

Environmental Management    Material Balance    Hino Environmental Challenge 2050

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## CHALLENGE! 1 New Vehicle Zero CO<sub>2</sub> Emissions Challenge

**TARGET** While driving  
**Reduce CO<sub>2</sub> Emissions By 90%**



Against the backdrop of increasing global warming, it was agreed at the 21st session of the Conference of the Parties (COP 21) to the United Framework Convention on Climate Change to keep the temperature rise under two degrees compared to the time before the industrial revolution. This goal is necessary for reducing the CO<sub>2</sub> emissions that are one of the contributors to global warming.

Hino Motors will take on the challenge of reducing CO<sub>2</sub> emissions during vehicle operation, which accounts for about 90% of CO<sub>2</sub> emissions in the truck and bus life cycle. Therefore, Hino Motors will take on the challenge of raising environmental performance, such as fuel efficiency, as much as possible, while raising the distribution efficiency of trucks.

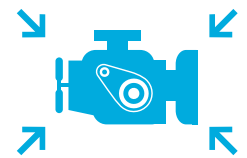
### Developing Next-generation vehicle



Hino Motors will improve product environmental technologies and develop next-generation vehicles including plug-in hybrid vehicles (PHV), electric vehicles (EV), and fuel cell vehicles (FCV). Concurrently, the Company will collaborate with governments and other related organizations and play a role in their spread.



### Evolve Existing technologies



Hino Motors will further raise fuel efficiency of diesel (DE) and hybrid vehicles (HV), efficiently recover the energy generated during braking, and improve aerodynamic performance of the products.



### Make distribution More efficient



Hino Motors will help improve waste and inconsistency in collaboration with customers by incorporating IoT technologies in vehicles and enabling the "visualization of distribution." Above all, Hino Motors recommends using heavy-duty trucks in mainline transport where long-distance distribution is the norm and using light-duty trucks in urban areas. In addition, the company will promote technological development so that it can offer logistics matching, which properly manages information on trucks that are in or out of operation.

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## 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<sub>2</sub>, a greenhouse gas, is inevitable.

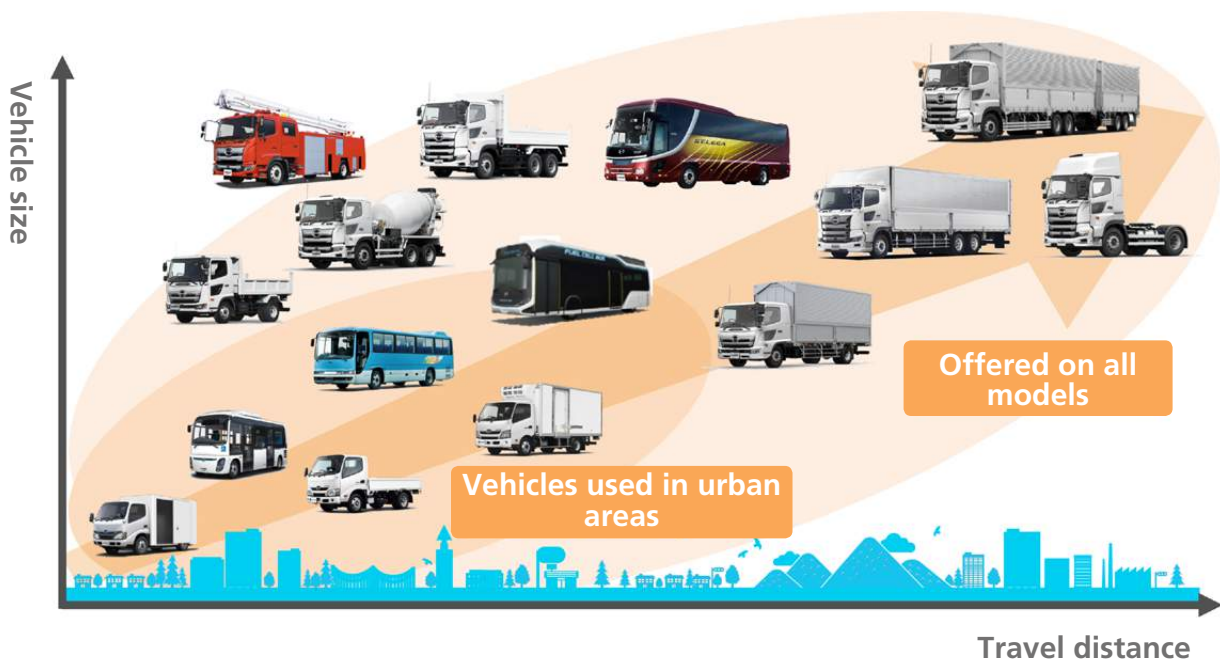
Unique aspects of trucks and buses include their comparatively large size and loading capacities, the long distances they travel, and their wide array of uses and places where they are used. Taking into account these varying conditions, Hino Motors considers what types of environmental technologies are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

## Initiatives for Next-generation Vehicles

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.



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## Hino Motors' Highly Promising Technologies (Including trial experiments)

### Next-generation vehicle

### Existing technologies

#### ◆ Hybrid Vehicles (HV)

##### ● Hino Profia Electric Refrigeration Trucks

By combining its hybrid system technologies with Denso Corporation's automotive-use electric refrigeration system technologies, Hino Motors has developed a refrigeration truck that offers a complete lineup of benefits for customers, including economical operations, excellent refrigeration performance, superior quality, and extremely quiet running.



#### ◆ Electric vehicle (EV)

##### ● Light-Duty, Low-Floor Electric Trucks

Hino Motors has collaborated with Japanese delivery companies Seino Transportation Co., Ltd. and Yamato Transport Co., Ltd. to commence trial operations of its electric light-duty trucks. Since the trucks are powered by an electric motor, no exhaust gases are emitted while running and noise levels are very low, making them optimal vehicles for pick-up and delivery duties during late night or early morning hours.

Hino Motors succeeded in lowering the floor of the loading platform by leveraging the distinctive characteristics of EVs—the smaller power train and the front engine, front-wheel drive system.



#### ◆ Fuel Cell Vehicle (FCV)

##### ● Fuel cell bus "SORA" (in collaboration with Toyota Motors)

Fuel cell buses that operate on their own generated hydrogen as a fuel source have a high environmental performance of zero CO<sub>2</sub> emissions during operation.

Hino Motors will make further improvements with the aim of popularizing FC buses and will also consider adopting fuel cells in trucks.

\*Hino Motors has been entrusted by Toyota Motors with the development of the vehicle body

#### ◆ Plug-in Hybrid Vehicles (PHV)

##### ● Hino Melpha Plug-In Hybrid Bus

The Hino Melpha Plug-In Hybrid Bus can run as an electric or hybrid vehicle and supply electricity externally for relatively long periods of time from power generated by its diesel engine, making it useful for supplying electricity to evacuation centers and other facilities in times of disaster. Hino Motors made this possible by combining its many years of expertise developing hybrid systems with high-capacity lithium-ion batteries. This model is operating as a route bus and school bus.



##### ● Light-Duty Electric Buses

Hino Motors' small-sized electric buses have begun service on fixed routes as community buses in Tokyo's Sumida Ward, the city of Hamura in the Tokyo Metropolitan area, and the city of Komatsu in Ishikawa Prefecture. Hino Motors made the batteries as small as possible and extended the battery life. As a result, the feasibility of operating the buses on fixed routes has been verified.



#### ◆ Diesel

##### ● Hino Profia Heavy-Duty Trucks

Through downsizing, the new A09C engine offers high levels of both power and fuel economy. The new 9-liter engine installed in a ProShift-equipped vehicle has achieved performance that is 10% above heavy-duty vehicle fuel efficiency standards.



##### ● Hino Ranger Medium-Duty Truck

Through downsizing, the new A05C engine offers high levels of both torque and fuel efficiency. By combining this engine with an advanced transmission, Hino provides a broad range of vehicle types with performance that is 5% above heavy-duty vehicle fuel-efficiency standards.



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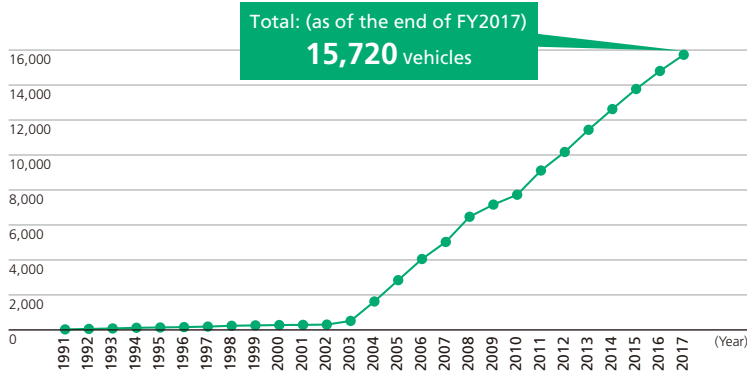
## Evolution of the Hybrid Vehicle

Next-generation vehicle

Existing technologies

Ever since Hino Motors commercialized and sold the world's first hybrid bus in 1991, the Company has constantly led the industry in environmentally friendly products. Hino Motor's environmentally friendly products continue to be loved by customers around the world. Among these products, cumulative sales of hybrid vehicles surpassed 15,000 as of the end of fiscal 2017.

### ● Hybrid Vehicle Sales Volume



Hino Dutro Hybrid



Hino Blue Ribbon II Hybrid

## TOPIC

### Heavy-duty Hybrid Truck Employing World-first Technology to Be Launched in Summer 2019

Hino Motors plans to launch the Hino Profia Hybrid, an innovative heavy-duty hybrid truck that combines high-level advanced performance and safety technology.

Thanks to hybrid control that pre-reads the road gradient using artificial intelligence (AI), Hino Motors has achieved the world's first hybrid system with fuel economy even in vehicles that run at high speeds, a feat considered difficult until now.

The system maintains the same fundamental performance and ease of use as offered by a diesel vehicle, reduces fuel consumption by about 15% (based on internal data), and is expected to cut vehicle operating costs.

The large-capacity lithium-ion battery in the truck can be used as an external emergency power supply. Moreover, noise and vibration are reduced during vehicle operation, which helps to alleviate driver fatigue.

The heavy-duty Hino Profia Hybrid truck.

