

Toyota to Sell its FCV Core Parts to other Automakers

Arranged by T. Homma

1. Governmental Measures

(1) METI

The Ministry of Economy, Trade and Industry (METI) will relax regulations this year for fuel cell vehicles (FCVs) operating on hydrogen to be able to provide homes with electricity. Currently only electric vehicles (EVs) are allowed to supply electricity. FCVs will be commercially available from FY 2014, and the ministry will change the regulations to treat FCVs the same as EVs. As well as an emergency power source, these vehicles can supply electricity at a peak period to reduce electricity bills. Under the current regulations, power supply from FCV to homes requires a licensed electrical engineer. The ministry will eliminate the need of engineers by amending a ministerial ordinance of the Electricity Business Act in FY 2014, so that unqualified individuals can connect the vehicles to homes. Providers offer cheaper electricity overnight than in the day. EV users can store electricity in their cars at night and send the power from vehicles to homes in the day, which allows a reduction in energy bills. However, this power supply needs a device which changes direct current to alternating current and costs approximately a couple of ¥100,000. (The Nikkei, June 15, 2014)

METI has approved the “New Business Project Plan” submitted by Toyota Industries using the Industrial Competitiveness Enhancement Act. This approval allows the firm to test a fuel cell (FC) forklift with a metal hydrogen container which is not certified under the current regulations. With this special scheme, the ministry hopes for earlier commercialization of a FC forklifts. The firm applied for the special scheme for business experiments which allows approved firms to obtain special deregulations. (Nikkan Jidosha Shimbun & The Chemical Daily, July 1, 2014)

METI will review the plan for hydrogen filling station preparation for FCVs. Discussions will be held to re-arrange work share between the industry and

government. A strategic area will be chosen from four large metropolitan areas to concentrate the policy and business resources. Cooperation with local governments will also be strengthened by the plan. The ministry plans to install approximately 100 hydrogen filling stations, but the number of the installed filling stations has reached only one third of the target. METI will encourage new car dealers to install simple or mobile filling facilities to prepare hydrogen filling infrastructure for smooth FCV takeoff. (Nikkan Jidosha Shimbun, July 1, 2014)

(2) Japanese Government & METI

On June 19th, the Japanese government finished drawing up a plan to promote FCVs and home FCs. FCV sales will start fully in 2015, and this is determined as the “first year of hydrogen” in the plan. The government aims for related businesses to be launched with the global market in their view. A subsidy scheme is under consideration to support ¥2 to ¥3 million for each FCV, and they are expected to sell for nearly ¥10 million, excluding the subsidy. For example, Toyota’s FCV will be available from the end of this year, and it will sell for ¥7 million. With the subsidy, the actual cost will become approximately ¥5 million. METI will include an outline of the subsidy scheme in the budget request this summer. They aim to bring the FCV price down to ¥2 million, the level of hybrid vehicles (HVs). Cost reduction by volume production is the key for this price cut. The ministry aims to unify safety standards among other major developed countries by 2020, and has started discussions with related departments of these countries. The uniform standards allow Japanese automakers to sell their vehicles easier worldwide, which leads to enlarging the scale of production.

METI also aims to reduce the construction cost of hydrogen filling stations which are essential for FCV

growth. Currently a hydrogen filling station costs ¥400 to ¥500 million to build, and the ministry targets ¥200 million by 2020. Additionally, a subsidy scheme for operation costs of the hydrogen filling stations is now under consideration.

On the other hand, home FC will keep its current subsidy scheme which supports about ¥0.4 million for each purchase. The ministry targets at ¥0.7 to 0.8 million, a half that of the current price, by 2020 and ¥0.5 to ¥0.6 million by 2030. Furthermore, a power station using hydrogen is planned to be commercialized in 2030's. A meeting of the "Committee for Strategy of Hydrogen and FC" an advisory committee of METI, was held in the afternoon of June 19th, and the plan and measures were compiled there. This is the first time the government has drawn up a hydrogen business plan. The plan shows the outline of the whole hydrogen industry for businesses, financial institutions and investors to help in making their decisions. (The Nikkei, June 19th & 20th, 2014; The Mainichi Newspapers, The Sankei Shimbun, The Nikkan Kogyo Shimbun, The Tokyo Shimbun, The Chunichi Shimbun & Nikkan Jidosha Shimbun, June 20, 2014; Osaka Nichinichi Shimbun, June 21st, 2014; The Chemical Daily, June 23rd, 2014; The Denki Shimbun, June 25th, 2014 & 12 other newspapers)

(3) NEDO & IEA

The International Energy Agency (IEA) will hold a conference to compile a road map for hydrogen technologies on June 26th and 27th at Hotel Mt. Fuji in the Yamanakako Village, and has invited related organizations in the Asian region to the conference. The conference will have discussions on hydrogen production and hydrogen application technologies to draw up a road map. The New Energy and Industrial Technology Development Organization (NEDO) has been organizing the conference. (The Yamanashi Nichinichi Shimbun, June 25, 2014)

(4) Cabinet Office

On June 25th, the Cabinet Office held the first meeting of the Energy Carrier Promotion Committee of the Strategic Innovation Promotion Program (SIP). The committee will promote technological developments of hydrogen production, transport, storage and usage in cooperation with industry, academia and government. Priority issues and

schedule were discussed in the meeting. The enforcement policies for next five years were examined. The priority subjects for FY 2014 were decided; ① hydrogen transport and storage technology using ammonia as a carrier, ② hydrogen transport and storage technology using toluene, ③ liquid hydrogen, ④ hydrogen usage technology, and ⑤ the development of element technology for safety evaluation of the energy carrier. (The Denki Shimbun, June 26, 2014)

(5) Japan & EU

Japan and the European Union (EU) intend to unify standards and regulations for five fields including FCVs and robots for medical/nursing-care. On July 2nd, they held an experts' meeting in Brussels to confirm the aim of unifying regulations and standards. For FCVs, they plan to standardize the shape and material of hydrogen tanks to hold fuel, as well as the procedure of the safety test. This allows Japanese firms to sell their products to Europe without a large change in the specifications for the domestic market, which is a backup for them to explore the EU market. Their FCVs are expected to sell for about ¥7 million when their commercial production starts. These uniform standards may reduce the costs, which would attract more consumers. (The Nikkei & The Chunichi Shimbun July 3, 2014; The Sankei Shimbun, Osaka Nichinichi Shimbun, Kanagawa Shimbun, Gifu Shimbun, The Chugoku Shimbun, The Ibaraki Shimbun, Miyazaki Nichinichi Shimbun, The Kitanippon Shimbun, Minami-Nippon Shimbun, Nihonkai Shimbun, The Yamaguchi Shimbun, The Tokushima Shimbun, The Kochi Shimbun, The Shikoku Shimbun, Jomo Shinbun & The To-o Nippo, July 4, 2014)

(6) Liberal Democratic Party of Japan

On June 12th, the Sub-committee for the Hydrogen Society Promotion of the Liberal Democratic Party of Japan held a meeting to compile a policy proposal to instigate a hydrogen society. The proposal shows targets to promote FCVs and to form a hydrogen energy society as well as objectives to accelerate hydrogen procurement in Japan. (The Denki Shimbun & The Shizuoka Shimbun, June 13, 2014)

The Liberal Democratic Party of Japan has proposed a number of policies to promote new energy. The Policy Research Council for Resource and Energy

Strategy of the party insists that the Heat Supply Business Act should be amended to relax the regulations on charges to encourage installation of cogeneration systems which use exhaust heat for cooling and heating buildings. For hydrogen energy usage, a FCV price including subsidy is targeted at ¥2 million, the same level as HVs. They suggest that the vehicle be subsidized until 2025 and the subsidy amount gradually decreased over 10 years. Expressway fee exemption for FCVs until 2020 was also recommended. (Nikkan Jidosha Shimbun, June 14, 2014; The Nikkei, June 16, 2014)

2. Local Governmental Measure

(1) Aichi Prefecture

On June 6th, Aichi Prefecture announced that a mobile hydrogen filling station will be prepared at the West Annex of the prefectural office in Nagoya City to promote FCVs. The prefecture will submit a supplemental spending bill of ¥83 million including the preparation cost of ¥58 million to the Prefectural Assembly at the session this month. According to the prefecture, a truck will be the mobile filling station which is the first project of a local government in Japan. The prefecture aims to start the operation in January 2015. (Gifu Shimbun, June 7, 2014; The Nikkan Kogyo Shimbun, June 10, 2014)

(2) Okayama Prefecture

On July 9th, Okayama Prefecture will establish the “Study Group of Hydrogen Use for Mizushima Complex to be a Comprehensive Special Zone”. The participants are the prefecture, Kurashiki City and eight firms in the complex including Mitsubishi Chemical, JX Nippon Oil & Energy, Asahi Kasei Chemicals, Mitsubishi Motors, and JFE Steel. About four meetings will be held in a year to draw up the project concept for a hydrogen society by FY 2016 and to form stronger cooperation in the complex. (The Chemical Daily, June 27, 2014)

(3) Fukuoka Prefecture

Fukuoka Prefecture will establish the “Fukuoka FCV Club”, an organization of the cooperation of industry with government this year. The organization is to stimulate demand of FCVs from the launching stage and to encourage local governments, firms and taxi operators to buy these vehicles. The prefecture is working on forming a hydrogen business base in

cooperation with industry, academia and government as well as hydrogen energy related research and development. Fukuoka aims to sell itself as an advanced hydrogen research center with the result of goods sales. (The Nishinippon Shimbun, July 5, 2014)

3. FC Element Technology Developments

(1) Nippon Sheet Glass

On June 16th, Nippon Sheet Glass announced that a Super Glass Paper, a glass fiber sheet, with the thinnest of 20 μ m had been developed. The existing product has a 150 μ m thickness. They examined the process technology, and also succeeded in producing a roll of very thin glass paper sheet which is considered difficult. Because glass paper has high porosity and heat resistance, and it is used often as a separator of lead–acid batteries. Having made a thinner product, the firm aims to commercialize the glass paper by 2017 to 2018 as a reinforcement of the FC electrolyte membrane and a separator in the lithium-ion battery (LIB). As a LIB separator, they consider developing the product to reduce resistance. (The Nikkei Business Daily, June 16, 2014; The Nikkan Kogyo Shimbun, June 17, 2014)

(2) TOTO

TOTO has developed a commercial production technology for a module of solid oxide fuel cell (SOFC), and plans to establish it as its business soon. Cylindrical shape is selected for the cell stack, and lanthanum gallate is used for the electrolyte. The module operates in 700°C or less, and is ready to be provided to manufacturers. The sales system will be established as soon as possible. The firm aims for ¥8.5 billion of sales and to make the business profitable by FY 2017. (The Chemical Daily, June 16, 2014)

(3) Keeper Co.

Keeper Co., produces and sells oil seals, boots for automobiles, industrial rubber and resin products in Kanagawa Prefecture, and will accelerate the development of materials for polymer electrolyte fuel cells (PEFCs). Although injection molding is considered difficult for carbon separators, they plan to use the method for mass production to reduce costs. The newly developed separator performs at the same level as existing products. Their rubber gasket is planned to improve its sealing performance. The best combination of separator and gasket will be sought to

increase the amount of generation in order for it to be used in stationary PEFC as early as possible. Trial separators have been injection molded in their research and development center in Fujisawa City. (The Chemical Daily, June 23, 2014)

4. Microbial FC Research & Development

A group of Associate Prof. Kengo Inoue at the Department of Biochemistry and Applied Biosciences of University of Miyazaki has designed a system which treats sewage and generates electricity at same time using microbes. *Geobacter* is an anaerobic respiration bacterial species and releases electrons by decomposing organic matter, which caught the study group's attention. The group collected approximately 120 species of bacteria from river sludge for screening inspection. Among the bacteria, a new isolate, a species of *Geobacter*, demonstrated highly efficient generation. The output was 3 kW/m³ which is the highest level in the world as an axenic culture of *Geobacter*. The group also developed a microbial fuel cell (MFC) using this *Geobacter* to process water with organic waste. The generation efficiency of MFC was lower than the bacteria themselves. They aim to improve generation efficiency by optimizing the structure of the system and electrode materials. (The Nikkan Kogyo Shimbun, June 17, 2014)

5. Business Use FC Developments & Business Plans

(1) POSCO

On June 10th, POSCO revealed the intention to introduce its FCs to the Japanese market. Their subsidiary POSCO Energy operates FC business using technologies transferred from US-based Fuel Cell Energy, a partner, and has the exclusive distribution right in Asia. POSCO Energy uses molten carbonate fuel cells (MCFCs), which have an advantage of a large generation capacity, and has sold a total of over 113 MW of output. They aim to sell their product to use hydrogen derived from sewage treatment as a bio-gas, and to be a backup generator of a data center. (Japan Metal Daily & The Nikkei Business Daily, June 11, 2014)

(2) Mitsubishi Hitachi Power Systems & NGK Spark Plug

On June 20th, Mitsubishi Hitachi Power Systems (MHPS) and NGK Spark Plug (also known as NTK:

Nagoya City) together announced that they were committed to cooperation for volume production of cylindrical cell stacks of SOFCs which are used in a highly efficient generation systems. Both firms will accelerate the development of material for SOFCs, and share expertise for the developments of materials which are difficult for volume production and reduction in cost. Commercialization of the product is aimed by April 2018. The stack will use ceramics, the specialty of NTK, as its base, and MHPS's expertise in the generation system will be combined. A joint production facility will be considered in the future. SOFCs allow exhaust heat of by-products and unreacted gas to be reused. This enables a highly efficient generation system. (The Asahi Shimbun, The Nikkei, Nikkan Jidosha Shimbun & The Chunichi Shimbun, June 21, 2014; The Denki Shimbun, The Nikkei Business Daily, The Nikkan Kogyo Shimbun & The Chemical Daily, June 23, 2014; Dempa Shimbun, June 24, 2014)

(3) Taisei Corporation

Taisei Corporation has developed a radiation air conditioning system for offices combining SOFCs and absorption refrigerators. The system will be installed at a new laboratory "ZEB Demonstration Building" to be finished soon at the Taisei Technology Center. Miura Co. is working on commercialization of SOFCs with a subsidy of NEDO, and it will install the experimental FC system with approximately 5 kW output to demonstrate electricity and heat supply in the building. The offices do not have any attic, and pipes are buried in the concrete slab of the upper floor to circulate hot or cold water to make the whole ceiling into a radiator. The SOFC system discharges about 60 °C hot water. The hot water goes directly in the pipes in winter, and the absorption refrigerator uses the hot water to make 15 to 18 °C water in summer to circulate in the pipe. The firm aims to reduce the costs of the radiation air conditioning system to significantly save energy. The target generation efficiency is 48%. With exhaust heat utilization and renewable energy usage, they aim to have a building with zero net primary energy consumption, or a zero-energy building (ZEB). (The Nikkan Kogyo Shimbun, June 11, 2014; Architectures, Constructions & Engineerings News (Daily), June 16, 2014; The Denki Shimbun, June 17, 2014)

(4) SoftBank

On June 17th, SoftBank and Bloom Energy Japan (Tokyo) announced that “Bloom Energy Server”, a highly efficient industrial SOFC system, had started operating in Tokyo Shiodome Building. The system uses natural gas or biogas as a fuel and its output is approximately 200 kW. The headquarters of SoftBank is located in the building, and the SOFCs supply approximately 14% of the electricity consumption of the building. The power is also used for street lights, and emergency power sockets are prepared to charge cell phones free of charge during disasters. Additionally an EV charger is installed to provide the power generated by the SOFC for free in the basement car park. The SOFC was developed through NASA’s space project, and operates over 60% generation efficiency. The installation and maintenance are easy, and the generation capacity can be advantageously adjusted to the customer’s desire. Bloom Energy Japan will accelerate sales of electricity to larger firms, public bodies and hospitals. The electricity rate is ¥25 /kWh and it is fixed for 10 years. (The Yomiuri Shimbun, The Asahi Shimbun, The Nikkei, The Denki Shimbun, The Nikkei Business Daily, The Sankei Shimbun, The Yamanashi Nichinichi Shimbun, Miyazaki Nichinichi Shimbun & Fuji Sankei Business i, June 18, 2014; The Nikkan Kensetsu Kogyo Shimbun, June 19, 2014)

6. Ene-Farm Business Plans

(1) Tokyo Gas

Tokyo Gas has significantly reduced the amount of electricity bought from the grid using demand response (DR) in an experiment in a smart apartment. The experiment proved DR’s energy saving effect with Tokyo Gas Isogo Smart Houses (total 24 apartment units). At peak usage, an integrated control system manages Ene-Farm and storage batteries, and encourages each household to save energy through home energy management system (HEMS). This allowed reduction in electricity purchase at peak usage of 58% in summer (July to September) and 49% in winter (January) in FY 2013. (The Chemical Daily, June 12, 2014)

(2) Gas Bureau, City of Sendai

The Gas Bureau, City of Sendai, will sell more

Ene-Farm because its residents are becoming more energy-efficiency conscious, and the product can work as an emergency power source during disasters. The bureau has two products in the range, and will add Panasonic’s Ene-Farm to improve the range. The FC sales started with products of Toshiba FC Power System and JX Nippon Oil & Energy 2010. A total of 253 units were sold by the end of March 2014,. (The Kahoku Shimpo, June 29, 2014)

(3) Nihonkai Gas

Nihonkai Gas, Toyama City, has achieved 200 units of Ene-Farm accumulated sales by the end of June. Approximately 60% of the product was installed as a double generation system combining with other facilities such as photovoltaic generators. The FC’s price reduction and feed-in tariff (FIT) schemes are considered to be supporting the sales. Although the price of the FCs was over ¥3 million at the beginning of the sales period, it has gone down as the product spreads more. The firm sells Ene-Farm by Toshiba FC Power System to its gas users for ¥2.45 million including the installation cost. The purchase is subject to a governmental subsidy of ¥0.38 million, and ¥0.05 million is added for residents of Toyama City from the local government. (The Hokkoku Shimbun & The Toyama Shimbun, July 3, 2014)

7. Cutting Edge Technologies of FCV & EV

(1) Nissan

On June 9th, Nissan Motor announced that “e-NV200”, an EV for business use, would be available from October in Japan. This is the second EV after “Leaf”, and it aims to be used by firms and local governments. The EV has a large capacity battery, and the advantage of the ability to supply power to external devices outside. With this EV advantage, the automaker attracts customers. The car drives 185 to 190 km on a full charge, and the price is from ¥3,880,440. Maximum ¥850,000 will be supported by the governmental subsidy scheme for a purchase. The firm aims for 500 vehicle sales each month. (The Nikkei, June 10, 2014)

Nissan Car Rental Solutions in Yokohama City, a car rental operator of the Nissan Group, will expand its carsharing business for apartments. A total of 100 apartment houses is targeted, and the operator plans to introduce carsharing to another 85 apartment

houses by the end of March 2017. Increasing driving experience of EV may help EV sales, which is another point of this business. Nissan Motor has sold a total number of approximately 120,000 vehicles of Leaf globally. (The Nikkei, July 6, 2014)

(2) Toyota

On June 11th, Toyota Motor showed an intention that commercial production of its FCVs, a promising next generation eco car, would start in mid-December. The sales were expected to start in 2015, but the automaker is considering making the start earlier in FY 2014. The FCV is expected to sell for around ¥8 million. The firm will also install simple hydrogen filling facilities at official Toyota dealers in urban areas. Additionally, they will ask for oil distributors' and other Japanese automakers' cooperation to prepare hydrogen refueling infrastructure. (The Ibaraki Shimbun, June 12, 2014; Nikkan Jidosha Shimbun, June 17, 2014)

On June 25th, Toyota Motor announced that its FCVs would be available in Japan in FY 2014. The developed sedan FCV takes four passengers, and will be produced in a plant in Toyota City, Aichi Prefecture. The automaker plans to sell the product mainly in Tokyo, Nagoya, Osaka and Fukuoka where there are urban areas, and they are making hydrogen filling infrastructure preparations. This car is also planned to be introduced to the US and European markets in the summer of 2015. The price is expected to be about ¥7 million excluding tax. The automaker thinks the real consumer price should be about ¥5 million, and will request a subsidy scheme for purchase from the government. Cost reduction is sought by volume effect and reviewing parts to achieve the price level of the same class of HV by 2025. (The Yomiuri Shimbun, The Asahi Shimbun, The Mainichi Newspapers, The Nikkei, The Sankei Shimbun, The Denki Shimbun, The Nikkei Business Daily, The Nikkan Kogyo Shimbun, Dempa Shimbun, Nikkan Jidosha Shimbun, The Tokyo Shimbun, Osaka Nichinichi Shimbun & The Chemical Daily, June 26, 2014; & other 42 newspapers)

On July 2nd, Toyota Motor expressed an intention to supply other automakers with its FCV core components. They will start component distribution to other automakers once their FCV production and sales go on track and component production becomes

ready for distribution. Because a FCV development is a very expensive project, it is harder for smaller scale firms to develop inside and outside Japan. Toyota wants to encourage other automakers to join in the market by providing core components to accelerate growth of the FCV market. (Osaka Nichinichi Shimbun & The Nishinippon Shimbun, July 3, 2014; other 37 newspapers)

(3) Tesla

On June 12th, a US-based EV manufacturer Tesla announced that all of its patents would be open to use. A technological innovation is aimed at by asking for cooperation of a wide range of other engineers and component manufacturers. Although this kind of strategy is common in IT software, making whole patents open is unusual in the manufacturing industry. This makes emerging businesses easier to enter the EV market. (The Nikkei, June 13, 2014)

(4) Mitsubishi Motors

On June 16th, Mitsubishi Motors announced that a production line in its plant in Okazaki had been renovated. The line was made suitable for plug-in hybrid car (PHV) production, which reduces production cost by 30%. The layout also can be re-arranged to quickly accommodate the change in demand. The automaker will make a shift to EV, its specialty, and flexibly respond to a market change. With the investment of ¥4.5 billion, the production capacity will increase by 10%. The main line was renewed, and renovation of the all the lines will be complete by May 2015. The battery is now fixed to PHV on the new line. The new line has an original automatic transport system to deliver parts. (The Nikkei, June 17, 2014)

(5) Honda, Toshiba, Sekisui House

On June 16, Honda Motor, Toshiba and Sekisui House revealed a smart house which uses the latest energy saving technology in Saitama City. The smart house is designed for a two-generation family, and allows sharing energy from a photovoltaic generator and EV between two households. An experiment will be carried out in the house to find out any issues. Honda revealed its automatic parking function of EV using a smartphone. The car park has contactless EV chargers which allow providing electricity from the vehicle to the home. (The Nikkei, June 17, 2014)

(6) Harley-Davidson

Harley-Davidson, a US-based manufacturer of large motorcycles, has revealed a prototype of electric motorcycle. The development started since automobile battery performance improved. The firm tries to attract new customers specifically the younger generation. The motorbike boasts about its driving noise. A senior officer says “a similar noise to a fighter plane”. The driving range on a full battery is 100 miles (approximately 160 km). The prototype can accelerate to the speed of 100 km/h in four seconds from a start. (The Nikkei, June 21, 2014)

(7) Honda

On June 24th, Honda Motor revealed that it intended to introduce FCVs into the Japanese market first. The price is expected to be ¥7 to 8 million without subsidy. The automaker planned the vehicle sales globally from next year. However, the vehicle will be available in Japan earlier than in the rest of the regions. In addition, the driving range on a single charge is expected to be 800 km, which is 100 km longer than the initial plan. (The Sankei Shimbun & Fuji Sankei Business i, June 25, 2014; Ise Shimbun, June 26, 2014)

(8) Toyota Group

Toyota Motor's FCV is going ahead with its commercialization. At the same time, Toyota Industries, a member of the Toyota group, is developing a forklift powered by FCs, and Hino Motors is making a large FC bus. Toyota Motor has supplied both group members with FCs, and the group cooperates to reduce FCV price by volume effect. Toyota Industries will provide FC forklifts for experiment at Kansai International Airport. Also, Hino's FC bus made its debut in Expo 2005 in Aichi, and has been used as a transit bus in Toyota City, Aichi Prefecture, as an experiment. The vehicle is planned to be partially available in 2016, and expected to be used at 2020 Tokyo Olympics. (The Chunichi Shimbun, June 27, 2014)

Toyota Tsusho will operate mobile hydrogen filling stations to support sales of FCVs to be released by Toyota Motor. In FY 2014, five trucks will be prepared in Nagoya City and Tokyo. Two trucks will function as hydrogen filling stations in Naka-ku and Higasi-ku in Nagoya City and Kiyosu City, Aichi Prefecture. Three trucks will operate in Chiyoda-ku and Ota-ku in Tokyo. Toyota Tsusho considers establishing an

operating firm in cooperation with Sumitomo Mitsui Finance and Leasing Company. (The Chunichi Shimbun, July 3, 2014)

(9) Mitsui Fudosan & NEC

Mitsui Fudosan and NEC will install a large number of chargers for EV and PHV. Mitsui Fudosan will prepare 125 normal chargers by NEC at “Tokyo Midtown (Minato-ku)”, a commercial complex in the center of Tokyo. This is the largest number to be installed in a single facility in Japan, and will attract the wealthy population, who possibly own EVs, to the complex. The cost is approximately ¥100 million. The real estate developer also considers installing at “LaLaport”, a commercial complex in an urban area where more EVs are possibly in use. NEC has developed a small charger which can be used in a small parking space. The charger supplies electricity at 3 kWh per hour (driving range of 20 to 30 km) irrespective of types of vehicles. The fee is expected to be ¥100 to ¥150/h, cheaper than gasoline. The number of registered EVs and PHVs for FY 2012 is approximately 56,000. (The Nikkei, June 27, 2014)

(10) China

A subsidy scheme for new energy car purchase has spread in China. As well as central government's subsidy, Wuhan, Hubei, has its own subsidy scheme to support purchase. Like Wuhan more local governments set their own subsidy schemes. The Chinese government supports three types of new energy cars, EV, PHV and FCV in the subsidy scheme. For personal use, the scheme supports up to 57,000 CNY (approximately ¥930,000) for EV, 33,250 CNY for PHV and 190,000 CNY for FCV. (The Nikkei Business Daily, June 30, 2014)

(11) KEPCO

On July 1st, the Kansai Electric Power Company (KEPCO) and MID Urban Development, a real estate developer and KEPCO's subsidiary, announced the start of a project to use EV as a power source for a building. On the day, an elevator was experimentally operated by electricity from EV assuming a power cut. A facility is placed to charge and discharge five EVs or PHVs at a same time in Matsushita IMP building in Osaka Business Park (OBP). By controlling the timing of charging, cheaper electricity will be stored by vehicles at night, and then power will be used in the day in the experiment. The project will examine

the cost saving effect of the system to the whole building. (The Nikkei, July 2, 2014)

(12) LG Chem

On July 2nd, LG Chem announced that a plant of LIB for EVs would be built in Nanjing, China. The production capacity will be over 100,000 battery packs, which add 40% to the LG's global production capacity. On the same day, the firm signed a memorandum for partnership with the Nanjing government at the headquarters in Seoul. A company, which is run by the local government, and LG will invest equally to launch a joint venture by August. The construction will start in September, and the firms aim to start operating the plant in 2015. (The Nikkei, July 3, 2014)

8. Hydrogen Filling Station Technology Developments & Business Plans

(1) IPHE

Policy-makers from all over the world discuss promoting hydrogen and FCs at the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), an international organization. IPHE will develop a data base (DB) to secure the safety of hydrogen filling stations for FCVs. A conference will be held either in November or December in Rome, Italy, to decide the types of information to collect for the DB, and the collection method as a preparation of the DB operation system. IPHE has 18 states and regions as its members including Japan, the US and Germany. (The Nikkan Kogyo Shimbun, June 18, 2014)

(2) Kobe Steel

Kobe Steel will sell more facilities for hydrogen filling stations for FCVs which are to be available from this fiscal year. They aim to provide equipment for half of the new hydrogen filling stations, and a couple of dozen billion yen sales by 2025. In Japan, the construction of 19 hydrogen filling stations was decided in FY 2013. The firm provided six filling stations with core facilities. The construction cost was reduced by 20% by making the facilities smaller. The automobile industry aims to prepare 1,000 stations nationwide by 2015. (The Asahi Shimbun, July 3, 2014)

(3) Nippon Steel & Sumikin P& E

On July 3rd, Nippon Steel & Sumikin Pipeline & Engineering, Tokyo, held a press conference in Tokyo.

Mr. Takeshi Asai, the president, announced that the firm plans to develop hydrogen filling station businesses to aim steadily at ¥50 billion level sales with its core business of high pressure pipe line. Earlier this year, the firm signed a memorandum to cooperate with a gas facility manufacturer of the US for the construction business of hydrogen filling stations in Japan. Both firms are currently exchanging technologies, and nearly ready to take an order. (The Nikkan Kensetsu Kogyo Shimbun, July 4, 2014)

9. Hydrogen Generation/Refining Technology and Business Development

A group of Assistant Prof. Kenichi Ozawa at the Tokyo Institute of Technology has developed a technology to evaluate the reaction efficiency of photocatalysts, which prevents building walls from getting dirty, using X-rays. They discovered a characteristic behavior that the electron movement period became longer on the surface of a highly efficient photocatalyst. This finding makes it easy to examine the quality of photocatalysts, which speeds up development of photocatalysts. When light is applied, photocatalysts decompose organic matters and water, a cause of dirt. The typical material is titanium dioxide (TiO₂) which is used on buildings to prevent external walls from becoming filthy. Hydrogen gas can be produced by water and a photocatalyst. However, the photocatalyst needs to be 30 times more reactive than TiO₂ for practical use. The experiment was carried out at SPring-8. The timing of the ultraviolet laser beam and X-rays being applied to the photocatalyst was adjusted to analyze the surface of the photocatalyst. Electrons moved around on the TiO₂ surface during the decomposition of organic matter. (The Nikkei Business Daily, June 11, 2014)

10. FC & Hydrogen Related Measuring & Observation Instrument Development & Business Plan

Nireco will strengthen the inspection equipment business, and introduce an inspection facility of electrode sheet for FCs and LIB. They have released a film inspector "Mujiken+" which operates at a higher speed and precision than existing products. Using this

facility as its base, a new film inspector is planned to come out for the LIB and FC electrode sheets this autumn. (The Chemical Daily, June 11, 2014)

11. FC& Hydrogen Related Business Plans

(1) Epoch Science

Epoch Science, Kanagawa Prefecture, will start taking orders of a hydrogen FC power generator which can reduce hydrogen consumption by 20% this year. The generator uses a control method developed by Prof. Kazutaka Itako of Kanagawa Institute of Technology. The percentage of FC power output to hydrogen usage is calculated. The FC voltage to obtain the highest percentage is detected, and the voltage is controlled by to maintain this percentage. The product can provide electricity for a long period on a site where the power supply is cut off or during disasters. The price varies depending on capacity. The firm plans to combine the product with a photovoltaic generator or wind turbine, and to promote the package. (The Nikkan Kogyo Shimbun, June 26, 2014)

(2) Shizuoka Gas

Shizuoka Gas will investigate the hydrogen supply business around JR Higashi-Shizuoka Station with other organizations including Suzuyo Shoji. A hydrogen filling station will be built and it will provide FCVs, apartments and a commercial complex with hydrogen by FY 2016. They plan to prepare a “Hydrogen Town” around the station for the expanding use of hydrogen to come in 2020’s. (The Nikkei Business Daily, July 4, 2014)

— This edition is made up as of July 4, 2014 —