

Taking the Initiative for Growth – 2

Contributing Both in Terms of Product Development and Production to the Establishment of a Carbon Neutral Society



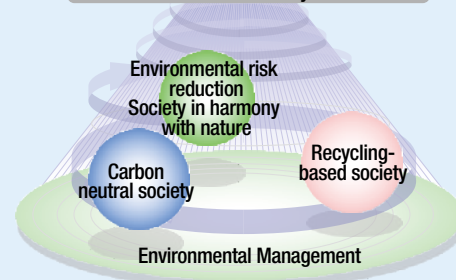
Toshihiko Shimizu
Senior Executive Officer
Head of the Production Engineering Development Center, Die Engineering Center, Quality Control Dept., and Plant Engineering & Environment Dept., Production Headquarters
(As of March 31, 2021)

Environmental Vision 2050

As one tenet under our Basic Philosophy, Toyota Industries works to contribute to making the earth a better place to live and enriching lifestyles and also strives to offer products and services that are clean, safe and of high quality. Accordingly, we have established the Global Environmental Commitment, a specific environmental action guideline, and have been sharing and implementing it throughout the Toyota Industries Group.

We recognize that contributing to the establishment of a carbon neutral society is an important issue under the commitment. As such, we have been promoting initiatives in various fields, such as electrification, weight reduction, energy savings and adoption of renewable energy sources in seeking to realize a zero CO₂ emissions society in 2050.

Aiming at building a sustainable society which enables the harmonious coexistence of nature with our daily lives



Notional Diagram of Global Environmental Commitment

- (1) Establishing a carbon neutral society
→ Globally take on challenge of establishing a zero CO₂ emissions society
- (2) Establishing a recycling-based society
→ Take on challenge of minimizing the use of resources
- (3) Reducing environmental risk and establishing a society in harmony with nature
→ Generate positive influence on biodiversity
- (4) Promoting environmental management
→ Enhance consolidated environmental management and promote enlightenment activities

Review of the Sixth Environmental Action Plan – Establishing a Carbon Neutral Society –

Positioning the establishment of a carbon neutral society as our most crucial environmental issue, Toyota Industries has been carrying out production activities with a constant focus on saving energy. At the same time, we have accelerated the development of more environment-friendly products.

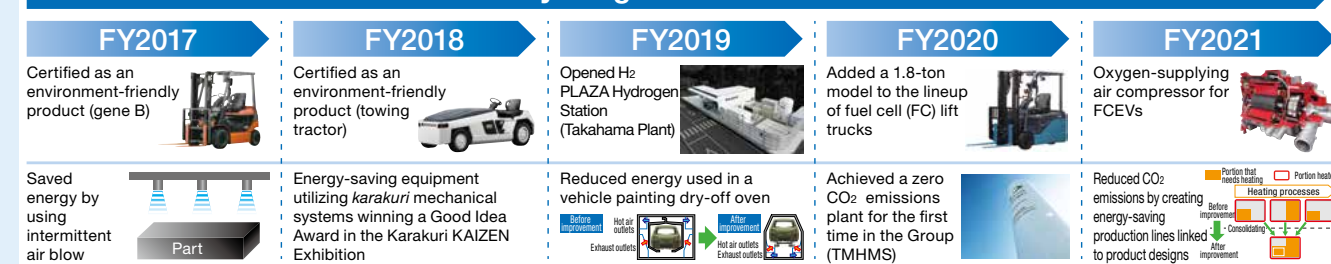
Under the Sixth Environmental Action Plan, a five-year plan implemented from fiscal 2017 to fiscal 2021, our two primary action policies were to “develop products and technologies possessing the utmost level of environmental performance” and “develop and introduce production engineering technologies with lower CO₂ emissions and utilize clean energy.” We have steadily undertaken tasks defined for each policy and successfully achieved respective targets. Please see pages 62–63 for details.

Approach of the Seventh Environmental Action Plan – Establishing a Carbon Neutral Society –

We have formulated a next plan, the Seventh Environmental Action Plan covering five years from fiscal 2022 to fiscal 2026.

With regard to products, we will emphasize reduction of CO₂ emissions as early as from the technology development stage while further pursuing better energy-saving performance, lighter weight and development of technologies responding to electrification. In terms of production, while making all-out efforts to save energy, we will define a global target of total CO₂ emissions and work toward the target so that we can curb emissions as we expand business. In addition, we will actively adopt renewable energy sources on a global basis by setting a target introduction rate. Please see pages 64–65 for details.

Steady Progress in Five Years



Reducing CO₂ Emissions in Product Development

Toyota Industries develops products with excellent environmental performance by sharing and encouraging the evolution of technologies and know-how of each business, mainly the Materials Handling Equipment Business and the automobile-related businesses.

This section highlights our efforts related to electrification, which is key to developing products that can reduce CO₂ emissions.



Automobile-Related Businesses

We develop and manufacture devices for a range of electrified vehicles, from hybrid electric vehicles (HEVs) to fuel cell electric vehicles (FCEVs), and enjoy the world's top share*1 in the car air-conditioning compressor and electronics fields.

*1: Survey by Toyota Industries Corporation

Car Air-Conditioning Compressor

■ Providing Products with Excellent Energy-Saving Performance



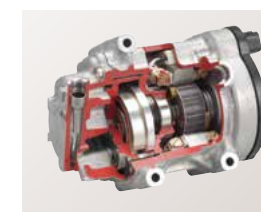
Tomoji Tarutani
General Manager, Engineering Dept., Compressor Division
(As of March 31, 2021)

Sales of various electrified vehicles, including HEVs, plug-in hybrid electric vehicles (PHEVs), battery electric vehicles (BEVs) and FCEVs, are increasing in line with the growing need for car electrification.

Car air-conditioning compressors mounted on these electrified vehicles also need to be electric, and the most important aspect of their performance is electric efficiency, which is directly linked to the cruising range.

Besides requiring the same level of precision processing and assembly technologies used for conventional compressors for internal-combustion vehicles, electric compressors need another important technology to ensure compatibility with newly added electronic components. Taking advantage of our strengths in these technologies, we have successfully achieved high electric efficiency performance.

Since being adopted in the Prius of Toyota Motor Corporation (TMC), we have been providing compressors for various electrified vehicles of automakers in and outside Japan for about 20 years, accumulating a pool of related technologies and know-how along the way. Additionally, as BEVs face a problem of lower electric efficiency when a heater is turned on, we have developed a compressor for heat pump air conditioning systems to help improve electric efficiency while heating.



ESB20 electric compressor

■ Compressors Also Used for Cooling Key Components

In recent years, following car electrification and widespread use of autonomous driving technology, there has been a growing need to cool electronic devices, batteries and other key heat-emitting components. In response, we have developed a large-capacity model used not only for vehicle interior air conditioning but also for cooling those key components. As products in this field relate to the driving performance of automobiles, we believe that the reliability of our products will serve as an even greater strength of Toyota Industries.

■ Utilizing Compression Technologies to Provide Drive System Components

For FCEVs, which are a type of electrified vehicle that generates electricity through a chemical reaction of hydrogen and oxygen, we have applied compression technology of car air-conditioning compressors and developed such products as an oxygen-supplying air compressor, which efficiently compresses and supplies oxygen. The product is already fitted in the MIRAI.

By leveraging our elemental technologies, we intend to increase our role in the fields that relate to the driving functionality of FCEVs, which are said to be the “ultimate eco-car.”

Products Utilizing Compression Technologies



Oxygen-supplying air compressor

Hydrogen circulation pump



Electronics

Further Improving Environmental Performance of Power Source Devices and Helping to Promote Electrification in Each Business



Takashi Kubooka
General Manager, Engineering
Dept., Electronics Division
(As of March 31, 2021)

In the field of car electronics, we develop and manufacture on-board power source devices, including DC-DC converters, on-board chargers and AC inverters, and charging stands by utilizing power electronics as the core technology. By selling these products to automakers, mainly TMC, we are working to contribute to the widespread use of electrified vehicles.

The progress in car electrification and automation has raised

expectations for more diverse power source devices with higher performance (higher efficiency as well as size and weight reduction). Accordingly, we will pursue even higher environmental performance and expand the scope of our development efforts to power source system products. Moreover, we are seeking to improve environmental performance by applying the technology and know-how accumulated in the development of power source devices to our other products, such as materials handling equipment and textile machinery. Our plan is to increase our contribution to the establishment of a carbon neutral society by promoting electrification in each business field, including car electronics.

Materials Handling Equipment Business

Toyota industries offers a wide range of industrial vehicles such as towing tractors, low lift trucks, automatic guided vehicles (AGV) and lift trucks, which have the global top market share*2. Since releasing our electric lift trucks to the market in the 1970s, many products have been electrified, and we are working to strengthen the competitiveness of our products through in-house production of key components such as motors, inverters and electronic control units (ECU).

*2: Survey by Toyota Industries Corporation



Haruhiko Otsuka
General Manager, Engineering Dept.,
Toyota Material Handling Japan
(As of March 31, 2021)

Offering Trucks Equipped with Lithium-Ion Batteries or Fuel Cells

In addition to the conventional electric lift truck, in 2016 we launched a lithium-ion battery installation type that significantly shortens the battery charging time. The truck does not require the replacement of heavy batteries, which can reduce the burden on the operator.



Compact FC module

In the same year, an FC lift truck was released. The FC system installed in this product was developed for realizing the features of the lift truck, utilizing the fuel cell used in the MIRAI developed by TMC. In February 2021, we developed a new general-purpose small fuel cell

module. This module packages FC system components for the generation of electricity and achieves high power generation efficiency. It's also relatively easy to install in various existing engine-powered products. In the future, we aim to supply the module as a stationary power generator to plants and commercial facilities and install it in industrial vehicles and buses.

Efforts to Increase the Percentage of Electrification of Large Models

The electrification rate of the entire lift truck market has already exceeded 60%, but the electrification of large models has not progressed much due to the lack of power compared with internal-combustion models. Toyota Industries will utilize its key component technology cultivated in electronics as well as truck control technology to advance the development of high-output and high-voltage components and improve the electrification of large models.

Lead-Acid Battery Type

- Equipped with an internally developed high-efficiency motor, etc.
- Lower energy cost resulting from longer uptime

Lithium-Ion Battery Type

- Much shorter charging time
- Less burden of battery replacement
- Equipped with T_Site telematics as standard for easier fleet management

Fuel Cell Type

- No CO₂ emissions while in operation
- Excellent environmental performance
- Enhanced convenience of completing fuel charging in three minutes

Reducing CO₂ Emissions in Production Activities

The two pillars of Toyota Industries' efforts to reduce CO₂ emissions in its production activities are promoting thorough energy savings and utilizing renewable energy. The following shows examples among such efforts in this area.

Promoting Thorough Energy Savings

In implementing thorough energy savings, we are making proactive, Company-wide efforts to "develop and introduce production engineering technologies with lower CO₂ emissions" and "fully implement improvement activities on a daily basis." For the former, the Nagakusa Plant, a vehicle assembly plant in Aichi Prefecture, undertook an improvement project with a focus on minimizing the amount of heat used in a painting dry-off oven and suppressing heat dissipation, thus successfully achieving lower energy loss and a subsequent, drastic reduction in CO₂ emissions. The project won the 2019 Minister of Economy, Trade and Industry Award in the Industrial Field, which is the highest award in the Energy Conservation Grand Prize program (Energy Saving Projects Category) run by the Energy Conservation Center, Japan.



2019 Energy Conservation Grand Prize

Utilizing Renewable Energy

As part of an effort to utilize renewable energy, we are proactively introducing clean energy.

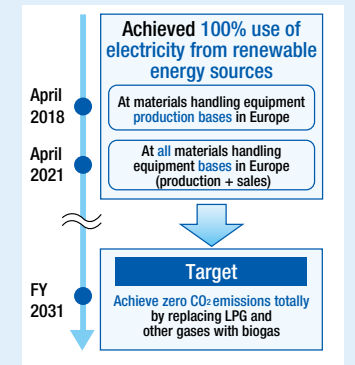
Toyota Material Handling Europe AB (TMHE), a subsidiary serving as the regional headquarters of the materials handling equipment business in Europe, has formulated a two-pronged policy aimed at zero energy *muda* (waste) and zero carbon emissions by fiscal 2031. As an interim target, TMHE has worked to increase the ratio of electricity from renewable

energy sources to 100% at all of its bases by fiscal 2021.

To achieve this target, TMHE has selected the one that best matches each base from among three options: power contracts for renewable energy power generation, renewable energy certificates and in-house power generation. As a result, all of its five production bases and all 28 non-production companies achieved the interim target in fiscal 2019 and in April 2021, respectively. TMHE became the first company in the materials handling equipment industry to achieve 100% use of electricity from renewable energy sources at all bases in Europe.

In 2019, Toyota Material Handling Manufacturing Sweden AB (TMHMS), a TMHE Group company, went a step beyond using electricity from renewable energy and introduced biogas in place of liquefied petroleum gas (LPG), thereby becoming the first zero CO₂ emissions plant in the Toyota Industries Group.

TMHE is undertaking activities to switch all energy sources used at business sites to renewable energy by 2030.



Summary

As highlighted in this section, Toyota Industries is aggressively working to reduce CO₂ emissions both in terms of products and production toward the establishment of a carbon neutral society. As a result of such efforts, we were selected for the A List, the highest rating, for three consecutive years in a survey conducted on climate change by CDP*3, a U.K.-based international environmental NGO.

As for products, we expect that more stringent environmental regulations in various countries and growing energy-saving consciousness among customers will further accelerate the electrification of cars and materials handling equipment in the future. Amid this environment, we will holistically leverage our broad range of technologies accumulated in the automobile-related businesses and Materials Handling Equipment Business to further reinforce our development efforts geared toward electrification.

In terms of production, we have announced our target to reduce CO₂ emissions by 25% in fiscal 2026 from the fiscal 2014 level in becoming carbon neutral (zero CO₂ emissions) in 2050. Actually, however, we are aiming for an even more ambitious target of achieving a 50% reduction by fiscal 2031 from the fiscal 2014 level. We recognize that

thorough improvement of our energy use efficiency and effective introduction of renewable energy will be crucial in achieving this target. Specifically, we will need to minimize and utilize exhaust heat from foundry and other processes, which form a distinctive part of our business. In promoting the utilization of renewable energy, we will extend the regionally unique effort first undertaken by our bases in Europe to the entire Group while defining new targets. Simultaneously, we will take up a challenge of spurring innovation in manufacturing to achieve carbon neutrality. The challenge will include introducing production engineering technologies that have undergone repeated discussions on CO₂ reduction from the product design stage. Further endeavors will also entail proactively carrying out demonstration and introduction of new carbon neutral technologies, such as the use of hydrogen and capturing of CO₂ at plants, for establishing a CO₂ circulation system at a model plant.

We will continue to make proactive efforts to reduce CO₂ emissions both in terms of products and production and contribute to the creation of a carbon neutral society.



*3: An international NGO running a project in which institutional investors work together and request companies around the world to disclose their strategies against climate change and greenhouse gas emissions data