

A Special Feature Article

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To Achieve carbon neutrality

-The automotive industry's response and the major challenges that stand in the way-

The automotive industry is moving more and more to achieve the government's goal of becoming carbon neutral by 2050. Reducing carbon dioxide (CO₂) emissions throughout the lifecycle of a vehicle, including energy production, the manufacturing process, and during vehicle operation, is a major issue for the entire industry. In the future, it is expected that automakers will strongly demand that parts manufacturers reduce their CO₂ emissions. For parts manufacturers, efforts to decarbonize are directly related to the survival of their core business. Major parts manufacturers have started to formulate concrete plans and initiatives to achieve carbon neutrality by 2050 in their business activities

The challenge is to promote to Tier2 and below.

While well-capitalized automakers and Tier1 companies could promote plans that follow a roadmap toward carbon neutrality, it is not easy for Tier2 companies and smaller manufacturers to go carbon neutral in their production activities that require large investments. There are many issues to be solved to achieve carbon neutrality in the entire industry, such as support measures and funding support from automakers, Tier1 companies, and other companies that are taking the lead in decarbonization, but if we do not work to reduce CO₂ emissions, it will have a significant impact on the survival of our business. The entire industry is trying to survive, industry associations are required to take a leading role in promoting and supporting carbon neutrality among small and medium-sized companies.

Accelerate collaboration among industry associations.

JAPIA has launched a new cross-sectional organization, the Carbon Neutral Response Subcommittee, this year. The purpose of this project for JAPIA is to conduct a survey on carbon neutral initiatives, opinions, and issues to member companies, to understand the situation of each company, and to recognize and support issues. Regarding the realization of carbon neutrality, Shinichi Odo, chairman of JAPIA, said, "Ultimately, each company will have to work on its own, but it will be difficult for one company to tackle everything." JAPIA will play a role

in understanding the problems the industry and seeking support from the government and other related organizations.

Cooperation among automotive-related organizations is essential for this industry-wide issue. Five industry organizations, JAMA (Chairman Akio Toyoda), JAPIA, JABIA (Chairman Kazuhiro Miyauchi), JAMTA (Chairman Osamu Tsuji), and JADA (Chairman Kazuo Kato), have established a new joint secretariat for the realization of carbon neutrality. The goal is to strengthen support for small and medium-sized companies, which are the key to reducing CO2 emissions throughout the entire life cycle, and to identify industry-wide issues.

In order to disseminate more information and implement more effective measures, it is necessary to cooperate with non-automotive related organizations. The Battery Supply Chain Council (chaired by Isao Abe), which was launched on April 1, is eager to actively collaborate with automotive-related organizations. Carbon neutrality in batteries requires efforts in the entire supply chain, including stable procurement of raw materials, mining of resources, and recycling. However, it is difficult to achieve this within the industry alone, such as battery manufacturers. We are planning to work with the automotive industry to make automotive batteries carbon neutral.

Strategies are being materialized, mainly in major companies.

In June, TOYOTA MOTOR CORPORATION announced that it has moved up its initial goal of becoming carbon neutral by 2050 to 2035. The company will begin to decarbonize globally. Toyota-affiliated suppliers are also moving toward the early realization of carbon neutrality.

DENSO CORPORATION was the first company to announce its intention to move up its carbon neutral target, aiming to achieve it by 2035 like TOYOTA MOTOR CORPORATION. This spring, a CO2 recycling plant was installed at the Electric Power Development Center in the Anjo Plant (Anjo City, Aichi Prefecture) and demonstration experiment began. The plant consists of a 'dehydrator' that removes water from the exhaust gas from the equipment and a 'CO2 recovery unit,' a 'hydrogen generator' to produce hydrogen to be synthesized with the recovered CO2, and a 'methanation reactor' to produce methane gas from hydrogen and CO2. We will test a process to generate methane gas from CO2 emitted in the production process and hydrogen made from renewable electricity and reuse it as an energy source for the factory. The CO2 produced by burning methane gas is also put back into the recovery cycle.

TOYODA GOSEI Co., Ltd. will introduce a recycling plant for waste rubber materials generated in the weather strip manufacturing process to reduce CO2 emissions. The plant was installed at the Morimachi Plant (Morimachi, Shizuoka Prefecture) and has recently started operation. About 20 years ago, they developed a technology to cut the bonds between rubber and sulfur compounds by shearing heat while retaining the bonds between rubber molecules by controlling the rotation speed and temperature of the metal screw. Since the deodorization technology, which is also related to the quality of delivery, was insufficient and new materials were cheaper, the project was limited to demonstration. Since recycled materials emit less CO2 than new materials at manufacturing, it could contribute to the environment by reducing CO2 emissions by 1,000 tons per year, TOYODA GOSEI Co., Ltd. decided to introduce them on a full scale.

TOKAIRIKA,CO, LTD. has increased target for CO2 emissions in the manufacturing stage in 2030 from 35% to 65% compared to FY2013. As part of its efforts to decarbonize, the company has developed a system that can predict CO2 emissions during manufacturing at the parts design stage and will begin utilizing it in 2025. TOKAIRIKA,CO, LTD. will use this information to design parts that emit less CO2 than ever before and also use it as PR for automakers.

In addition to Toyota-affiliated suppliers, an increasing number of parts manufacturers are showing a policy of going carbon neutral, such as 'Yorozu Corporation's formulation of the Yorozu Global Environmental Vision 2040.'

The use of hydrogen is gaining attention.

Hydrogen is being used more and more as a next-generation energy source. TOYOTA MOTOR CORPORATION produces hydrogen from electricity generated by solar panels installed at TOYOTA MOTOR KYUSHU, INC.'s Miyata Plant (Miyawaka City, Fukuoka Prefecture) and uses it for fuel cell forklifts and other equipment. In addition to this, OBAYASHI CORPORATION, a major general contractor, will start using hydrogen generated by geothermal power generation at a plant in Oita Prefecture. The green hydrogen produced in Kyushu is also used as fuel for hydrogen-powered cars at races held in the region, and the region is taking on the challenge of the local production for local consumption of renewable energy.

AISIN CORPORATION has set a goal of reducing emissions by at least 50% in 2030 compared to FY2013 and becoming carbon neutral by 2050. Started

evaluation of hydrogen-fueled indirect heating burner in the continuous heat treatment furnace at Shiroyama Plant (Nishio City, Aichi Prefecture) in May, jointly with TOHO GAS Co., Ltd.. The company plans to test a hydrogen-fueled direct-heating burner in the Nishio plant's aluminum melting and holding furnace this fall, with the aim of commercializing it in five years.

Sumitomo Rubber Industries, Ltd. will begin a demonstration experiment to use hydrogen for tire production. A hydrogen boiler will be installed in the NEO-T01 metal core manufacturing system, and carbon-free hydrogen procurement will be considered to reduce CO₂ emissions throughout the tire life cycle. The hydrogen will be produced in Fukushima Prefecture, creating a model for the local production for local consumption of energy. Sumitomo Rubber will evaluate the effectiveness of converting production energy to hydrogen by identifying the issues that need to be addressed when installing a hydrogen boiler during 24-hour continuous operation, such as controlling nitrogen oxide emissions. In the future, it will plan to expand its business to the entire plant and to other plants in Japan and overseas.

Tire manufacturers face decarbonization challenges in materials

Tire manufacturers believe that the use of biomass materials will also contribute to carbon neutrality. But it is not realistic to use biomass material for mass-produced tires because it is not possible to extract enough biomass material to supply all tire manufacturers and cost is too high. It is difficult to achieve carbon neutrality without the cooperation of other companies in the industry and raw material manufacturers. There is an opinion that it is necessary to set up a consortium, rather than a single company's effort, to study and secure materials for carbon neutrality. Therefore, it may take some time to realize this.

Steel industry also moving toward zero carbon

Steel manufacturers, which account for about 40% of the CO₂ emitted by the domestic manufacturing industry, are working in earnest to reduce CO₂ emissions by developing zero-carbon steel. The industry is aiming to commercialize Course 50, which replaces part of the reduction with hydrogen to reduce CO₂ emissions from the blast furnace, and Ferro-coke technology, which uses ferro-coke, a blast furnace material produced from low-grade coal and iron ore, to increase the reduction efficiency in the blast furnace. The goal is to eventually commercialize a hydrogen reduction steelmaking system that does not

use coal and can reduce CO2 emissions to zero, but there are many obstacles to overcome, such as reducing production costs and procuring large amounts of inexpensive green hydrogen.

The chemical industry is in full swing with its resource recycling system

The chemical industry is second largest emitter of greenhouse gases in the manufacturing industry after the steel industry. Renewable energy and other sources are being introduced into the business bases of various companies, which will accelerate the reduction of CO2 emissions in manufacturing. In addition, companies are working on use of biomass for raw materials and circular economy. Collaboration with related companies and academia is also underway to build a resource recycling system through material recycling. In April, SUMITOMO CHEMICAL COMPANY, LIMITED established the Plastic Resources Recycling Promotion Office, aiming to commercialize resource recycling-related business. In June, the company began discussing a business alliance with REVER HOLDINGS CORPORATION, a general recycling company, and will make decision on the alliance within a year.

By combining SUMITOMO CHEMICAL COMPANY, LIMITED's plastic manufacturing technology and REVER HOLDINGS CORPORATION's knowledge of waste recycling, the company will recycle collected plastic waste into products. The company will also start demonstration experiment on acrylic resin in the fall of 2022. It will establish a recycling system, including a collection system for automobiles and home appliances, and a resource circulation system from reclamation to commercialization for social implementation.

Consideration of the use of biomass for materials is also in progress gradually. Mitsui Chemicals Inc. will introduce biomass naphtha at Osaka Plant (Takaishi City, Osaka Prefecture) in October. Replacing petroleum-derived naphtha with biomass resources is to achieve a low-carbon society.

There is no time to wait to become carbon neutral in the manufacture of parts and materials. While it has been pointed out that the target figures are spreading like wildfire, there are many manufacturers who recognize that "we cannot let future generations bear the burden of environmental problems" (Hideki Kobori, President of Asahi Kasei Corporation). While the major companies will be the first to make progress, it will be interesting to see how each company reduces emissions as they work toward their high goals.