

Achievements of FC Element Technological R&D

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1. Governmental Measures

(1) METI

On July 6th, the Ministry of Economy, Trade and Industry (METI) revealed a draft roadmap to commercialize highly efficient thermal power station technology with lower CO₂ emissions. “Integrated coal gasification fuel cell combined cycle (IGFC)” is a combination of coal gasification technology and fuel cells (FCs) and an ultimate future technology still under development. The ministry shows the intention to establish IGFC by 2025 in the draft. The roadmap will be officially compiled at a meeting of a committee of industry, academia and government this month. The draft plans to establish “integrated coal gasification combined cycle (IGCC)” which is a power generation technology with steam turbines and gas produced from coal by 2018. This technology allows the reduction of CO₂ emissions by 20% compared to that of the most advanced coal power generation. IGFC established by 2025 is estimated to cut down the emissions by 30%. As a liquefied natural gas (LNG) power generation, gas turbine fuel cell combined cycle (GTFC) is a combination of steam turbine and FCs, and planned to be established by 2025. Commercialization of these technologies allows 20% reduction in CO₂ emissions compared to the most advanced technology at the moment. (The Sankei Shimbun, July 7, 2015; The Denki Shimbun, July 15, 2015; The Nikkan Kogyo Shimbun, July 20, 2015)

On July 23rd, the ministry started a discussion of industrial policy to be achieved by the 2020 Tokyo Olympics and Paralympics. Actual measures will be compiled with next generation cars and actions for the aging population as the key fields by the end of this financial year. A meeting of the advisory committee “2020 Future Development Committee” of the Industrial Structure Council was held on the day, and METI indicated nine projects as key fields including “mobility”, “stress-free” and “energetic super-aging

society”. As “mobility”, the market of electric vehicles (EVs) and fuel cell vehicles (FCVs) are to be expanded by 2020. Additionally, an automatic driving system is planned to be commercialized. (The Nikkei, July 24, 2015)

(2) Japanese Government

On July 14th, the Cabinet approved the white paper on energy usage which shows the current state of the energy structure in Japan and a direction of institutional reform based on state changes of energy security such as revolutionary shale gas in the US. The government brought up discussions on power source structure (energy mix) in 2030 and emphasizes early achievements of the hydrogen society, energy saving/environmental measures and stronger market competition as a long-term objective to be promoted at same time. For hydrogen society, the energy source is to be diversified by implementing promotional measures of FCVs and hydrogen refueling stations. They also brought up developing a hydrogen supply chain using oversea unused energy and a hydrogen production system using renewable energy as examples. (Nikkan Jidosha Shimbun, July 15, 2015)

(3) MOE

The Ministry of the Environment (MOE) will test a small ship using FCs in the actual environment of the ocean from August. The experiment will use hydrogen produced by excess electricity of floating wind turbines which is another experimental project off the coast of Goto, Nagasaki Prefecture carried out by the ministry. Toda Corporation will operate the experiment which aims to develop a small FC ship to be able to operate on ocean. The ministry intends to establish a technology to reduce CO₂ emissions of ships with the experiment, and use the technology for fishing boats later. (The Chemical Daily, July 31, 2015)

2. Local Governmental Measures

(1) Osaka Prefecture

Osaka Prefecture has selected five proposals out of six for the “Next Generation Electric Vehicle Development Project” to build and promote the market of FCV and EV. The planned subsidy is ¥22.577 million. The prefecture will support these projects in cooperation with related institutes including the R&D Center for the Electric Vehicles of the Osaka Prefecture University which is designated as supportive organization with a wide range of basic research and human resources. (Nikkan Jidosha Shimbun, July 16, 2015)

(2) Tokyo

On July 21st, Tokyo announced that a FC bus would start operating as public transport by FY 2016. An experiment will start on 27th to find out issues for the operation. According to the local government, this will be the first FC bus operation in the greater Tokyo area. Their aim is over 100 FC buses to be used by FY 2020. These buses are also planned to be used for the bus rapid transit (BRT) to connect the coastal area and the center of Tokyo. During the four day experiment from 27th to 30th, “Toyota FC Bus” developed in cooperation of Toyota Motor and Hino Motors will be examined for its performance in traffic jams, frequent lane changes and on slopes. The test results will be reported to the manufacturers for further development. “We plan to use FC buses for the transport between the Olympic village and the venues to appeal to everyone and give a feel of the coming hydrogen society at the event.” said Governor Yoichi Masuzoe at the press conference on 21st. (The Nikkei, July 22, 2015)

3. FC Related Element Technology Development & Business Plans

(1) Gunma University

Prof. Nobuyoshi Nakagawa at the Department of Chemical and Environmental Engineering of Faculty of Engineering of Gunma University developed a highly active electrode catalyst for direct methanol fuel cells (DMFCs). Carbon nano-fiber is soaked in a solution of titanium oxide precursor, and then oxidized to become a titania coated carbon nano-fiber (TCCNF). TCCNF is used to support metal particles for this new catalyst. The catalyst contributes to reducing the

amount of platinum and ruthenium used, and exhibits triple the activity of commercial catalysts. The professor is working on collecting data of power generation and improvement of durability in order to commercialize the catalyst early. He is also trying to improve DMFC power output while reducing the amount of platinum. His previous development was titanium oxide embed carbon nano-fiber (TECNF) in which CNF is strongly bonded with titanium dioxide particles to achieve high catalytic activity. The trial catalyst with the precious metal supported demonstrated a conductive property between a reaction point and the FC current collector, which indicates high activity. TCCNF uses the knowledge of TECNF. CNF with a diameter of 100 to 300 nm is manufactured and soaked in a solution of titanium oxide precursor. The CNF is dried and oxidized to be TCCNF. Because CNF surfaces are totally coated with titanium oxide particles, TCCNF has double the methanol oxidation activity of that of TECNF where each titanium oxide particle is bonded to another at a point. The new catalyst can perform at the same level with one third of platinum of that of conventional catalysts. (The Chemical Daily, July 10, 2015)

(2) Fuji Electric

Fuji Electric aims at orders for 60 units of business use FCs, nearly double of that of FY 2014. The orders were placed for 34 units for FY 2014, and half of them are for oversea. The majority of FCs for oversea is pure hydrogen system. In Japan, FC systems using sewage digestion gas are included in the feed-in tariff (FIT) scheme, and are going strong. The manufacturer plans to continuously expand its sales of this type of FCs. They target for Europe, South Korea and South Africa for oversea FC sales. Currently their product range of phosphoric acid fuel cells (PAFCs) and solid oxide fuel cells (SOFCs) for business use are under development. (The Denki Shimbun, July 14, 2015)

(3) Kyoto University

A team of Prof. Koichi Eguchi has developed a FC to generate power using a reaction of ammonia and oxygen in the air in cooperation of Noritake Co. Their next target is to develop 1 kW level FCs for home by 2020. Ammonia contains a large amount of hydrogen, and is expected to be a fuel for power generation replacing oil. Common FCs generate power using

hydrogen and oxygen, and ammonia has the advantage of being liquid and therefore easier than hydrogen for transport. The new FC is a SOFC using ceramics. Connecting parts of conventional products corrode which leads to leaks of ammonia. The study team used glass as a material for the trial FC to avoid corrosion. The product uses ammonia directly, and generated 255 W of power. This generation efficiency is better than that of a FC using hydrogen. The team will test the durability next. (The Nikkei & The Chemical Daily, July 27, 2015)

(4) Tokyo Institute of Technology

A team of Prof. Kimihisa Yamamoto and Associate Prof. Takane Imaoka at the Chemical Resource Laboratory of the Tokyo Institute of Technology has discovered that platinum particles consisting of 19 atoms could demonstrate 20 times better catalytic activity than that of existing carbon supported platinum catalysts. A technology was developed to precisely control and each composing atom of platinum nano-particles to synthesize for this research. The team investigated catalytic activity of the oxygen reduction of platinum nano-particles consisting of a small number of atoms, and pointed out the structure exhibited the highest catalytic activity yet observed. This study was carried out as “Nano-system Creation by Process Integration” of the “Strategic Basic Research Program (CREST)” of the Japan Science and Technology Agency (JST). The team of Prof. Yamamoto developed metallo-nano molecular system processing, which can control a number of atoms using dendrimer, branched molecules, as the CREST project “Establishing Metallo System to Create New Metal Nano-particle”. The new research used this technology. The number of atoms in platinum nano-particle was precisely controlled to between 12 and 20, and each catalytic activity of oxygen reduction was examined. As a platinum atom was added, the catalytic activity irregularly changed. Because platinum has a highly geometrically symmetric structure, the most stable and effective number of atoms was believed 13 (Pt13) previously. However Pt13 was the least active among the others. The highest was 19 atoms of platinum particles (Pt19) which exhibited four times the activity of that of Pt13. The activity of Pt19 per mass was found out 20 times better than that of commonly used

carbon supported platinum nano-particles of 3 to 5 nm diameter. (The Chemical Daily, July 27, 2015)

(5) Mitsubishi Gas Chemical Company

An uninterruptible power supply using DMFCs of Mitsubishi Gas Chemical Company has been tested at the Gotemba field pickup unit (FPU) of NHK Shizuoka, and the FC stably operated in the test. As a portable power source, the FCs performed an experimental operation to power a camera to broadcast a golf game. The manufacturer aims to sell and promote the product using the reliable performance exhibited in the test. A stationary FC system was installed at the FPU base of NHK Gotemba as an emergency power source for the test and achieved a 2,000 hour backup. A portable FC system was used to power a camera to broadcast the golf game. Due to its quiet and clean operation, the portable product can be placed around a teeing ground, and can supply power for eight-hours of broadcasting without refueling. The Niigata Research Laboratory of the manufacturer carried out a durability test in an outdoor environment for a year, and the product demonstrated a stable operation. With these test results, the manufacturer has decided on standard specifications of UPS and portable power generator. They mainly aim to sell their UPS as backup power sources for broadcasting equipment and portable base station and emergency power sources for businesses and local governments. The portable one will be targeted for broadcasting equipment and as a power source for outdoor activities and recreations. DMFCs directly use liquid methanol as fuel without reforming, and their fuel is easily supplied, stored and transported, making it safe. These power systems are characteristically clean without harmful gas emissions such as nitrogen oxide and sulfur oxides. The firm developed an electrolysis layer which has an original composition and structure with a highly distributed platinum catalyst to improve power density. Power generators have been their key products since emergency power sources increased in demand after the Great East Japan Earthquake. The UPS version is 500 W level DMFCs with large capacity, and the portable one is a 250 W level generator. A lithium-ion battery (LIB) unit can make the output even more stable. (The Chemical Daily, July 28, 2015)

(6) Tokyo Gas & Kyushu University

A research group of Tokyo Gas and Kyushu University has developed a method to significantly improve generation efficiency of SOFCs. A single cell consists of a charge carrier of solid electrolyte, and oxide ions are used for common charge carriers. In this method, oxide ions are replaced with protons when cell stacks, the main unit of a FC system, are arranged in series. This method improves the generation efficiency from the current 45 to 55% lower heating value (LHV) to over 80% LHV. The group aims to commercialize the method in 10 years. Tokyo Gas and a group of Dr. Kazunari Sasaki, the head of the Kyushu University Next-Generation Fuel Cell Research Center make the research group, and pursued this achievement. They developed a calculating formula to estimate generation efficiency of SOFCs where cell stacks are arranged to fit with the fuel flow of a variety of materials and conditions. The group researched conditions to maximize the generation efficiency, and found out that the efficiency theoretically increased to over 80% LHV by replacing oxide ions of charge carrier with protons in solid electrolyte. (The Nikkan Kogyo Shimbun, July 30, 2015)

4. Hydrogen Infrastructure Related Technology Development & Business Plans

(1) Iwatani

Iwatani will increase hydrogen production for FCVs. A new plant will be constructed in Kanagawa Prefecture by FY 2018, and their existing plants in Chiba and Yamaguchi Prefectures will improve the capacities. That will raise the production capacity by 80%. The investment is up to ¥12 billion. The manufacturer is the leader in the hydrogen market for semiconductor plants in Japan with a 70% share. With anticipation of FCV growth, their plan is to improve their production capacity before their competitors. Iwatani's advantage is a technology to store and transport hydrogen by chilling and liquefying it. The production capacity of liquid hydrogen will be increased to 504,000 L each day by FY 2018. Hydrogen is expected to be used also for power generation. JX Nippon Oil & Energy Corporation and Taiyo Nippon Sanso have strengthened their hydrogen business. Iwatani

estimates hydrogen demand to increase to 16 times of that of current one by 2025 when FCVs become popular. (The Nikkei, July 9, 2015)

(2) Showa Denko

Showa Denko will test a system to supply neighboring buildings with hydrogen which is produced during the production of chemical products. A pipeline will be installed between their plant in Kawasaki City and building for hydrogen to be used as fuel of stationary FCs. FCs give less impact to the environment, and stable hydrogen supply is essential to use FC's fully. The manufacture has focused on hydrogen which comes from the production at the plant, and will try to bring this as a profitable new business. (The Nikkei, July 24, 2015)

5. Ene-Farm Business Plans

(1) Hokkaido Gas

Hokkaido Gas will introduce new Ene-Farm for cold climates into the market on October 1st. The product will sell for ¥2.1 million, excluding tax. Although the firm has limited the sales to the regions around Sapporo, Otaru and Hakodate Cities, Chitose and Kitami Cities will be added to the sales area. Their target for FY 2015 is 190 units of sales. The new FC system has an output range of 200 to 700 W. By improving insulation of the system and reviewing the internal structure, the lowest environmental temperature for operation was lowered from -15 to -20 °C. The price was reduced by ¥0.1 million from the existing product by revising the system structure. (The Nikkan Kogyo Shimbun, July 7, 2015)

(2) Osaka Gas

For 2015, Osaka Gas aims to sell 12,300 units of Ene-Farm, a 10% decrease on that of the previous year. The target is lower than the sales figure for the previous year when they introduced a new product into the market. However, a combined generation system with photovoltaic generator is becoming popular and expected to be over 10,000 units which would be the second consecutive 5-digit sales for them. Their accumulated sales went over 40,000 units in July. Sales of home gas energy-saving equipment are the key to explore gas demand. The accumulated sales with "Ecowill" which generates power with an engine reached 128,000 units, the highest number in Japan. (The Nikkei Business Daily, July 15, 2015)

On July 16th, Osaka Gas revealed its apartment building which is a test environment for energy saving technologies in Osaka City. The apartment building is used as employees' accommodation with pieces of the latest energy saving gas equipment combined to measure the effect. Since 2013, an experiment has been carried out to share electricity and heat between apartment units using SOFCs, a highly efficient generation system. In the experiment, energy saving effect reached double occasionally, and the results will be publicized this autumn. The apartment building for the experiment is "NEXT 21", Tennoji-ku in Osaka City, to test energy-saving equipment in order to introduce them by 2020. There are five types of energy tests are in progress including effective heat use combining FCs and solar power and an experiment of next generation home energy management system (HEMS). The previous HEMS has the ability to control fewer pieces of equipment. The next generation one has improved to be capable of remote control of gas equipment and home appliances, which allows the turning off of a gas cooker without being there using a tablet PC. Also the system enable residences to find out household consumption of electricity, gas and water in more detail such as use by each room or purpose with various patterns of displays. The next generation of Ene-Farm targets 50% generation efficiency, and is also being tested there. (The Nikkei & The Denki Shimbun, July 17, 2015)

6. Cutting Edge Technology of FCV & EV

(1) Hyundai Motor

On July 9th, Hyundai Motor, the largest South Korean automaker, announced that its first plug-in hybrid vehicle (PHV) had been released in South Korea. The sales will be limited to 100 vehicles to start with. The firm will prepare chargers in cooperation with retailers as quickly as possible, and the full-scale sales are planned to start in 2016. (The Nikkei, July 10, 2015)

(2) BMW & German-based Automakers

Currently, BMW has the only one PHV, "i8", and will expand its PHV range to five. Their luxury sport utility vehicle (SUV) "X5" will offer PHV from this summer. Next year, they will add PHV in "2 Series Active Tourer", "3 Series" and "7 Series". The carbon

fiber for "i8" will also be used for 7 Series to make the body light in order to extend the driving range on battery. Other automakers are adding eco cars in their product ranges. Currently, German-based Audi does not have diesel cars, but a few diesel cars will be introduced into the market in the first half of the next year according to Mr. Hiroshi Okita, the president of Audi Japan. "A3" will offer PHV in this year. German-based Volkswagen (VW) will add PHV and diesel in the mid-size car "Passat", and PHV in its core product "Golf". German-based Mercedes-Benz will add PHV and diesel car to "C-Class" as well as a diesel hybrid vehicle (HV). (The Nikkei, July 11, 2015)

Mercedes-Benz will open a showroom in Haneda Airport in this month to appeal to consumers, and diesel and PHV version of C-Class will be introduced into the market. (The Nikkei, July 17, 2015)

(3) Nissan, Mitsubishi, Honda & Others

Although EVs, PHVs and FCVs are more expensive than conventional cars, they have an advantage of power output function. Nissan has developed an EV "ultimate smart BBQ car" which allows making the familiar leisure of BBQ easier using the business use EV "e-NV200" as the base. Mitsubishi Motors will introduce new "Outlander PHEV" at its annual auto camping event this year. The car will appear in programs of café and lighting using electricity from the car. According to the public relation section, some users enjoy watching stars using electricity from PHEV to operate telescopes. Honda has operated a merry-go-round as a power output demonstration using a high power FCV. This program gives an excellent impact to catch eyes of children and grown-ups at environmental fairs. (The Nikkan Kogyo Shimbun, July 20, 2015)

Honda has announced that an experiment of an inverter for power output would be carried out in cooperation of Tottori University Hospital in August. Electricity from EVs and FCVs will be sent to medical equipment using an inverter to investigate the possibility to use these cars for medical activity during disasters. Honda developed an inverter for power supply "Power Exporter CONCEPT 9000", and will examine operation of the device to send power from EVs to medical tools such as concentrated oxygen supplier and portable X-ray machine. (The Nikkei Business Daily, August 3, 2015)

(4) Toyota & Hino Motors

On July 21st, Toyota Motor and Hino Motors announced that their jointly developed FC bus would be tested in Tokyo. The test period is from 24th to 30th. The bus will operate in the center and bay areas, and the power supply experiment will be carried out at the Tokyo Metropolitan Research Institute for Environmental Protection, Koto-ku. The low-floor hybrid city bus of Hino is used as the base of the FC bus with “Toyota Fuel Cell System” for FCV MIRAI. The bus has two units each of FC stacks and motors and eight high pressure hydrogen tanks to achieve high power. (The Nikkan Kogyo Shimbun, July 22, 2015)

(5) VW

On July 28th, the Japanese arm of German-based VW announced that an EV “e-Golf” would be released later than the previous launch plan of mid-2015. Changing the quick charging system to fit the Japanese environment has taken time, which is causing the delay. Although the new market introduction timing is left undecided, the release has not been cancelled. (The Nikkei, July 29, 2015)

(6) Haier

Promotional projects for electric motorbikes and EVs are in progress in Laos. On July 28th, Haier, a Chinese major home appliances manufacturer, delivered a trial product of the electric motorbike to the Laotian government. The product is planned to be introduced into the market in 2015. Electric three-wheelers have been used in Luang Prabang, a northern tourist town. Laos aims to revitalize its economy using EVs and plentiful power sources, including hydroelectric energy. Mr. Yoshiaki Ito, the president of Haier Aisa, came in on an electric motorbike with the company logo in the handover ceremony in Vientiane. “There is a large business opportunity in Laos where plenty of electricity sources are found” he said with an expectant of business growth. They have a target of over 3,000 vehicles for 2015. The product is planned to be exported from Japan to begin with, and they are considering production in the country in future. The product has been jointly developed with the Ministry of Science and Technology, Laos, and Sims International which is a venture of electric motorbikes in Shiga Prefecture, and has given technical support. It takes eight hours to charge the bike, but it can drive

80 km on the battery. The price has not been set yet, but they plan to price the product at the same level of a gasoline motorbike according to Mr. Ito. The whole city of Luang Prabang is registered as a World Heritage Site, and gasoline vehicles are being replaced with electric ones. The Japan International Cooperation Agency (JICA) carried out a project of electric three-wheelers for auto rickshaw produced by Prozza, Ichinomiya City of Aichi Prefecture. In the city, 14 electric auto rickshaws are in operation on fixed routes like buses, and expected to be used by tourists. The head of the transport bureau of the city said they aimed to reduce CO₂ emissions to protect the World Heritage. (The Nikkei, July 29, 2015)

(7) BYD

BYD, a major Chinese automaker, announced that 10 electric buses had been delivered to Campinas, in the state of São Paulo, and the operation began in mid-July. This is the first electric bus for Brazil. The manufacturer will start the production of the bus at its new plant in the city in this year. (The Nikkei, August 1, 2015)

7. Hydrogen Refueling Station Business Plans

(1) Shinko EN&M

For the growing FCV market, Shinko EN&M plans to increase orders for hydrogen refueling stations with the advantage of total engineering. This product is a combination of their own simulation technology to detect irregular hydrogen dispensing activities, a high pressure hydrogen compressor and microchannel heat exchanger of Kobe Steel as the core equipment. For FY 2013, three orders were placed for stationary hydrogen refueling stations in the greater Tokyo area. For FY 2014, one order was placed for a stationary station in Kyushu. They received seven orders, and are currently working on detail design using a simulation for the optimum combination of equipment. A hydrogen refueling station requires ¥400 to 500 million construction costs. The preparation of the facilities is expected more in urban areas as the FCV market grows. For this reason, the Shinko EN&M is trying to make facility smaller and to reduce the construction costs to ¥200 million by cutting down the delivery period from 12 months, the delivery period in FY 2013, to 10 months by 2025. Currently their market share is 30%, and they aim at 50%. (Japan

Metal Daily, July 9, 2015)

(2) The High Pressure Gas Safety Institute of Japan

The High Pressure Gas Safety Institute of Japan, Tokyo, will strengthen its test and research function of high pressure hydrogen containers. Their Research & Development Center, the core research laboratory in Machida City, will be completely rebuilt, and construction will start this year. At the same time, a testing facility will be prepared on the same premises to test the strength of hydrogen storage containers for refueling stations. Currently, they can only test automobile hydrogen tanks, and a new dedicated facility will be installed on top of the one for automobile tanks to meet the increasing demand for safety evaluation of containers for hydrogen refueling stations. The construction period is planned to be around one year. There is a facility to examine durability and burst strength of high pressure hydrogen containers, but it can only test the capacity level of 150 to 180 L which is the small automobile tank size for FCV related product. (The Nikkan Kogyo Shimbun, July 10, 2015)

(3) Sohgo Security Services

Sohgo Security Services, also known as ALSOK, will start a security service for hydrogen refueling stations with Hochiki, a major manufacturer of fire alarm notification appliances, this month. This service offers a package to look out for facility troubles and the incursion of suspicious individuals and to prevent explosion. ALSOK will support safety measures for hydrogen refueling stations of which the number is expected to increase. They target at ¥150 million sales with 20 contracts for the first year. The service includes 24 hour remote monitoring, stopping facilities by remote control when facilities operate abnormally and sending security agents to solve problems. When an intruder is found by image sensor, an agent tries to warn them and get them to leave using a speaker installed at the facility from the monitoring center. (The Nikkei, July 18, 2015)

(4) Four Gas Suppliers

Four gas suppliers will operate a total of 10 hydrogen refueling stations from FY 2015. With the advantage of hydrogen production from natural gas, their plan is to create a new natural gas demand. They are hastening to be “total energy firms” to survive a fiercer competition of the coming full liberalization of

consumer gas sales in 2017 for their main business. (Nikkan Jidosha Shimbun, July 22, 2015)

(5) JX Nippon Oil & Energy

JX Nippon Oil & Energy revealed that its plan to switch from purchasing hydrogen for FCVs to producing it. A high pressure hydrogen production facility will be built at their Central Technical Research Laboratory, Yokohama City, to supply their refueling stations in the greater Tokyo area from FY 2016. They plan to achieve a significant efficiency improvement for storage and transport using an organic hydride to make the hydrogen supply business profitable in the future. The new facility will extract hydrogen from LPG to distribute the gas to its own refueling stations in the greater Tokyo area. The planned specifications allow the production of 15,000 m³ of hydrogen, about 300 FCV worth, each day. Currently they buy hydrogen gas from producers, but will prepare their own supply chain in the greater Tokyo area. The new facility has higher filling pressure, which enable lorries to transport double the amount of hydrogen. They are developing a technology for hydrogen storage and transport using an organic hydride. This technology turns hydrogen into liquid by reacting it with another chemical, which gives the advantage of transport at normal temperature and pressure. The technology is planned to be commercialized by 2025. They intend to expand hydrogen usage to hydrogen power generation and domestic/industrial distributed power sources as well as hydrogen from renewable energy. (Nikkan Jidosha Shimbun, July 24, 2015)

(6) Shikoku Taiyo Nippon Sanso

Shikoku Taiyo Nippon Sanso, a group member of Taiyo Nippon Sanso, will operate a commercial mobile hydrogen refueling station at its headquarters in Tokushima City next February. This filling facility on a trailer is the first hydrogen refueling station in Shikoku. Tokushima Toyopet registered one FCV of MIRAI to offer test rides, and want the mobile refueling station to be a key factor to promote FCVs. (Nikkan Jidosha Shimbun, July 28, 2015)

(7) Mitsubishi Kakoki Kaisha

Mitsubishi Kakoki Kaisha will work on technological development to make some pieces of hydrogen filling equipment into a single package. With the licensing of technology from Danish-based H2 Logic, a compressor,

accumulator and chiller required for a filling facility will be fitted in a single container. This will achieve a cheaper installation cost than individually installing each piece of equipment, which contributes to a reduction in the cost of refueling facility preparation. Shikoku Taiyo Nippon Sanso aims to introduce the product into the market by FY 2016. They develop a unit to produce and compress hydrogen to fill FCV at a high pressure. By placing the equipment in a container, the installation will be shortened, which will allow the dispensing hydrogen within 48 hours of the start of installation. The hydrogen supply capacity is 300 Nm³/h, which is applicable for a subsidy in Japan. (The Nikkan Kogyo Shimbun, July 31, 2015)

Mitsubishi Kakoki Kaisha introduced an experimental hydrogen supply system using sewage biogas developed in cooperation of Fukuoka City, Kyushu University and Toyota Tsusho at the Sewage Work Exhibition in Tokyo Big Sight held until July 31st. This project tests a system to produce hydrogen from sewage biogas at Fukuoka City Central Sewage Treatment Center to supply FCVs with hydrogen. Hydrogen production unit “HyGeia-A” developed by Mitsubishi Kakoki Kaisha and dispenser were installed, near the established sewage treatment facility and the experiment started in April. Gas derived from digesting sewage sludge in a chamber is processed to make methane gas, which is the material of hydrogen. Previously, 30% of the digestion gas was unused at the sewage treatment center, but this project tries to make a use of the gas. The hydrogen refueling station is used by the four participants of the project for now. Mitsubishi Kakoki Kaisha filled FCV MIRAI for test rides at the exhibition with hydrogen produced at the sewage treatment center. (Nikkan Jidosha Shimbun, July 31, 2015)

— This edition is made up as of August 3, 2015 —

A POSTER COLUMN

Oversea Automakers to Expand their Ranges of Eco Cars

Oversea automakers will expand their range of eco cars by 2016 in Japan. German-based BMW will introduce four PHVs, which can be charged through domestic wall sockets, into the Japanese market. Swedish-based Volvo will bring out five diesel cars at once this summer to be more environmentally-friendly. Although retail sales of passenger cars have been struggling since the sales tax increase, oversea automakers are going strong by fortifying their ranges with affordable cars. With a variety of eco cars, they are enthusiastically trying to get more users.

The reason behind their expansion of eco car range in Japan is that the fuel efficiency for tax reduction of eco cars was tightened in April. For FY 2014, 70% of the imported cars were applicable to the tax reduction. The ratio went down to 60% this April. Moreover, many imported cars are still applicable to the tax reduction, but the amount of deduction was made smaller. The real price of imported cars has been increased except for eco cars. On the other hand, diesel cars and PHVs are still eligible for a reduction in automobile acquisition and automobile weight taxes. Due to the background, the oversea automakers expect to increase their sales.

Japanese automakers are also working on this. Mitsubishi Motors has the largest range of PHVs in Japan, and released the significantly improved “Outlander PHEV” in June. The design improvement was carried out to compete with European automakers’ introduction of PHVs. Mazda has nearly an 80% share in the diesel passenger vehicle sales in Japan, and released “CX-3”, which only has diesel engine version in February.

Deloitte Tohmatsu Consulting has conducted a survey on 2,000 consumers regarding purchases of cars. The results show 25%, a 4 point rise of that of the previous year, of them are tempted to buy diesel cars, and 26%, a 5 point increase of that of the previous year, of them consider PHVs. In the results, these cars are next to 44% for HVs, and considerably more than EVs and FCVs. (The Nikkei, July 11, 2015)