

DECARBONIZATION IN JAPAN'S TRUCKING INDUSTRY

— A TURNING POINT FOR LABOR AND ENVIRONMENTAL SOLUTIONS —

Katsuhide Takashima
Industrial Research Dept., Industrial Studies Div.
Mitsui & Co. Global Strategic Studies Institute

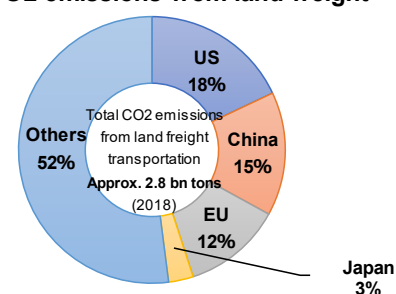
SUMMARY

- In the trucking industry, there are three effective approaches toward achieving decarbonization. Regarding the “vehicle conversion” approach, while Japan is making advancements in the use of EVs as light-duty delivery vehicles, it has yet to see progress in adopting EVs for heavy-duty trucks.
- Companies have been exploring the “changeover of shipping modes” and “shipping efficiency improvement” as means to reduce costs. Given that freight consignors and trucking companies are now obliged to reduce CO2 emissions, the former are making headway with modal shifts in freight transportation, while the latter are accelerating their efforts through cooperation with other companies.
- The trucking industry is at a major turning point, with the global trend toward decarbonization forcing the industry to address a number of existing problems, such as labor shortages and logistics inefficiencies, all at once.

1. FREIGHT VEHICLES ACCOUNT FOR 8% OF TOTAL CO2 EMISSIONS BY ALL INDUSTRIES

The challenge to achieving carbon neutrality by 2050 means reducing the world’s overall greenhouse gas emissions to reach a state of net-zero emissions. Of the total CO2 emissions generated by all industries, approximately 20% can be attributed to the transportation sector, and of that amount, freight vehicles, such as trucks, account for about 40% (approximately 8% of the total). As such, many countries and municipalities have launched initiatives to reduce CO2 emissions from trucks. Looking at global CO2 emissions from land freight transportation by country/region, of the approximately 2.8 billion metric tons of CO2 emissions, the US, China, and the EU are the top emitters, while Japan accounts for 3% (Figure 1). This report discusses the legal and labor issues related to decarbonization in Japan's trucking industry, including approaches on how to respond to these issues, and then examines the industry's efforts and approaches toward decarbonization.

Figure 1: CO2 emissions from land freight



Source: Compiled by MGSSI based on the data of the IEA (International Energy Agency)

2. TWO LAWS RELATED TO DECARBONIZATION IN JAPAN'S TRUCKING INDUSTRY

Amid the trend toward decarbonization, there are two notable laws in the trucking industry in Japan. One is the Act on the Rational Use of Energy (Energy Saving Act) enacted in 1979. This law obliges freight carriers and consignors above a certain size to report their energy use plans and usage status, for the purpose of taking necessary measures to promote the rational use of energy. Furthermore, the 2018 amendment to the law

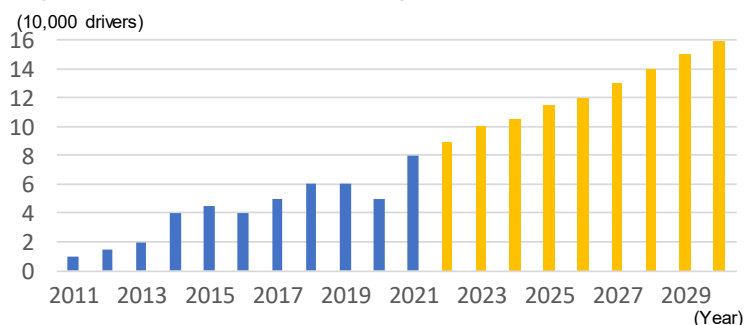
defines the consignor as the party who determines the shipping method and arrival date and time, and extends the application of the Energy Saving Act to e-commerce retailers who do not have ownership of the freight (consignor regulations). The other is the Act on Advancement of Integration and Streamlining of Distribution Business, which was revised in October 2016. This law, for the purpose of securing a workforce, giving consideration to the environment, etc., certifies and supports business that saves labor and reduces environmental impact by promoting the modal shift from trucks and other freight transportation means to trains and ships, as well as joint deliveries, consolidation of transportation networks, and other shipping streamlining processes. These two laws were enacted in consideration of energy use and the natural environment, and are consistent with recent initiatives to reduce CO2 emissions.

CHALLENGES FACING THE TRUCKING INDUSTRY: LABOR SHORTAGES AND THE WORKING ENVIRONMENT

The trucking industries in Japan, Europe, and the US continue to face a shortage of drivers due to difficulties in recruiting young and new workers against the backdrop of relatively low wages and long working hours, and the departure of older drivers from the market. In Japan, this problem became noticeable around 2007, but has been compensated for by the long working hours of the existing drivers. In this environment, the Act on the Arrangement of Related Acts to Promote Work Style Reform (Work Style Reform Act) was passed in 2018 to stipulate a maximum overtime work limit of 720 hours per year with penalties for exceeding the limit, and it became effective for large companies in April 2019 and for small and medium-sized companies in April 2020. For vehicle driving work, however, it was deemed difficult to meet the requirements of the new law in a short period of time. As such, the industry was given special consideration and the effective date has been extended to April 2024. Moreover, the maximum number of overtime hours for vehicle driving work has been set at 960 hours, which is more lenient compared with other industries. There is concern about confusion when the law goes into effect, and it has been dubbed the “2024 problem” in the logistics industry. Currently, approximately 850,000 truck drivers are employed in Japan, but the Boston Consulting Group has forecast a shortage of 240,000 drivers by 2027, which would work out to a 25% labor supply-demand gap in the trucking industry.

In the US, where similar driver shortages and work environment challenges also exist (Figure 2), the use of electronic logging devices (ELDs) to track driving time and driver attendance was mandated and fully implemented in December 2019. ELDs are devices that record the operational status of trucks and other vehicles. Drivers are required to log in each time before the start of their driving duties, and vehicle operations and driver attendance are recorded simultaneously. The introduction of ELDs was aimed at managing and improving the working environment for drivers against the backdrop of an increase in truck accidents, but since ELDs enable precise management of vehicle operations, they are also being used to calculate CO2 emissions and thus play a role as an environmental measure.

Figure 2: Truck driver shortage trends in the US



Note: Figures for 2022 and beyond are projections

Source: Compiled by MGSSI based on data of the American Trucking Association (ATA)

In Japan, it is expected that the use of ELDs or similar devices will support management of vehicles and driver attendance and thereby improve the working environment, as well as promote measures to reduce CO2 emissions through visualization of CO2 emissions data.

4. THREE EFFECTIVE APPROACHES TOWARD DECARBONIZATION IN THE TRUCKING INDUSTRY

This chapter summarizes the measures being taken worldwide to reduce CO2 emissions in the trucking industry, organized into three areas of approach.

4-1. Vehicle conversion

Vehicle types that reduce CO2 emissions include electric vehicles, fuel cell vehicles, hybrid vehicles, and natural gas vehicles. The introduction of these types of vehicles is especially advancing for short-distance and last-mile deliveries using small trucks. Meanwhile, it has been said that conversion to EVs for long-distance transportation is difficult due to the heavy weight of the vehicles, long travel distances, and long hours of operation. However, according to the International Energy Agency (IEA), as of 2020, 6,700 large EV trucks had been introduced in China on a trial basis, 450 in the EU, and 240 in the US, mainly by major freight carriers.

Schneider National, a major US freight carrier and logistics provider, has announced a plan to introduce 50 electric semi-trailer trucks manufactured by Freightliner Trucks, a subsidiary of Daimler Truck North America, by the end of 2022. A semi-trailer truck (or semitruck) is a trailer head that tows one or more trailers. An EV semitruck has disadvantages compared to a conventional diesel vehicle, such as being more than twice as expensive to introduce to a fleet, having approximately one-fourth the driving range¹, and taking about 90 minutes to charge. It has, however, the advantages of producing less vibration and noise, thereby placing less strain on the driver and freight cargo. Although transport trucks account for no more than 16% of all automobiles in terms of the number of units, in the EU, for example, they account for approximately one-third of vehicle CO2 emissions due to the exceedingly long distances they travel each year². The freight carriers Dependable Supply Chain Services and Quality Custom Distribution have announced the trial introduction of Volvo-manufactured electric semitrucks. In China, in consideration of CO2 emissions reduction and work efficiency requirements prescribed by the government, vehicle models that are both rechargeable and have replaceable batteries are being introduced at drilling sites of mines and ports where long-distance travel is not necessary.

4-2. Shipping mode changeover

As for modal shifts in freight transportation, in Europe, attention is returning to conventional marine shipping (the UK, Sweden, Finland, etc.) and river transport (France, Belgium, the Netherlands, etc.) with a view to improving shipping efficiency and reducing environmental impact. Water transportation has the advantage of emitting about one-fifth the amount of CO2 compared to truck transportation. In the US, freight transportation companies are experimenting with the promotion of railway use, and the efforts are expected to contribute along with other measures to alleviate the problem of truck driver shortages on long-distance routes.

4-3. Shipping efficiency improvement

Joint deliveries and the sharing of other forms of shipping-related assets are improving load factors, and the use of AI is helping to optimize delivery routes, shifting the focus of freight transportation from making deliveries in a short time to achieving more energy-efficient deliveries. Cooperation between freight consignors and logistics companies is also improving shipping efficiency by allowing for more flexibility with shipping timing and lead times. In the US, Mothership has developed a platform that connects transportation companies and uses AI to optimize delivery routes, reduce the rate of empty vehicle return trips, and improve loading efficiency. The platform has been adopted in the US by major freight carrier XPO Logistics as well as less-than-truckload freight carriers YRC Freight, ABF Freight, etc. In the European market, meanwhile, a similar platform developed by the Israeli company Trucknet is being deployed in France and other European countries. Although the initial goal

¹ Diesel vehicles usually have a driving range of approximately 1,000 miles.

² Kosuke Nishino, *Jōyōsha no datsu tanso-ka e no michisuji* (The road to decarbonization of commercial vehicles), Mitsui & Co. Global Strategic Studies Institute, December 2021

of both developers was cost reduction, the companies clearly state that environmental considerations, such as CO2 emissions reduction and sustainability, are also providing impetus for their development.

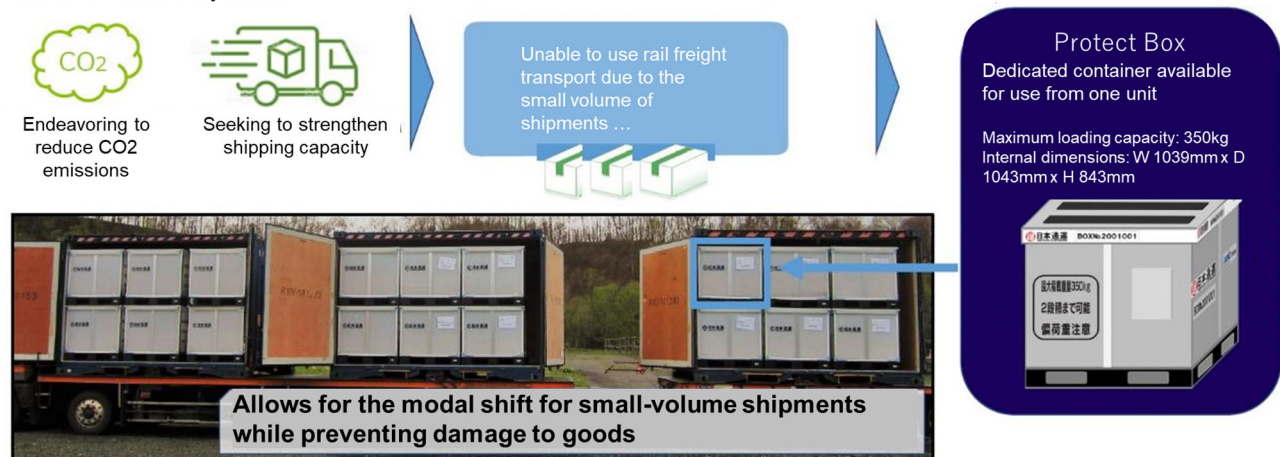
DECARBONIZATION INITIATIVES IN JAPAN

In response to global trends, Japan is also implementing effective measures toward achieving decarbonization.

In the area of “vehicle conversion”, Japan is especially making progress in the shift to EVs for small delivery vehicles. SBS Holdings plans to implement a total of 10,000 trucks (including 1-ton light-duty trucks manufactured by Dongfeng Sokon Motor) designed by Kyoto-based EV startup folofly and produced by Chinese companies. Sagawa Express, Japan Post, Yamato Transport, and others are also introducing EVs for last-mile and short-distance small-volume deliveries, but not for large trucks.

Concerning the “shipping mode changeover”, such a modal shift was clearly stated as an energy-saving measure in a report by the Council for Transport Policy in 1981, and was advocated as part of measures to address global warming in the second Comprehensive Physical Distribution Policy outlined in July 2001. Recently, support for the business has been progressing under the aforementioned Act on Advancement of Integration and Streamlining of Distribution Business. The combination of using trucks with both sea and rail transportation is being tested, and is considered one of the ways to reduce driving hours and to contribute to environmental conservation. Nippon Express, for example, shifted from using conventional large trucks to rail freight transportation to ship chocolates for Nikkoh from Gifu Prefecture to Fukuoka Prefecture. Moreover, the company has developed a new product called Protect Box, a small, dedicated container that can be stored inside a train cargo container, making it possible for consignors of small-volume freight to use rail services for their shipping needs (Figure 3). This is an example of standardization of freight shipping containers, and standardization itself has long been implemented for the purpose of energy conservation and cost reduction. In addition to this, it can further encourage a modal shift in freight transportation tied to decarbonization efforts.

Figure 3: Nippon Express’ “Protect Box” allows for rail freight transport of small-volume shipments



Source: Materials for a lecture given by Tadahiro Furue (Nippon Express), entitled “NX Group’s approach to realizing sustainable logistics”, March 24, 2022

In the area of “shipping efficiency improvement”, joint delivery companies have been established by multiple partners, and the collaborators are proceeding with trials of joint delivery through inter-company cooperation. For example, in 2019, F-LINE was established through the joint investment of five food manufacturers³ to integrate their logistics subsidiaries and other logistics operations. Also, approximately 50 retailers, wholesalers, and manufacturers of food products and daily necessities, including Aeon, are collaborating in a joint distribution project that envisions the sharing of trucks and distribution facilities by 2025. In addition to improving shipping efficiency, these efforts are also addressing driver shortages and reducing CO2 emissions. A joint delivery

³ Ajinomoto, House Foods Group, Kagome, Nisshin Seifun Welna, and The Nisshin OilliO Group

experiment by three major convenience store operators, launched in 2020 to solve the problem of driver shortages and reduce environmental impact, has resulted in improved loading rates, less CO2 emissions, and other positive results. This is proving that collaboration is possible even among competitors, and it will rather become essential in the future. Kao and Aeon have been working together on trucking operations between the Kanto and Chubu regions, using Shizuoka as an intermediate point of relay to allow drivers to make one-day trips. Sapporo Group Logistics and Nissin Foods have started joint shipping of combined freight of heavy beer kegs and lightweight instant noodles (Figure 4). For the optimization of shipping routes, Meitetsu Transportation is among those companies leveraging AI technologies.

Figure 4: Example of joint delivery efforts between Sapporo Group Logistics and Nissin Foods



On the outbound route, even when beer kegs, which are heavy cargo, are loaded to reach the truck's maximum loading weight, space is left at the top of the cargo bed. By replacing some beer kegs with instant noodles to fully fill the space, a loading factor of almost 100% is achieved in terms of both weight and volume. On the return trip, when the truck cannot be fully loaded with empty Sapporo beer kegs, empty pallets of Nissin Foods are loaded in the available space, thereby increasing the loading factor.

Source: Sapporo Holdings news release, February 17, 2022: <https://www.sapporoholdings.jp/news/dit/?id=8894>

Efforts to address decarbonization through these three approaches, which are making headway in countries around the world, will accelerate in Japan as well. While companies have already been pursuing a changeover of shipping mode and an improvement in shipping efficiency in a bid to reduce costs, the most significant change is the acceleration of inter-company cooperation in the face of the requirement to reduce CO2 emissions. These efforts will contribute not only to protecting the environment, but also to solving the trucking industry's driver shortage problem. In the process of keeping in step with the global decarbonization trend, the trucking industry is being forced to address a number of other existing problems all at once, such as the need to improve the working environment by rectifying the long-standing issue of long working hours for drivers.

Any use, reproduction, copying or redistribution of this report, in whole or in part, is prohibited without the prior consent of Mitsui & Co. Global Strategic Studies Institute (MGSSI). This report was created based on information and data obtained from sources believed to be reliable; however, MGSSI does not guarantee the accuracy, reliability, or completeness of such information or data. Opinions contained in this report represent those of the author and cannot in any way be considered as representing the unified opinion of MGSSI and the Mitsui & Co. group. MGSSI and the Mitsui & Co. group will not be liable for any damages or losses, whether direct or indirect, that may result from the use of this report. The information in this report is subject to change without prior notice.