CHALLENGE! 1 New Vehicle Zero CO_2 Emissions Challenge

Hino Motors' Environmental Technologies

Existing technologies

Trucks and buses are made to transport large numbers of people or goods over relatively long distances, and fuel and energy are needed to do that. As a result, emission of CO_2, a greenhouse gas, is inevitable.

Unique aspects of trucks and buses include their comparatively large size and loading capacities, the long distances they travel, and their wide array of uses and places where they are used. Taking into account these varying conditions, Hino Motors considers what types of environmental technologies are most suitable. By providing users with optimally equipped vehicles, the Company hopes to help curb global warming.

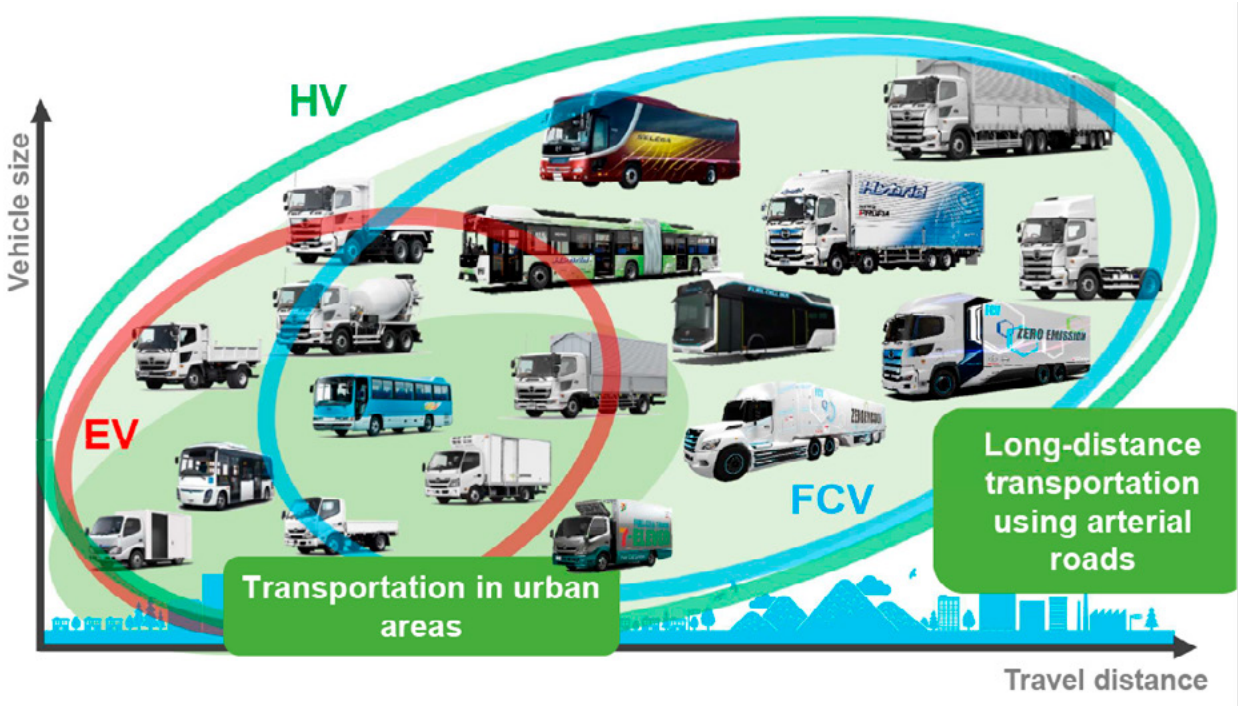
Initiatives for Next-generation Vehicles

Next-generation vehicle | Existing technologies | More efficient

Hino Motors capitalizes on the unique benefits of electric vehicles such as clean exhaust gas emissions and quietness of ride to create next-generation vehicles that meet customers' and society's needs.

Hino primarily pursues development for applications in urban areas such as light-duty trucks and buses and route buses.

Hino will continue to develop vehicles along with related technologies including batteries, while seeking to reinforce social infrastructure, such as charging facilities and hydrogen stations, in cooperation with relevant organizations. The ultimate goal is to offer electric or hydrogen power options on all models.



Initiatives for reducing CO_2 emissions by 90%

Hino Motors' Highly Promising Technologies

(technologies scheduled for practical implementation, technologies scheduled for trial experiments)

◆ BEV (electric vehicles)

● Light-duty BEV truck

Hino Motors is developing an ultra-low-floor, front-wheel-drive BEV. It achieves an ultra-low floor measuring approximately 400 mm, which is half the ground clearance of conventional rear-wheel drive vehicles. This dramatically improves cargo handling and accessibility.

The design also succeeds in making deliveries easy with a walk-through structure.

● Light-duty BEV bus

The Hino Poncho has been equipped with an electric motor to achieve green transportation while retaining its user-friendly universal design and optimum form for community buses. The model succeeds in being considerate of people and the environment, while contributing to sustainable community transportation for the future.

◆ FCEV (fuel cell vehicles)

● Heavy-duty FCEV truck

Heavy-duty trucks used for highway transport are required to have sufficient driving range, load capacity, and fuel supply for short periods. Hino Motors believes fuel cell systems using high-energy-dense hydrogen are effective. The heavy-duty FC truck being developed has a target driving range of approximately 600 km and aims for both environmental performance and advanced-level commercial vehicle practicality.

● Heavy-duty FCEV truck (for North America)

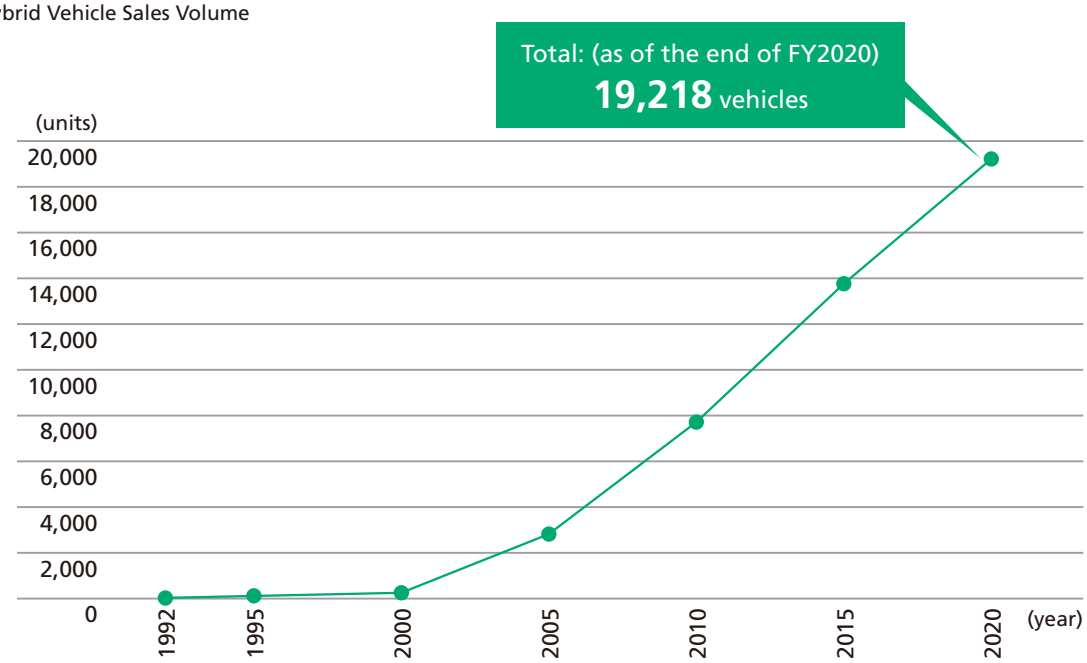
Hino Motors is developing a high-performance, heavy-duty truck that operates without emitting CO_2 by using the chassis of the new model HINO XL Series in combination with fuel cell technology from Toyota.

Evolution of the Hybrid Vehicle

Next-generation vehicle | Existing technologies | More efficient

Ever since Hino Motors commercialized and sold the world's first hybrid bus in 1991, cumulative global sales of hybrid vehicles surpassed 19,000 as of the end of fiscal 2020.

● Hybrid Vehicle Sales Volume



Hino 300 Series (for overseas market)

Hino Blue-Ribbon Hybrid Articulated Bus

The heavy-duty Hino Profia Hybrid truck

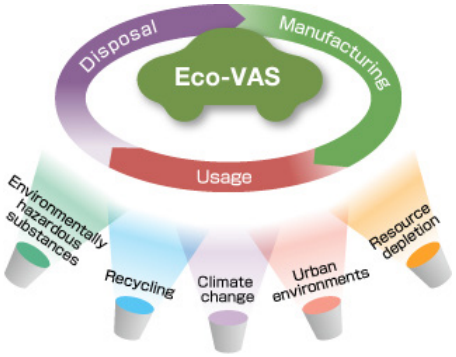
CHALLENGE! 2 Life Cycle Zero CO_2 Emissions

Environmental Load Reduction Activities Based on Life Cycle Assessment (LCA)

At Materials manufacturing stage | At the Distribution stage | At the Disposal and recycling stage

Factors such as measures for new regulations, vehicle performance enhancement efforts, and others can increase environmental burden during the process of manufacturing. Hino Motors is aiming to further reduce its environmental load by employing the Eco-Vehicle Assessment System (Eco-VAS*), an environmental product management system that incorporates a lifecycle approach during product development.

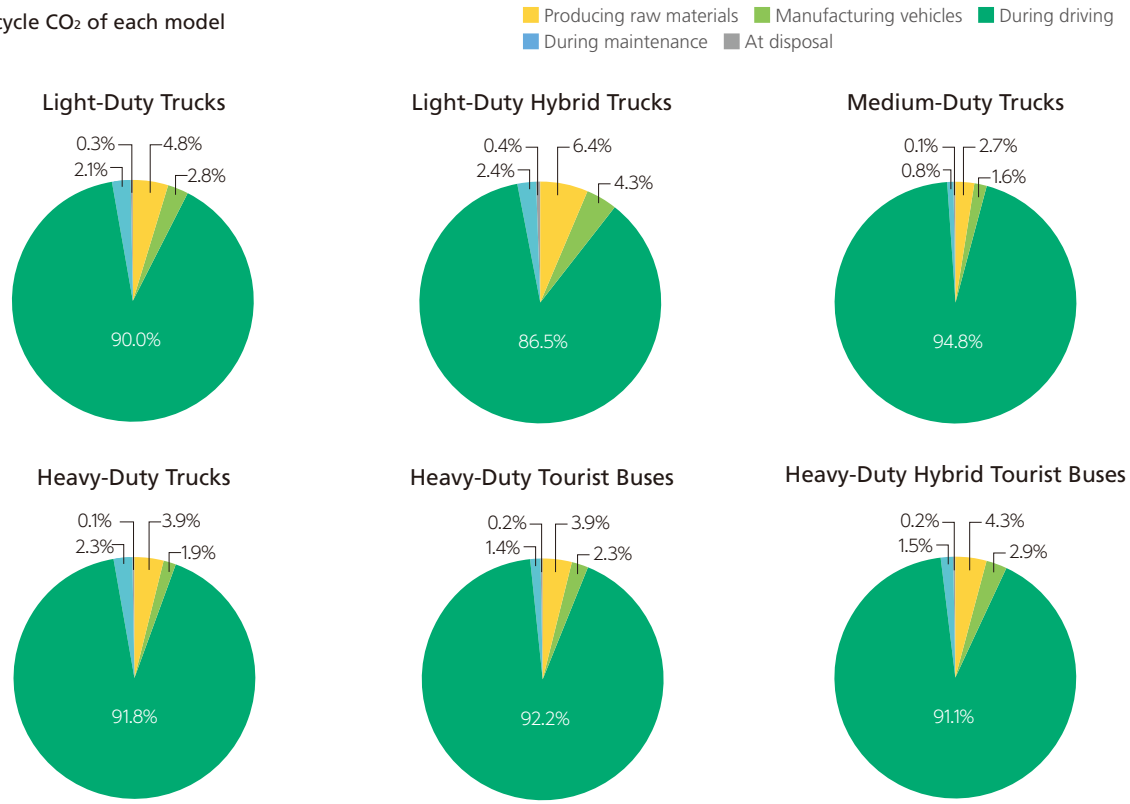
*Eco-VAS is a framework for setting targets to reduce the environmental burden from the products from the early vehicle development stage and for making steady reduction of environmental burden based on LCA methods.



◆ LCA Initiative

Life Cycle Assessment (LCA) is an analysis method that quantitatively measures environmental impact throughout the life cycle of products such as trucks and other vehicles, from manufacturing to use and eventual disposal. Hino Motors has been employing LCA since 2008 to track CO_2 emissions over the life cycle of its truck and bus models. The results for each type of vehicle are shown in the charts below.

● Lifecycle CO_2 of each model



*The graphs are results computed by Hino's proprietary calculation conditions, and may not reflect actual emissions measurements. Fuel efficiency uses the heavy-duty vehicle mode's fuel-efficiency value. Evaluation results show the entire lifecycle of each as a percentage of 100%

Reducing CO_2 Emissions in Distribution Operations

Logistics

◆ Initiatives to reduce CO_2 emissions from distribution

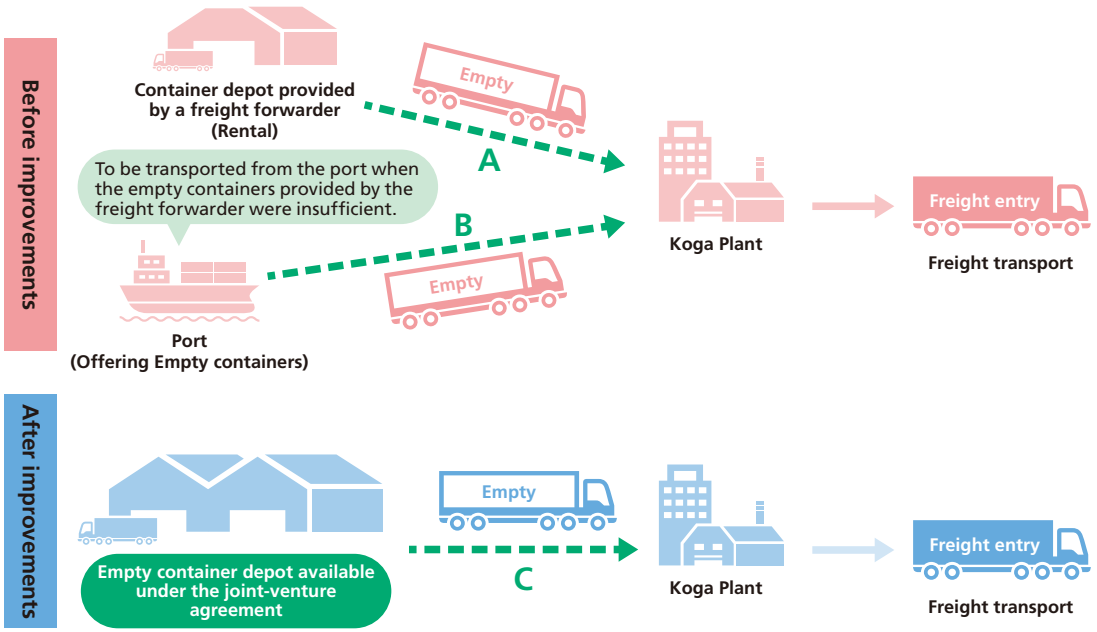
Under the guidance of the Logistics Improvement Council, Hino Motors is carrying out the following initiatives aimed at reducing CO_2 emissions from distribution-related operations:

1. Improving loading rates by integrating transportation routes and conducting joint shipments
2. Shortening transportation distances by packaging at the point of production to enable direct shipments
3. Increasing shipment volume using vehicles with higher tonnage (load volume) and utilizing different types of vehicles such as trailers
4. Promoting a modal shift to ships and other forms of transportation

| Example | Improving CO_2 Emissions by effectively using other companies' containers

We used to take empty containers from a container depot provided by a freight forwarder for the freight transport from the Koga Plant, but additional containers had to be transported from a port far away from the plant when empty containers were insufficient.

However, empty container transportation needs decreased and CO_2 Emissions were reduced by 31.6 tons per year since we started taking empty containers from the empty container depot that is close to the Koga Plant. These new logistics became available under a joint-venture agreement.



Distance to the Koga Plant

B > A > C

CO_2 Emissions reduced by 31.6 tons per year due to decreased empty container transportation

Eco-Driving Support

Logistics

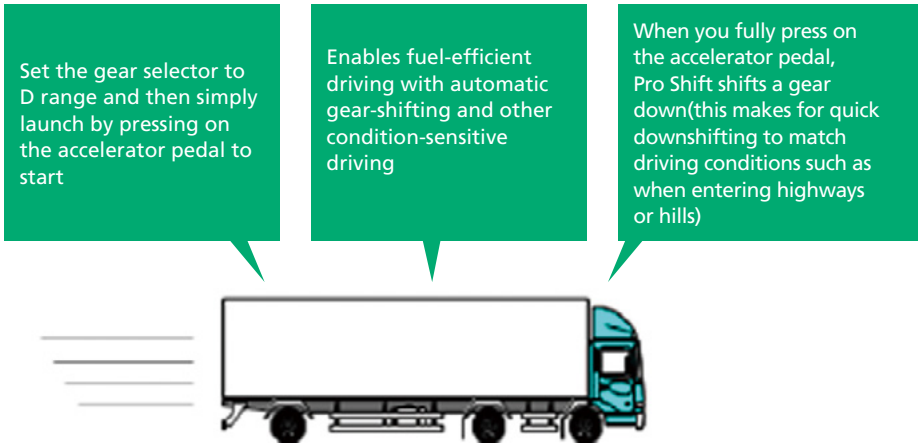
Hino Motors will continue to support customers' eco-driving capacities as it strives to remain a company trusted worldwide.

◆ Pro Shift (mechanical automatic transmission): Support for gear shifting

To support eco-driving, the engine has to stay in the rpm range best suited to each situation by changing gears in a suitable manner.

Pro Shift shifts gears automatically to ensure that the truck stays in the green zone on the fuel economy meter. This enables even truck drivers with little experience to drive like good eco-driving professionals.

● Example of main features of Pro Shift



◆ Eco-driving Seminars for Overseas Customers

Hino Motors holds "Eco-driving" classes in Japan and overseas as a part of its endeavors to contribute to the environment and customers. In fiscal 2020, a total of 11,780 students (171 in Japan and 11,609 in 28 countries overseas) took these classes. The classes are popular because students can learn eco-friendly driving and they improve corporate profitability.

As of March 2021, the Customer Technical Center in the Hamura Plant had welcomed a total of 101,000 visitors since it was established in 2005.

Overseas, the Hino Total Support Customer Center (HTSCC) at Hino Motors Sales (Malaysia) Sdn. Bhd. completely renovated its facility in 2017 to enable visitors to experience various driving conditions in response to the increasing number of visitors and to meet the varied demands of customers.

Hino Total Support Customer Center in Malaysia

Educational training (Above photo is taken before the COVID-19 pandemic)

◆ Hino Eco Tree Report

In order to provide eco-driving support to customers, Hino Motors products feature an "Eco Tree" display function. A tree icon grows more leaves as the level of eco-driving increases.

Furthermore, by providing complementary Eco Tree reports that contain automated analysis of each individual customer's driving status and serve as a useful source of information for eco-driving and drive management, Hino Motors supports customers in terms of environmental awareness.

Standard feature for Profia, Ranger, and S'elega models released in 2010 and later (exhaust emission symbols LKG and LDG onward). Standard feature for Dutro Hybrid models released in 2014 and later.

Eco Tree

Eco Tree Report

◆ Customer Assistance Programs

In collaboration with its dealers in Japan, Hino Motors carries out customer assistance programs that go beyond the scope of selling Hino vehicles. Hino Motors believes in providing total support that maintains a strong, long-term relationship with customers. The Company not only utilizes knowledge linked to fuel efficiency and environmental measures such as driving methods, it also contemplates customer troubles and supports problem-solving while utilizing the expertise of each company, including ensuring safety and fostering human resources.

A scene from training programs for customers (Above photo is taken before the COVID-19 pandemic)

Propose improvements based on Hino Eco Tree Report utilization

Reveal driving condition details unknown to the digital tachograph and propose safety and fuel efficiency improvements

Eco-driving Seminars

Learn practical driving skills and gain a better understanding about how to improve fuel efficiency

Guidance on subsidies and financing of low-emission vehicles

Guidance on various subsidy and financing programs when considering the purchase of a vehicle

Assistance in obtaining green management certification

Suggestions on obtaining certification as a means of calling attention to one's approach to environmental initiatives and assistance in obtaining certification

Assistance in reducing CO_2 emissions

Advice provided on CO_2 reduction (vehicle selection, eco-driving, and transportation efficiency

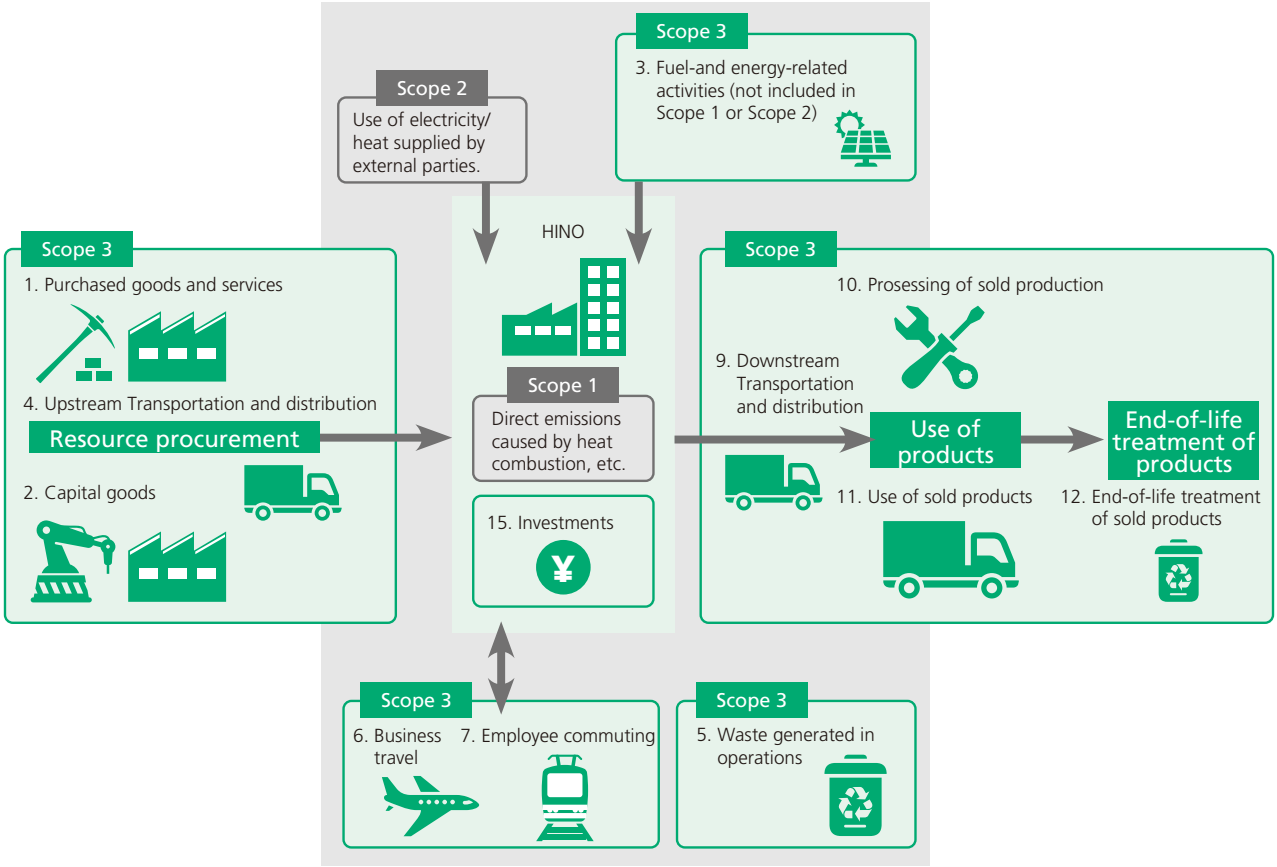
Handling Scope 3 Emissions

At Materials manufacturing stage **At the Distribution stage** **At the Disposal and recycling stage**

Companies are expected to calculate and disclose the greenhouse gas (GHG) emitted along the entire supply chain. Hino Motors calculates Scope 3 emissions, as well as Scope 1 and 2 emissions, based on GHG reporting guidelines and estimates are calculated from reported or derived values and available data. Actual emissions may vary.

Ratios of calculated emissions show that the combined percentages for Category 1 (Purchased Products and Services), Category 10 (Processing of Products Sold), and Category 11 (Use of Products Sold) account for approximately 99% of the total, with the remaining categories accounting for less than 1% each. Hino Motors will continue to strengthen management of CO_2 emissions along its entire supply chain, while also focusing on CO_2 reduction activities.

	Category	Emissions (1,000 t-CO_2)
Scope 1	Direct emissions caused by heat combustion, etc.	120
Scope 2	Use of electricity/heat supplied by external parties.	180
Scope 3	1. Purchased goods and services	1,780
	2. Capital goods	150
	3. Fuel-and energy-related activities (not included in Scope 1 or Scope 2)	60
	4. Upstream Transportation and distribution	10
	5. Waste generated in operations	10
	6. Business travel	10
	7. Employee commuting	20
	8. Upstream leased assets	0
	9. Downstream Transportation and distribution	10
	10. Processing of sold production	770
	11. Use of sold products	37,770
	12. End-of-life treatment of sold products	50
	13. Downstream leased assets	0
	14. Franchises	0
	15. Investments	20

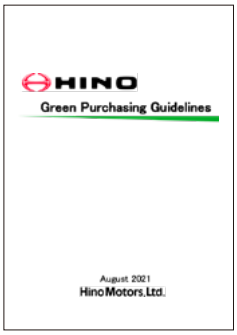


Green Purchasing Guidelines

To further promote environmental initiatives associated with business activities, in 2021 Hino Motors revised the Green Purchasing Guidelines on environmental endeavors for its business partners, based on the Hino Environmental Challenge 2050 and Hino Environmental Milestone 2030. The guidelines have been provided to clients in various countries worldwide.

Going forward, the Company will strengthen environmental endeavors throughout the supply chain and earnestly take action.

HINO's Green Purchasing Guidelines (all pages) are here



Green Purchasing Guidelines

CHALLENGE! 3 Factory with Zero CO_2 Emissions

Daily Improvement Initiatives

Daily improvement

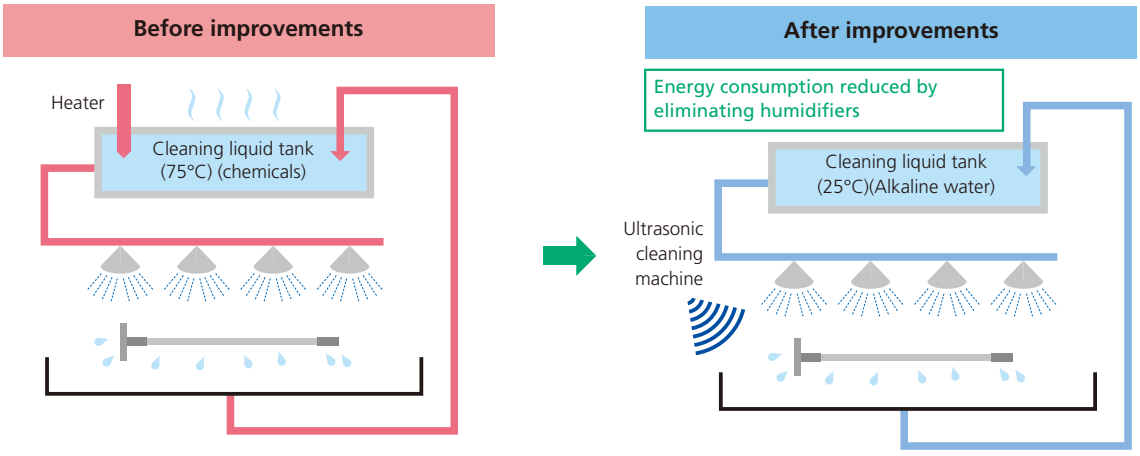
Recognizing climate change as one of the major challenges facing humanity, Hino Motors is working hard to reduce CO_2 emissions. In its continuing endeavors to reduce CO_2 emissions, the Company is carrying out regular activities with the participation of all employees to improve efficiency at all of its production sites, while also striving to reduce wasted energy. Based on the Hino Environmental Challenge 2050, a long-term environmental vision formulated in fiscal 2017, In fiscal 2020, Hino Motors continued to implement a wide range of daily energy-saving activities including the Factory Zero CO_2 Emissions Challenge aiming to completely eliminate CO_2 emissions due to production activities.

Major Initiatives

- Adopting electric booster pump systems
- Replacing fluorescent lighting with LEDs
- Applying thermal insulation paint to furnaces (see below)
- Switching to electric transport vehicles inside plants

| Example | Using room-temperature rinse water by installing an ultrasonic cleaning machine

A parts washer is used during the machining process to clean off oil and other debris that adhere to products. Until now, this was done by heating a cleaning agent containing chemicals, but an ultrasonic cleaning machine was installed that can achieve the same cleaning effect using room-temperature rinse water (alkaline water). This resulted in reducing CO_2 emissions from the heater that had been used to heat water by 5.7 t-CO_2 per unit, while simultaneously eliminating use of a cleaning agent containing chemicals.



Initiatives Related Renewable Energy

Renewable Energy

Hino Motors is installing solar power equipment as an initiative to make use of renewable energy. Electricity generated by the equipment is used for production activities, lighting inside its factories and offices, as well as outside lights on the premises. In the future, Hino Motors plans to pursue initiatives that not only save energy at its existing business facilities but also incorporate the broader perspective of combating climate change.

Solar panels installed at the Nitta Plant around 160 kW

| Example | Hino Motors Manufacturing Thailand: Solar power generation panels installed on roof of its plant

Solar power generation panels with an output of approximately 500 kW were newly installed on the roof of the Plant 3 of the Hino Motors Manufacturing Thailand. The generated electric power is being used for production activities, the office, and streetlights on the premises. In the future, the Company will not only improve the energy conservation of existing facilities, but also work to reduce CO_2 while incorporating renewable energy.

Solar power generation panels installed on the plant roof

| Example | Purchasing electricity produced by hydroelectric power generation

Meiyu Kiko Co., Ltd., a consolidated subsidiary of Hino Motors, concluded a contract for the "Furusato Hydropower Plan" offered by Yamanashi Power Plus, which is a power supply brand jointly operated by Yamanashi Prefecture and TEPCO Energy Partner, Incorporated.

The plan provides electric power generated at a hydropower plant operated by Yamanashi Prefecture that does not emit CO_2. The electric power will be used by two sites, the Meiyu Kiko Head Office and the Isawa Office. Converting this into plant CO_2 emissions based on fiscal 2018 performance results in an annual reduction of approximately 260 tons, which is around 89% of overall plant CO_2 emissions.

Meiyu Kiko was named an environmentally friendly company by the governor of Yamanashi Prefecture to enable a portion of electricity charges to be used for programs such as environmental conservation projects in Yamanashi Prefecture. In addition, utilization has continued with the renewal of the contract in fiscal 2020.

Going forward, the company aims to motorize forklifts and reduce other fuel consumption to further curtail CO_2 in order to promote activities for "Factory with Zero CO_2 Emissions" that was announced in the Hino Environmental Challenge 2050.

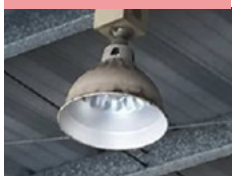
Receiving the award

| Example | Using LED lights for plant lighting

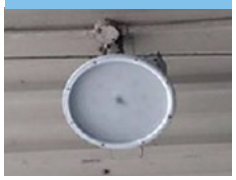
The switch to LED lights is actively being moved forward in each country.

● Hino Motors Vietnam

Before improvements



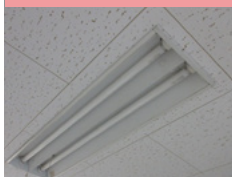
After improvements



Reduced by **1.5** t-CO_2/year

● Hino Motors Manufacturing (Thailand)

Before improvements



After improvements

Reduced by **5.7** t-CO_2/year

CHALLENGE! 4 Challenge of Minimizing and Optimizing Water Usage

Initiatives for Conserving Water at Factories

Small amounts of water | purified

Water is essential to the manufacturing of trucks and buses. To make effective use of precious water resources, Hino Motors has established the Hino Environmental Challenge 2050, its long-term environmental vision, and is working to reduce water usage every day. Hino will continue to work on water-saving activities with the aim of fulfilling the Challenge of Minimizing and Optimizing Water Usage.

Major Initiatives

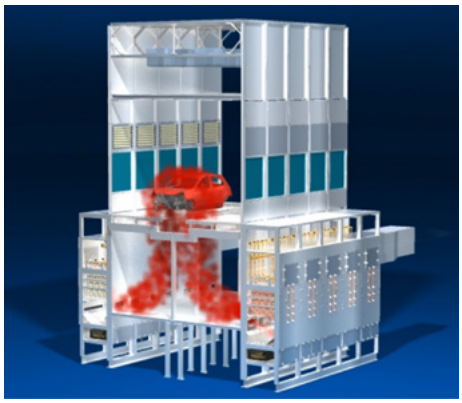
- Eradication of wasteful use with a water-saving patrol (leakage/overflow [effluent])
- Water-saving educational activities (using posters and other materials to communicate)
- Effective use of rainwater and wastewater treatment plant's treated water

| Example | Employing paint mist-collecting technology, which uses no water

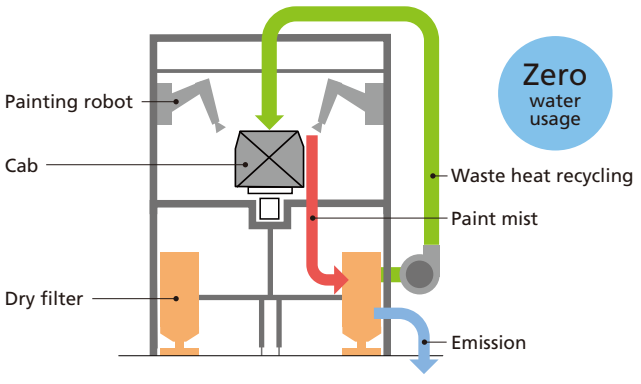
A dry booth system that reduces environmental impact in the cab painting process was introduced at the Koga Plant.

In the conventional method, the paint mist was removed with a water film and the paint was recovered using chemicals. This year, we employed a new, chemical-free system that uses filtering and calcium carbonate but no water.

Dry booth mechanism



Dry booth system



CHALLENGE! 5 Challenge of Achieving Zero Waste

Recycling Initiatives at Production Plants

Zero waste

Hino Motors is also working to reduce waste as one activity targeting the Hino Environmental Challenge 2050, its long-term environmental vision. In recent years, Hino has thoroughly re-examined materials which it has not been able to recycle and is working to recycle them internally.

Major Initiatives

- Reducing the volume of wastewater treatment plant sludge
- Reducing the amount of sand used during molding
- Extending the life of waste liquid processing machinery by installing filtration filters
- Comprehensive implementation of waste separation rules

| Example | Waste separation training

Hino Motors Manufacturing Colombia, S. A. trains employees by using real waste so that they can gain a greater understanding of the types of waste.

Training

| Example | Activities to reduce plastic (1)

Given current societal issues, actions to eliminate plastic are underway in each country. Hino Motors Manufacturing (Thailand) Ltd. is spurring employees to take action under the slogan, "Say No to Plastic" by asking them to refuse shopping bags and refrain from using disposable cups and containers at mealtimes. To encourage the outcomes of these actions, the company is promoting the activities by giving away reusable shopping bags and reusable cups. In addition, ordinary actions that can be taken such as reducing plastic bags are being steadily fostered in each country as a part of efforts to get away from packaging.

Taking action

Root Out Plastic Waste activity poster

| Example | Activities to reduce plastic (2)

Hino Motors Manufacturing (Thailand) Ltd. has stopped plastic packaging for undercarriage components (shock absorbers) and is instead creating a special box as a part of efforts to get away from plastic packaging.

Ordinary actions that can be taken are gradually being carried out.

Before improvements


Carrying out packaging one at a time

After improvements


Creating a special box to discontinue individual packaging

No. Reduced **544** bags /month

VOICE

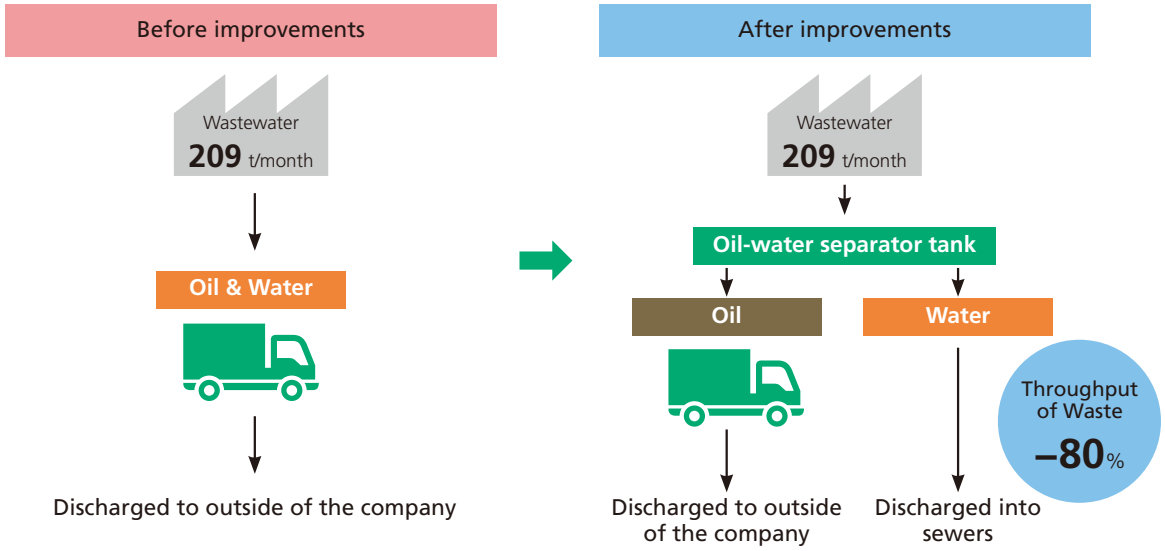
All employees work together to eliminate plastic

Plant Manager
Hino Motors Manufacturing (Thailand) Ltd.
Paradorn Siripunt

As a part of CSR activities, our employees and their families are partnering with local residents and various groups such as NPOs to carry out environmental conservation activities. Efforts were carried out in daily life together with all employees to combat the global issue of plastic under the slogan, "Say No to Plastic." As a leader in Thailand, we are striving to improve the global environment.

| Example | Reducing wastewater by installing an oil-water separator tank

Hino Motors Manufacturing U.S.A., Inc. disposes of wastewater containing oil that is discharged by the plant, but the installation of an oil-water separator tank enables oily water to be separated from wastewater, resulting in an 80% reduction in the annual quantity of waste treatment.



Design with Recycling in Mind

Zero waste | Newly manufactured vehicles

Since 1990, Hino Motors has been involved in product development and design initiatives with recycling in mind. It established a Voluntary Action Plan in 1998, listing specific values for recycling rates with the goal of enhancing recycling activities. In recent years the Company has also engaged in efforts to comply with regulations on environmentally hazardous substances by reducing them at an early stage.

Hino Motors has pursued the challenge of enhancing recyclability based on a variety of perspectives. These include adopting easily recyclable materials from the product development stage, using identification marking for materials, and preparing disassembly manuals.

Also, Hino Motors is endeavoring to gather information on chemical substances contained in all components and reducing them at an early stage in response to recent regulations on environmentally hazardous substances in and outside of Japan.

Environmental Activities at the Recycling Stage

Zero waste | Newly manufactured vehicles

To comply with the Automobile Recycling Law, which came into effect in Japan in 2005, Hino Motors has implemented a process of recovery, processing, and recycling of three materials designated by the law from end-of-life vehicles, namely automobile shredder residue (ASR), airbags, and chlorofluorocarbons (CFCs), with the help of a great many related businesses.

The ASR recycling ratio for fiscal 2020 was 95%, surpassing the legal standard of 70%. In addition, Hino Motors strives to promote eco-friendly manufacturing as early as the development stage by using recyclable materials and, where possible, easy-to-disassemble vehicle designs, thereby fostering the effective utilization of resources and contributing to the development of a recycling society.

Results of Recycling based on the Automobile Recycling Law (Japanese only)

CHALLENGE! 6 Challenge of Minimizing the Impact on Biodiversity

Considerations toward Biodiversity

Protection

Hino Motors has endorsed the Japan Business Federation's Declaration on Biodiversity, and after having also incorporated individual targets into the Company's five-year Environment Initiative Plan, in fiscal 2015 the Hino Motors Biodiversity Guidelines were formulated and the direction for Company activities and specific initiatives on biodiversity were set out and are now being advanced.

Going forward, the Company will promote various initiatives in consideration of biodiversity in accordance with the Biodiversity Guidelines in order to ensure coexistence with the ecosystems around Hino Motors and to continue to grow as a company. At the same time, Hino Motors plans to actively incorporate participation-based activities for employees as a means of tackling the issue of raising awareness and environmental consciousness among employees.

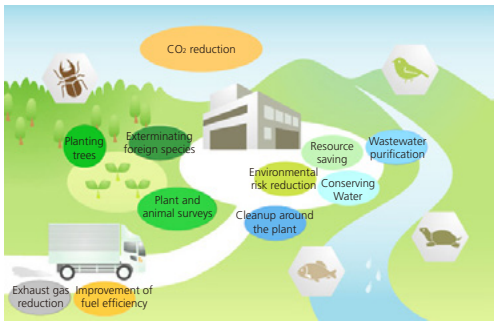
Biodiversity Initiatives

- Further pursuit of environmental technologies in products
- Consideration for regional water resources
- Contribution to biodiversity through steady promotion of environmental initiatives (CO_2 reduction, resource conservation, etc.)
- Collaboration and cooperation with communities
- Active information disclosure

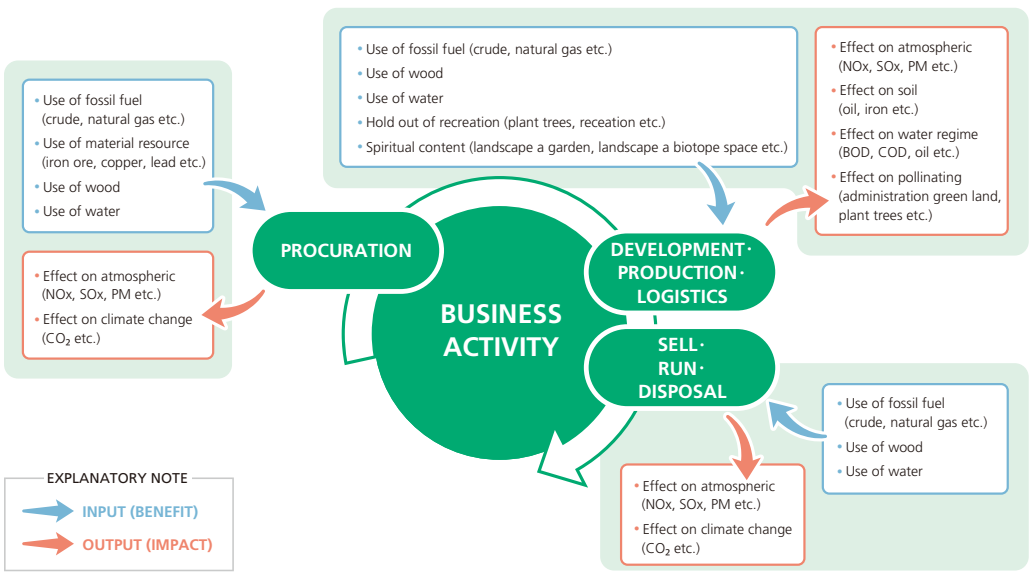
Categorizing the Interrelationship of Business Activities and Biodiversity

Protection

Referring to the Business & Biodiversity Interrelationship Map (see diagram below) devised by the Japan Business Initiative for Biodiversity (JBIB), Hino Motors has categorized benefits and impacts at each stage of the product life cycle. In this way, in the course of its business activities, Hino Motors simultaneously benefits from and impacts nature in the product life cycle as a whole. Hino Motors recognizes that every action counts, no matter how small. The Company is committed to reducing its environmental impact on biodiversity and ensuring that its business does not adversely affect surrounding ecosystems.



● Business & Biodiversity Interrelationship Map



Examples of Initiatives

Protection

The event was not held in fiscal 2020 to prevent the spread of COVID-19, but initiatives implemented to date are introduced here.

◆ Biodiversity public awareness and education activities

Hino's headquarters and plants collaborated with Hino City's Kingfisher House to familiarize people with the creatures that inhabit the area by holding exhibits of stuffed birds and reptiles living nearby, as well as displaying insect and plant specimens.

In addition, the Hamura Plant invited an instructor from the Hamura City Environmental Conservation Division, who presented local strategies for protecting the city's precious living creatures and local initiatives from a biodiversity perspective.

To ensure the future spread of these activities, we will continue exchanges with the government and expand them to other business offices.

Exhibition (Hino Plant)

Presentation of Hamura City's initiatives (Hamura Plant)

◆ Participation in local conservation activities

In Commemoration of the 70th anniversary of Hino Motor's founding, we mowed the undergrowth to help the planted trees grow and held and observation session th the children. In the Tachikawa Cliff Line (Total length of about 40 km) designated by the TOKYO Metropolitan Government, we carried on tree planting, green road maintenance, etc. with Hamura city and citizen groups at Inari Green Space area near the Hamaura Plant. We are engaged in green conservation activities as a habitat for various creatures in order to protect the precious nature left in Tokyo.

Inari Green Space Area activities

Mowing activities

Examples of Initiatives

◆ Holding of environmental study classes for a neighborhood elementary school

At the Koga Plant, employees planted aquatic plants and conducted biological surveys with neighboring elementary school students in the retention basin that directly connects to the nearby river.

We explained that many indigenous species have been identified this year and are surrounded by a rich ecosystem. The class also served to reaffirm that we must not forget to consider the surrounding ecosystem amid our ongoing business activities.

Retention basin survey

◆ Cleanup Events in Areas Surrounding Business Sites

Cleanup events are held in areas surrounding business sites including the Hino Plant, Hamura Plant, and Nitta Plant, as well as at group companies both in and outside of Japan, contributing to communities, raising environmental awareness and commuting etiquette.

Ome Parts Center

Hinopak Motors, Ltd.