CFRP for Hydrogen Tanks for Large Cost Reduction

Arranged by T. Homma

1.Governmental Measures

(1) METI

The Ministry of Economy, Trade and Industry (METI) will work on cost reduction of hydrogen filling station facilities and hydrogen filling stations for urban areas for fuel cell vehicles (FCVs). The ministry will revise its ministerial ordinances on August 15th to be able to use composite accumulators made of carbon fiber reinforced plastic (CFRP) for storing compressed hydrogen. A composite accumulator uses aluminum or plastic as its inner container, and the container is wound with CFRP to give more strength to the hydrogen storage while reducing its weight. The basic structure of the accumulator is the same as fuel tanks of FCVs, although the accumulator is three to six meters in length to hold a large amount of compressed hydrogen and characteristically much longer than a FCV fuel tank. This technology allows the inner container to be a thin light weight structure. The composite accumulator can save 40% in cost and 70% in weight compared to a steel accumulator, the more common product. The cost and weight reduction gives flexibility for design, which helps hydrogen infrastructure preparation for urban areas where land is limited.

The Designated Equipment Inspection Ordinance set by METI for the High Pressure Gas Safety Act stipulates that there must be certification plates of the inspection on accumulators for hydrogen filling stations. This regulation was made for steel accumulators, and the certification plates have to be welded, soldered or brazed on the accumulators. However composite accumulators are covered with CFRP which is weak against heat, and the accumulators will be damaged by the certification plate joining process with the current regulation. To solve the issue, the ministry will revise the ordinance to allow a stamped aluminum certification to be stuck on composite accumulators. (The Nikkan Kogyo Shimbun, August 15, 2013; The Nikkei, August 16, 2013; Nikkan Jidosha Shimbun, August 19, 2013; TheChemical Daily, August 20, 2013)

The ministry will start to develop basic technologies to effectively use hydrogen energy from FY 2013. The technologies are aimed to be established for hydrogen transport and storage and a large scale hydrogen production method at lower cost by FY 2022. As a future development research, the operation structure of the developments has been sorted, and will be led by the National Institute of Advanced Industrial Science and Technology (AIST) with the cooperation of industry, academia and government. The comprehensive development will accelerate to realize a hydrogen energy society with a road map of hydrogen technologies for 2030. With 16 businesses and universities participating in it, the project will be led by Dr. Shinichi Goto, the director of the Research Center for New Fuels and Vehicle Technology of AIST as the project leader. The budget for FY 2013 is ¥1.13 billion (The Chemical Daily, August 16, 2013)

(2) Budget Request for FY 2014

On August 27th, the budget request of METI for FY 2014 came out. For the Energy Resources Special Account, ¥1,294 billion is requested which is a 31.4% increase of the initial budget for FY 2013. In the amount, ¥152.6 billion is allocated for priority projects to fund the strategic fields of the growth policies. The total requested amount is ¥1,747 billion, a 21.5% increase on that of the previous year. New projects include a subsidy for stationary storage battery installation (¥13 billion), a subsidy for home fuel cell (FC) installation (¥22.4 billion) and a demonstration for the next generation energy management business model (¥13.8 billion). (The Denki Shimbun, The Chemical Daily August 28, 2013)

2. Local Governmental Measures

(1) Kawasaki City

Kawasaki City established an industry-academia-government organization “Kawasaki Coastal Area

Hydrogen Network Conference" to promote hydrogen as a fuel. The Chiyoda Corporation have their own technology to liquidize hydrogen for storage and transport it at normal temperature, and plays the central role in the conference which has approximately 20 organizations and individuals as members including Kanagawa Prefecture and Showa Denko. The conference aims to establish a hydrogen supply system using existing oil tanks and pipelines. They are considering reducing CO_2 emissions by mixing hydrogen with natural gas for thermal power plants, and using hydrogen for petroleum processing. For the next step, the preparation of hydrogen supply sites will be investigated for FCVs as well as a cogeneration system for home and office. (The Nikkei, August 13, 2013)

(2) Nara Prefecture

Nara Prefecture will establish an investigative commission this fall with related firms starting to look into the introduction of FCVs which are to be commercialized from 2015. On August 6th, the first test ride of a FC bus for the prefecture was held in Nara City. The FC bus for the test was developed by Toyota Motor, and runs between terminals on Saturdays and Sundays in Kansai International Airport as an experiment. The commission will start in September at the earliest, and hold consultations on the usage of FC buses and the location of a hydrogen filling station for refueling. The planned members of the commission are Toyota Motor, Nara Kotsu Bus Lines, Iwatani and Kansai Electric Power Co. from the related fields. (Nara Newspaper, August 18, 2013)

(3) Aichi Prefecture

On August 19th, Aichi Prefecture announced that an organization "Aichi Infrastructure Preparation Conference for Next Generation Vehicles" would be established to prepare hydrogen filling stations and chargers for electric vehicles (EVs) and plug-in hybrid vehicles (PHVs). The conference consists of a total of 17 local governments and businesses including automakers and related firms for charger and hydrogen filling stations. The prefecture has two projects the "Aichi EV PHV Promotion Network" of its environment department and "Aichi FCV Promotion Conference" of its industry and labor department, and these promotion organizations were classified by the types of vehicles. These two organizations are integrated into the new conference to promote next generation vehicles. The first conference will be held on 21st in Nagoya City. The prefecture aims to have 1,600 chargers installed by the end of FY 2020, and an outline of the deployment of hydrogen filling stations was newly added as a topic for the first conference. (The Nikkan Kogyo Shimbun, August, 20, 2013; The Chunichi Shimbun, August 22, 2013)

(4) Shunan City

In Shunan City where the industrial complex is located, local governments, businesses and experts have established the "Shunan City Hydrogen Utilization Conference" to research town planning with hydrogen. The first meeting was held at a community hall in the city, and information was exchanged for the campaign starting in 2015, to attract a hydrogen filling station to the city. Prof. Kazuya Inaba of the Graduate School of Management Technology at Yamaguchi University was appointed as chairman. "The city produces high purity hydrogen on a large scale, which is an advantage. We can attract plants to the city with hydrogen which can be used as energy. This can stimulate the local economy." He said expectantly. (The Yamaguchi Shimbun, August 24, 2013)

(5) Kanagawa Prefecture

On August 30th, Kanagawa Prefecture established the "Kanagawa Next Generation Promotion Conference", and the first meeting was held at Kanagawa Jichikaikan. For next generation vehicles such as FCVs and EVs, the industry and the local government will share current information and issues for promotional activities. The conference has a study group for FCVs and EVs. Each study group has three to four meetings a year to discuss future activities. (Kanagawa Shimbun, August 31, 2013)

3. FC Related Element Technology Development

(1) Kumamoto University

A research group of Prof. Yasumichi Matsumoto of the Department of Applied Chemistry and Biochemistry of the Graduate School of Science and Technology at Kumamoto University developed a new catalyst which can replace platinum/carbon catalysts for cathodes of FCs. The new product is a hybrid catalyst of graphene oxide (GO) and iron

phthalocyanine (FePc). A GO dispersion and FePc suspension were mixed so that FePc was spontaneously highly dispersed in the GO. This was then made conductive and highly activated to be the electrode catalyst by electrochemical reduction without damaging the catalytic structure. The catalyst can be produced on a large scale by the simple process of mixing and reducing the two cheaper material dispersions at a low cost. Also, the durability of the product is the same as platinum/carbon catalysts, and the reactivity is the same or greater than platinum/carbon catalysts. The technology can reduce costs and improve the performance of FCs. The group plans to apply for a patent and look for a research partner for commercialization. (The Chemical Daily, August 15, 2013)

(2) The University of Tokyo

A research group of the University of Tokyo observed a state of electrons of a carbon material, "carbon alloy catalyst", which can replace a platinum catalyst, on a real-time basis while generating. The team consists of Prof. Masaharu Oshima of the Synchrotron Radiation Research Organization, Associate Prof. Yoshihisa Harada and Mr. Hideharu Niwa, a researcher, of the Institute for Solid State Physics. With the cooperation of the Tokyo Institute of Technology and Toshiba, an in situ soft X-ray emission spectroscopy system was installed at the University-of-Tokyo Synchrotron Radiation Outstation in a large synchrotron radiation facility "SPring-8" to monitor oxygen reduction of a catalyst for FC cathodes. For observation during generation, they built a FC cell, applied soft X-rays through a 150 nm thin film of silicon carbide (SiC), and measured the returned soft X-rays. A carbon alloy catalyst is an aggregate of 20 nm diameter carbon nano particles, and contains approximately 1% nitrogen as an additive. Also, approximately 0.5% iron is included as an impurity. The first observation of the FC catalyst during generation revealed iron also captured oxygen and may have contributed to the production of water. The ingredients cost of a carbon alloy catalyst can favorably be reduced to a tenth of a platinum catalyst. However, a carbon alloy catalyst has poorer generation ability due to a low catalytic reaction. Finding the optimal ratio of iron can lead to the development of carbon alloy catalysts being able to compete with platinum catalysts. This may contribute to FC development for FCVs which use a large amount of catalysts. (The Nikkan Kogyo Shimbun, August 27, 2013)

4. Microbial FC R&D

A research unit of the Okinawa Institute of Science and Technology (OIST) successfully reduced the level of organic matter in waste water from the distillation process of Awamori, a local spirit, enabling it to flow out, in an experiment at a distillery. Prof. Igor Goryanin of the Biological Systems Unit says the system showed much better results than the initial target, and is nearly complete. He researches a microbial FC system which cleans waste water with microbes and generates electricity at same time. The microbes were collected from the sea near Uruma City and cultured. The system is planned to supply water treatment with required energy by adjusting the level of the battery. In a laboratory scale experiment, waste water from the Awamori distillation was successfully treated. Although the reduction of phosphorus was currently insufficient, the level has been confirmed to go down slowly in three to four months. (Okinawa Times, August 20, 2013)

5. Professional Use FCs Business Plans

(1) NTT Docomo

On August 16, NTT Docomo revealed that its base stations for cell phones would be equipped with FCs which have high environmental performance as emergency power sources for disasters throughout Japan. Currently only one base station is provided with FCs in Tokyo. The firm will finish choosing base stations by the end of 2013, and the installation will start from 2014. The FC to be installed uses a methanol solution as fuel. Small storage batteries were commonly used before the earthquake in 2011, but they only last for about three hours. The FC can supply power for a longer period of about three days. Also, the firm plans to install photovoltaic generators to reduce routine energy consumption of its base stations by using the facilities. (The Kyoto Shimbun, The Kobe Shimbun, Kanagawa Shimbun, Osaka Nichinichi Shimbun, The Shizuoka Shimbun, The Chugoku Shimbun, The Hokkaido Shimbun, The Sanyo Shimbun, The Ehime Shimbun, Ise Shimbun, The Nagasaki Shimbun, The Ibaraki Shimbun, The

Yamanashi Nichinichi Shimbun, Gifu Shimbun, Jomo Shinbun, Shimotsuke Shimbun, Yamagata Shimbun, The Hokkoku Shimbun, The Kitanippon Shimbun, Minami-Nippon Shimbun, Nihonkai Shimbun, The Toyama Shimbun, Fukui Shimbun, The Shikoku Shimbun, Saga Shimbun, Miyazaki Nichinichi Shimbun, The Kochi Shimbun, Chiba Nippo, The Niigata Nippo, The To-o Nippo, Kahoku Shimpo, The San-in Chuo Shimpo, Akita Sakigake Shimpo, August 17, 2013)

(2) Osaka Gas

Osaka Gas will sell solid oxide fuel cells (SOFCs) for business use which use natural gas as the fuel and output 3 to 200 kW depending on their specifications, targeting smaller businesses such as convenience stores. Although the product release has not been determined, President Hiroshi Ozaki of Osaka Gas intends to release it as early as possible. Osaka Gas will provide basic technologies of business use of SOFC for the joint development with a manufacturer. The generation efficiency of common SOFC is 45 to 65%, and the new product will be able to fit the wider range of demands by researching opportunities to use waste heat. The home use SOFC has a total energy conversion efficiency that reaches 94%, including heat utilization. The firm will advertise it as economical as well as having the cleanness of natural gas. On the other hand, the SOFC for apartment units has a 55% generation efficiency, and it is planned to be introduced to the market by 2016 when the subsidy scheme for purchase ends. The firm estimates ¥500,000 as the affordable price of the SOFC for apartment units to attract more consumers in the future. (The Nikkan Kogyo Shimbun, August 26, 2013)

6. Ene-Farm Business Plans

(1) Misumi

On August 8th, Misumi, Kagoshima City, will open its first show home "Smart Eco Ie" in Hoshigamine, Kagoshima City. The house is equipped with a photovoltaic generator and Ene-Farm as double generation to reduce utility bills. (Minami-Nippon Shimbun, August 8, 2013)

(2) Sekisui House

On August 10th, Sekisui House will open a show home of a highly durable house "Is Roy+E" in a housing exhibition RSK Housing Plaza, Okayama City. The house uses Dyne Concrete which absorbs less rain water and is a very durable material for its external walls. A photovoltaic generator and Ene-Farm can save energy, and for the interior the house uses wallpaper and tiles which capture chemical compounds causing health problems. (The Sanyo Shimbun, August 9, 2013)

Sekisui House prepared land for housing lots "Smart Common Stage Moriai" in Moriai, Fukushima City, and started sales on August 23rd. All 37 houses are meant to be zero-energy rated buildings. 14 houses out of 37 will be equipped with photovoltaic generator, storage battery and FC as disaster control points to be powered by these three facilities working together during power cuts. (Fukushima-Minpo, August 24, 2013)

(3) Osaka Gas

Osaka Gas announced that its accumulated sales of natural gas cogeneration facilities reached 100,000 units. Accumulated sales were 81,998 units by early August for "Ecowill" which drives engines with gas to generate electricity, and is available from 2003, and 18,385 units for Ene-Farm, available from 2009. (The Mainichi Newspapers, August 19, 2013)

(4) Toho Gas

Toho Gas, Nagoya City, confirmed that a home energy management system (HEMS) in an experiment controlled electricity and gas consumption and could reduce utility bills by 30% compared to a household without the system. The experiment was carried out from July 2012, and Ene-Farm, solar panels and a storage battery were installed in a house in the research laboratory. Monthly utility bills for winter of an average household were estimated at ¥17,000. The experiment house with HEMS reduced its utility bill to ¥11,600, and HEMS enable it to sell ¥21,600 of electricity from the photovoltaic generation by optimizing power usage. The firm aims to promote the combination of Ene-Farm and HEMS in energy saving houses. (The Chunichi Shimbun, August 24, 2013)

(5) PanaHome

On August 30th, PanaHome announced that all 83 apartment units would be equipped with Ene-Farm for apartment houses under development at its residential development "Smart City Shioashiya",

Ashiya City, Hyogo Prefecture. The apartment development consists of three five-story buildings, and the roofs of two buildings will have solar panels to feed energy to large communal storage batteries. The electricity in the storage batteries will be used to supply water during disasters. The roof without solar panels will be left for communal use and use as an evacuation site. Additionally the firm will construct approximately 400 houses with photovoltaic generators and FCs in Smart City Shioashiya. It is estimated that the houses of the whole development can generate the required energy for all the houses. PanaHome intends to change the standard specification for houses, except apartments, to zero-energy buildings which generate the energy required for a household by FY 2018. (The Mainichi Newspapers, The Kobe Shimbun, The Kyoto Shimbun, The Nishinippon Shimbun, August 31, 2013)

7. FCV & EV Cutting Edge Technologies

(1) FCV Performance

FCVs have accomplished certain targets in performance. According to Japan Hydrogen & Fuel Cell Demonstration Project (JHFC), the energy efficiency tank-to-wheel of hydrogen reached 60% with the latest technologies in 2010. This is much higher than the 20 to 30% efficiency of gasoline driven vehicles. Also other targets for 2015 were already achieved including low temperature start, driving range and the required time for hydrogen filling. Toyota Motor attained 3 kW/L power density of FCs in 2012. Being made much smaller, the volume of the stack is 27 to 33 L converted as an 80 to 100 kW level FC which is the product size on board cars expected by the automakers, and a close equivalent of a 3000cc gasoline engine. "Cost reduction is the largest issue for FCVs to fully expand." says Mr. Ohira, a senior researcher of New Energy and Industrial Technology Development Organization (NEDO). (The Nikkan Kogyo Shimbun, August 6, 2013)

(2) Mitsubishi Motors

Mitsubishi Motors will restart the production of PHV "Outlander PHEV" five months after its halt. Since the battery replacements of recalled cars were completed, the production scale will be doubled to export to Europe. The Nagoya Plant will produce 2,000 vehicles each month at the start. By simplifying the mounting process of the battery and motor, the production will be increased to 4,000 vehicles monthly by May, 2014. Having been released in January, a pre-delivery Outlander PHEV had a defective short circuit in its lithium-ion battery (LIB) shortly after the release. Having disclosed the trouble in March, the firm alerted the user to avoid recharging the battery, and stopped the production and shipping. An investigation was carried out, and it emerged that a worker of Lithium Energy Japan, a supplier in Shiga Prefecture, had dropped the battery. The battery was mistakenly mixed with others for Mitsubishi. Therefore the investigation concluded that the damaged battery caused the trouble but not the design of the battery. Using the same battery in its EV i-MiEV, Mitsubishi also stopped the production, and approximately 120 vehicles were recalled. The production will resume early August. (The Nikkei, August 19, 2013)

On August 29th, Mitsubishi announced that its production of small engine cars except EVs, the class less than 600 cc, for business specification would end in FY 2013. Suzuki Motor will produce these vehicles for Mitsubishi after the end of FY 2013. The Mizushima Plant of Mitsubishi will be producing "eK Wagon", EV and some sedans. The automaker plans to strategically intensify development and production of key small cars and PHVs which have achieved good sales in the emerging markets including Southeast Asia. (The Nikkei, August 30, 2013)

(3) Tesla Motors Japan

On August 27th, Tesla Motors Japan, a local corporation of a US-based EV venture, announced that it had introduced a payment system allowing the users to use their credit cards through smartphones. The system will be used to pay a deposit for test rides of a commercial EV sedan "Model S". (The Nikkei, August 28, 2013)

(4) Nissan

From January to July, Nissan Motor sold 11,703 units, about 3.3 times that of the same term in the previous year, of the EV "Leaf" in the US. The sales in July were 1,864 vehicles which is a sharp increase compared to the last July of 395 vehicles, indicating a healthy trend. The vehicle is now produced locally to reduce the costs. The automaker brought down the

vehicle's price by 20% from the previous model, which has attracted more consumers. (The Nikkei, August 28, 2013)

On August 27th, Nissan announced that the "self-driving car", eliminating the need of a driver's operation, and is planned to be introduced by 2020. They also revealed a prototype of a self-driving car based "Leaf" on the same day. The car has sensors using acoustic wave, radio-frequency and lasers to detect traffic lanes, other cars, obstacles and traffic lights and signs. Artificial intelligence is used to analyze the data from the sensors to realize autonomous driving which does not require a driver's steering. The car can also control its accelerator and brakes. The automaker plans to bring out multiple self-driving cars as early as possible for sales growth. For full-scale development, a dedicated test course for the cars will be prepared in Yokosuka City by the end of FY 2014. (The Nikkei, August 28, 2013)

(5) Ube Industries

Ube Industries will sell an efficient permeation membrane to separate desired gas, targeted at FCVs. Because certain humidity is required for oxygen or air to react in FC, they propose the membrane to be used for a membrane humidifier. Certain molecules can pass through polyimide hollow fiber holes of the gas separation membrane. The product can separate gas with a certain humidity and supply the gas to a FC. The manufacturer aims full application by 2016. (The Nikkan Kogyo Shimbun, August 30, 2013)

8. Hydrogen Filling Station Related Technology Developments and Business Plans

(1) JX Nippon Oil & Energy

JX Nippon Oil & Energy developed a hydrogen storage tank for hydrogen filling stations in collaboration with Samtech, an automobile parts manufacturer in Osaka Prefecture. Having used rare metal, they changed the material of the tank to CFRP to reduce the production costs by 70%. Tanks for hydrogen filling stations hold highly pressurized hydrogen at 82 MPa and are required to be resistant to corrosion from hydrogen and to stand high pressure. To meet the requirement, they previously used an expensive rare metal alloy including nickel, molybdenum and chromium, which pushed the production cost to ¥20 million for each tank. The new tank structure uses an aluminum vessel which has carbon fiber wounded around it, and is fixed together with resin. This method reduced the production costs by 30 % from the existing product. The new tanks have been used at three filling stations in Ebina City, Kanagawa Prefecture, and Nagoya City as an experiment. The firm plans to commercialize the product after evaluation of the performance such as durability. (The Nikkei Business Daily, August 20, 2013; The Chemical Daily, August 22, 2013)

(2) Hydrogen Energy Test and Research Center

On August 26th, the Hydrogen Energy Test and Research Center (HyTReC), Itoshima City of Fukuoka Prefecture, had a ground-breaking ceremony at its new laboratory building site. The new facility is a flat building with a steel structure in reinforced concrete with a total floor space of approximately 2700 m², to test the infrastructure of large hydrogen tanks for FCVs. Being constructed next to HyTReC, the building will be able to accommodate a maximum 500 L class large hydrogen storage tank. (Architectures, Constructions & Engineerings News (Daily), August 26, 2013; The Nishinippon Shimbun, August 27, 2013)

(3) Taiyo Nippon Sanso

On August 28th, Taiyo Nippon Sanso announced that a hydrogen filling station package "Hydro Shuttle" was developed for half the price of conventional products. Previously, each building was made for each main facility such as a dispenser to fill cars with hydrogen, a hydrogen compressor to increase the pressure of the hydrogen to a required value, a refrigeration system and an accumulator. The new product stores the main four facilities in a cuboid of 7 m long, 2 m wide and 2.6 m high. The price is approximately ¥0.2 to 0.3 billion which is half of a conventional product. The product is expected to be fixed on the ground as well as placed on a dedicated truck for mobile use. (The Nikkei Business Daily, The Nikkan Kogyo Shimbun, The Chemical Daily, August 29, 2013)

9. Microgrid Concept for Snowy Cold Region

Prof. Shin'ya OBARA of the Department of Electrical and Electronic Engineering of the Kitami Institute of Technology, this year, will install a simulation system for Microgrid to start an experiment for snowy cold

regions where more heating is required. Mirogrid is an energy network of independent generators such as renewable energy and FCs to efficiently use a combination of electricity and heat. The group will investigate the feasibility on the consumption of locally produced energy to indicate ideal models of Microgrid with heat supply for different regions. For the experiment, the simulated power source for FCs and renewable energy generators using solar, wind and wave will be prepared, as well as devices which consume the generated power and heat in their laboratory. This system will be connected to computers which are programed with information of energy demand and climate for different size cities. An optimal operation will be found to suit each region with different commercial, industrial and agricultural characteristics. For example, an experiment would be carried out at a scale of a few thousandths for Kitami City which has a population of approximately 120,000. (The Hokkaido Shimbun, August 14, 2013)

10. R&D and Business Activities of Private Organizations

(1) Atecs

Atecs, a plastics processing firm in Higashiosaka City, will build its "Kyoto Plant Production, Research and Development Center" in Kansai Science City in Kyoto Prefecture aiming to start operation from April, 2014. The plant will have capital of ¥0.5 billion by 2015, and serve to accommodate a production increase of casings for automobile chargers and inverter modules. The manufacturer is specialized in integral molding of engineering plastics, such as heat-resistant plastic, and metal terminals. Since orders have been increased from large manufacturers for key components of EVs and FCVs, the firm decided to establish the integrated facility which allows designing and developing products and managing the costs with its clients as well as production. (The Nikkan Kogyo Shimbun, August 6, 2013; The Kyoto Shimbun, August 8, 2013)

(2) Japan Vilene

Japan Vilene will strengthen its automobile battery business. Facility investments will be carried out by 2015 for the next generation of separators, and a production system will be built for separators of LIB and nickel–metal hydride batteries. A gas diffusion layer is being rapidly developed for FCs. Currently the product is being distributed as samples, and it has received highly positive evaluations from its users. The manufacturing targets for FCVs are expected to grow strongly for the product application. (Nikkan Jidosha Shimbun, The Chemical Daily, August 9, 2013)

11. FCV Market Trend

On August 19th, Deloitte Tohmatsu Consulting, Tokyo, revealed its estimation for the global FCV market scale to be ¥5.3 trillion in 2025. The market scale in 2015 is expected to be approximately ¥0.2 trillion, the global sales for 2025 are calculated approximately at approximately 1.8 million vehicles, 45 times that of 2015. Firstly, the sales are anticipated to be led by California in the US, which has environmental regulations. Secondly, the hydrogen, a byproduct from shale gas, is expected to take sales growth nationwide. In Japan, the sales is expected to be 0.2 million vehicles for 2025. (The Nikkei Business Daily, The Nikkan Kogyo Shimbun, August 20, 2013; Nikkan Jidosha Shimbun, Fuji Sankei Business i, August 21, 2013)

―This edition is made up as of August 31, 2013―

A POSTER COLUMN

FCV Driven R&D Investment Growth

Business recovery of private organizations has promoted investments in research and development. "The survey on research and development activities" of The Nikkei for FY 2013 reveals investment increase will be double-digit in 63 firms, 24% of 261 major business operators.

The top three in investment amount are automakers, and they will spend the capital on developments including FCVs. Toyota Motor, with the top rank, will spend ¥900 billion increased by 11.5% and adding ¥10 billion to the initial budget for FY 2013. In 2015, they plan to release a FCV which is advancement on the previous prototype costing ¥0.1 billion for each car and reduced considerably in price. Technological developments are accelerated to lead to further cost reduction and durability improvements. Honda Motor,

the second spender, will invest ¥630 billion, a 12.4% rise. They will advance core technologies for FCVs with GM, a partner since July.

The trend of these automakers will positively affect material manufacturers supplying parts. Mitsubishi Chemical Holdings (¥138 billion, a 2.4% increase) is developing a bioplastic for automobile interiors in cooperation with a French automobile part manufacturer, and is aiming to finish this by FY 2014. Toray (¥58 billion, an 8.8% increase) will speed up the research on the application of carbon fiber, which is lighter and stronger than iron, for automobile parts.

The machinery industry which has increased its investment will advance energy saving technologies. Mitsubishi Heavy Industries will capitalize ¥70 billion, a 23.8% increase, to focus on research and development of highly efficient gas turbines, FCs and offshore wind power. Hitachi will concentrate on the fields of water processing, railway and storage batteries. Toshiba will put its emphasis on next generation power networks. On the other hand, Panasonic and Sony decreased their investments. However their proportions of sales are retained, and they pay consistent attention to such fields as storage batteries for growth. (The Nikkei, August 8, 2013)