortening the forging cycle time and downsizing the capacity of melting and heat treatment equipment.
- Processing and assembly: Evolved conventional flexible manufacturing lines to realize higher-efficiency, mixed flow production. Also pursued more efficient manufacturing by ensuring a smooth flow of lines and by consolidating and integrating lines.
- Press: Reduced the amount of scraps generated in manufacturing of press parts, and retrieved parts from scraps to reduce the amount of use of steel sheets. Also achieved multi-pressing, which performs molding of several parts using a single die, resulting in both integration of processes and reduction of energy consumption.
- Paint: Completed the introduction of the Aqua-Tech Paint System, a new water based painting technology realized through the integration of painting functions and high-efficient panting technologies, into the Ujina Plant No.2. Also introduced the Aqua-Tech Paint System to global production sites, resulting in reduced energy use and a substantial reduction of VOC (volatile organic compound) emissions.

i j

#### i CO<sub>2</sub> Emissions from Mazda's Four Principal Domestic Sites/CO<sub>2</sub> Emissions per Unit of Sales Revenue



\* CO<sub>2</sub> emissions at Mazda's four principal domestic sites are calculated using the CO<sub>2</sub> coefficient for each year based on standards from the Japan Automobile Manufacturers Association Inc. (JAMA) (Commitment to a Low Carbon Society). Data for each fiscal year were recalculated according to the coefficient change of September 30, 2020. The power coefficient for FY March 2021 was undetermined as of July 10, 2021; the FY March 2020 power coefficient is used for FY March 2021.

\* The figures of the amount of CO<sub>2</sub> emissions at Mazda's four principal domestic sites in FY March 2021 have been verified by a third party (see p. 134).

#### j Energy Consumption Breakdown at Mazda's Four Principal Domestic Sites

	Unit: (Thousands of GJ/year)					
	FY March 1991	FY March 2017	FY March 2018	FY March 2019	FY March 2020	FY March 2021
Electricity	4,921	6,124	6,248	6,115	5,790	4,946
Industrial steam	0	1,236	1,253	1,165	1,143	1,054
Coal	4,967	0	0	0	0	0
Coke	766	168	171	218	165	93
Fuel oil A	596	15	14	24	22	21
Fuel oil B	11	0	0	0	0	0
Fuel oil C	1,168	7	6	5	3	10
Gasoline	193	52	54	59	55	47
Kerosene	101	11	15	5	2	1
Diesel	81	46	48	40	38	33
LPG	989	55	56	55	53	45
City gas	45	949	955	882	775	588
Total	13,838	8,663	8,820	8,568	8,048	6,840

\* Amount of heat emission at Mazda's four principal domestic sites is calculated using the CO<sub>2</sub> coefficient for each year based on standards from the Japan Automobile Manufacturers Association Inc. (JAMA) (Commitment to a Low Carbon Society). Past data was recalculated according to the change of the coefficient.

\*<sup>1</sup> Head office (Hiroshima); Miyoshi Plant; Hofu Plant, Nishinoura District; Hofu Plant, Nakanoseki District (including non-manufacturing areas such as product development)

## Use of Renewable Energy

Mazda promotes the use of renewable energy for in-house power.\*1

- Solar panels were installed at the Hiroshima Plant, and operation of the solar power generation system was started in July 2021. Electricity generated by this system is used to charge the batteries of MX-30 EV models produced at the plant and for other manufacturing processes there.
- At the Hofu Plant, solar-powered units have been introduced in some corridor lighting.
- A solar power system is installed on the roof of the radio wave experiment building of the Miyoshi Office. The amount of electricity generated by this system in FY March 2021 was 28.1 MWh. Electricity generated by this system is used to provide power and lighting for the building, thereby continuously contributing to the reduction of CO<sub>2</sub> emissions.
- Mazda de Mexico Vehicle Operation (MMVO) in Mexico installed outdoor solar lighting, thereby promoting effective use of renewable energy using solar power and LEDs. In FY March 2021, MMVO is using 554 units in total. Currently, 7.4% of the energies purchased by MMVO are clean energies, including renewable energies.

### TOPICS Energy Conservation Grand Prize Award in Japan: Mazda Receives the Grand Prize of the Minister of Economy, Trade and Industry and the Prize of the Chairman of ECCJ

In December 2020, winners of the 2020 Energy Conservation Grand Prize Award of Japan (organized by the Energy Conservation Center, Japan [ECCJ] and supported by the Ministry of Economy, Trade and Industry)\*1 were announced, and Mazda's "VOC recovery technology for simultaneous reduction of CO<sub>2</sub> and VOCs in automobile coating" won the highest honor, the Grand Prize of the Minister of Economy, Trade and Industry (Category of Energy Conservation Best Practices at Workplaces). At the same time, the Company received the Prize of the Chairman of ECCJ (Category of Energy Conservation Best Practices at Workplaces) for its "promotion of energy conservation activities for air conditioning in office buildings through the visualization of results." The VOC recovery technology, which won the Grand Prize of the Minister of Economy, Trade and Industry (Category of Energy Conservation Best Practices at Workplaces), is a technology that realizes an energy-efficient closed system by recovering and processing VOCs generated during the coating drying process using a heat pump. The "promotion of energy conservation activities for air conditioning in office buildings through the visualization of results," which won the Prize of the Chairman of ECCJ (Category of Energy Conservation Best Practices at Workplaces), is a practice of developing a new evaluation index to visualize the results of energy conservation through operational improvements, which are difficult to evaluate quantitatively. Mazda will continue to make efforts to reduce CO<sub>2</sub> emissions through various innovations.

\*1 The Energy Conservation Grand Prize Award in Japan is an awarding program that widely recognizes excellent energy conservation activities and advanced energy conservation products achieved by technological development, etc., with the aim of contributing to the spread of energy conservation awareness and the promotion of energy conservation products.

#### ● Grand Prize of the Minister of Economy, Trade and Industry



#### ● Prize of the Chairman of ECCJ



\*1 Refers to natural energy sources that can be used continuously without being depleted, such as electricity generation using solar, wind, geothermal, hydroelectric or biomass power, or direct solar heating. These types of energy generate zero or negligible CO<sub>2</sub> emissions.

**【Logistics】Initiatives for Reducing CO<sub>2</sub> Emissions during Product Shipment**

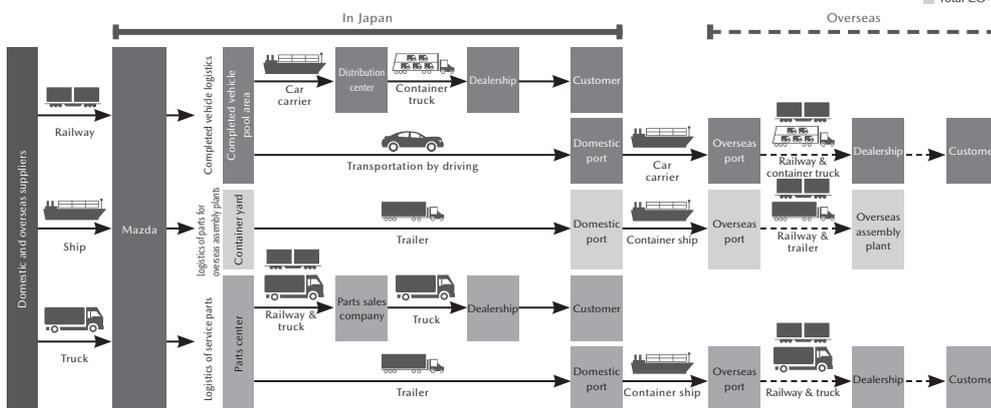
Mazda is working with logistics companies, dealerships, and other automakers throughout Japan to provide customers with the volume they require, with the precise timing they expect, while reducing CO<sub>2</sub> emissions during product shipment through highly efficient logistics across the entire supply chain.

**<FY March 2021 Results>**

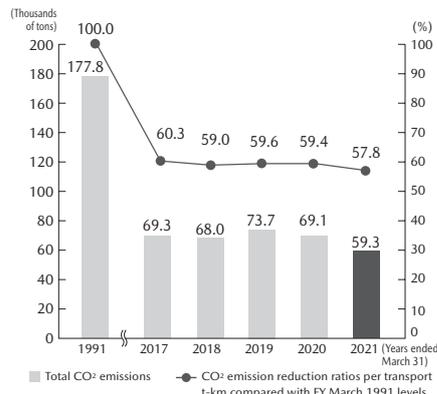
- Total domestic transportation volume was approximately 450 million ton-kilometers. This represents a 42.2% reduction in transportation CO<sub>2</sub> emissions per ton-kilometer compared with FY March 1991 levels, far exceeding the Company's target of 33% or more.

■ Range of the tracking capability for CO<sub>2</sub> emissions in the supply chain

( → Current tracking line    - - - - -> Tracking line to be extended by 2030)



**k CO<sub>2</sub> Emissions and Reductions for Logistics (in Japan)**



**<Specific Initiatives>**

Efforts to focus on the following three pillars of logistics are being taken by visualizing in detail the hidden logistics issues in each process on a global level.

**1. Hub-and-spoke system for transportation of completed vehicles and service parts\*1**

■ Reforming transportation for completed vehicles

<In Japan>

Mazda has been continuously reviewing the operation of car carriers (hereinafter referred to as "domestic vessels") according to their shipping volumes to improve loading efficiency through initiatives such as promoting collaborative transportation with other companies by making more effective use of the domestic vessels on the return journey. In addition, the Company is promoting the loading of completed vehicles into ships as directly as possible from their manufacturing sites. Through these efforts, Mazda succeeded in curbing around 340 tons of CO<sub>2</sub> emissions in FY March 2021. To further reduce CO<sub>2</sub> emissions, the Company is now planning to stop transportation by container trucks between the Hiroshima Plant and the Hofu Plant and use domestic vessels instead.

<Overseas>

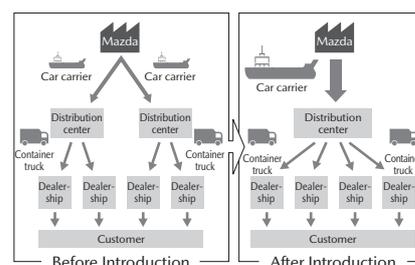
With regard to overseas transportation, Mazda has been deliberating with a shipping company as to using overseas car carriers that use fuels with fewer CO<sub>2</sub> emissions, with a view to introducing them in a few years. The Company also contributes to the reduction of CO<sub>2</sub> emissions by producing and transporting only the vehicles that are needed by refining its production plans in line with market trends.

■ Improving the ratio of modal shift for the transportation of service parts

Mazda is striving to improve the rate of modal shift regarding the transportation of service parts.

The Company has also used large returnable containers, originally introduced to transport parts overseas, for domestic transportation to improve the loading efficiency of JR containers, thereby contributing to the reduction of CO<sub>2</sub> emissions. In FY March 2021, Mazda's railway transportation rate was 27%, reducing CO<sub>2</sub> emissions by around 248 tons.

**Hub-and-Spoke System**



\*1 In the "hub-and-spoke" system, distribution centers around the country (hubs) act as bases for delivering completed vehicles to dealerships (spokes). In transporting service parts, parts suppliers serve as the hubs and vehicle dealerships the spokes.

## 2. “Straightening” of logistics network

### ■ Straight logistics without distribution centers (Vanning in plant)

Mazda is working to enlarge the scope of straight logistics—i.e., after the manufacture of parts to be exported to overseas assembly plants is completed, they are packaged and loaded into containers at the same location without the need for shipment between production locations and distribution centers. Now this straight logistics system has been expanded to cover engines, transmissions and auto body parts produced at the Hiroshima Plant and the Hofu Plant. In FY March 2021, by applying this system to a broader range of parts destined for the Mexico plant, the Company reduced CO<sub>2</sub> emissions by around 9 tons.

### ■ Reducing the transportation distance for procured parts for overseas production

Previously, the parts procured in Asia to be used for overseas production were transported via Japan to the Mexico plant. In July 2016, this was changed to direct transportation, so that now these parts are transported from existing distribution centers in Thailand and China, leading to a reduced transportation distance. In Japan, Mazda has been landing parts imported from overseas at the ports close to production sites, in order to reduce the transportation distance between the Hiroshima Plant and Hofu Plant. In FY March 2021, by applying this measure to a broader range of parts, the Company further reduced CO<sub>2</sub> emissions by around 6 tons.

### ■ Reducing the transportation distance for repair parts

When the Mexico plant started to run, repair parts were transported via North America to Europe, since their transportation volume was small. Five years after the plant’s startup, however, the volume was on the rise. For this reason, the shipping method was changed to direct transportation to Europe to reduce the transportation distance through straight logistics. By setting up a distribution center in Mexico in FY March 2020, the Company succeeded in reducing CO<sub>2</sub> emissions by around 3,400 tons in FY March 2021. The Company is also planning to localize the production of some parts to further reduce CO<sub>2</sub> emissions.

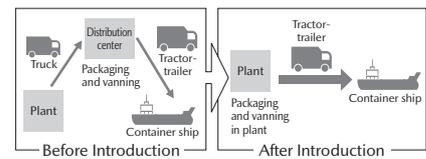
## 3. Continuous improvement of transportation efficiency for procured parts

For domestically produced parts, deployment of the Milk-Run system\*<sup>1</sup> was completed throughout Japan by FY March 2008. Today, Mazda is introducing the same system in overseas production sites, with deployment in the Mexico plant completed in FY March 2014, and in the transmission plant in Thailand completed in FY March 2016, aiming to reduce CO<sub>2</sub> emissions by further promoting efficiency in the purchasing and logistics processes across the entire supply chain. For trucks transporting procured parts in Japan, the Company introduced the Cloud-based Transportation/Delivery Progress Management Service for Logistics Operators\*<sup>2</sup> in 2016. This service has been proven effective in reducing delivery time and costs and improving the quality of transportation, as well as in mitigating the burden on drivers, easing traffic congestion, and reducing CO<sub>2</sub> emissions through efficient transportation. The Company plans to apply this service to 600 vehicles in five years after its launch. In FY March 2021, the number of vehicles covered by this service increased to 673. By utilizing this system and reviewing cargo handling operations, Mazda is also working to improve truck turnover rates and reduce truck waiting time in the plants.

At the same time, Mazda is now introducing new standard containers for parts to be transported in containers from Japan to overseas plants, to eliminate the empty space that used to be inside the containers. By improving the container filling rate, it will be possible to reduce the number of containers and the number of transportation truck services. The Company is also working to reduce the inventory and transportation of unnecessary parts by shipping the parts to overseas plants at the timing they are needed. Through these efforts, Mazda aims to reduce CO<sub>2</sub> emissions.

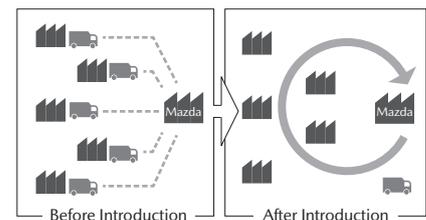
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### m Logistics without Distribution Centers (Vanning in plant)



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### n Milk-Run System



\*1 A method in which a single truck visits multiple suppliers to collect supplies. Named after truck routes in rural areas, which picked up milk from each farm.

\*2 The Cloud-based Transportation/Delivery Progress Management Service for Logistics Operators, developed by DOCOMO Systems, Inc.