

Revision of Technical Standards on Compressed Hydrogen Station

Arranged by T. Homma

1. Governmental Measures

(1) METI

The Ministry of Economy, Trade and Industry (METI) has started considering financial support to operational costs for hydrogen filling stations. Fuel cell vehicles (FCVs) are expected to be introduced into the market at commercial level from 2015, but number of FCVs is low in the initial period until then it may be difficult for hydrogen filling stations to be financially viable. If the established hydrogen facilities do not pay, this may disturb mid- to long-term preparation of the facilities. Due to this, the ministry has decided to subsidize these stations with certain standards. The new scheme will be quickly organized, and the subsidy expense will be included in the next fiscal year's budget. (Nikkan Jidosha Shimbun, April 22, 2014)

On April 21st, METI revised the technical standards for compressed hydrogen filling stations as a promotional measure for FCVs. A ministerial ordinance requires a 6 m or more distance between a compressed hydrogen facility and compressed natural gas facility both on the same premise in order to prevent them affecting each other during accidents and disasters. The revision allows filling stations to have shorter distance between these facilities by taking certain measures such as a barrier installation. The selection range of steel was also widened for compressed hydrogen filling facility. Copper materials (C3604 and C3771) are expected to be used for valves and pipes, and have been added to the exemplified standard with pressure and temperature ranges for usage. SUS316 and SUS316L, stainless steels, were already usable under previous regulations. By the revision, their application range of pressures and temperatures has been expanded in order to be used for the high pressure and high temperature parts

compressor and the high pressure and low temperature parts which are a pre-cool facility to reduce the temperature of hydrogen. (The Nikkan Kogyo Shimbun & The Chemical Daily, April 22, 2014; The Nikkei Business Daily, April 24, 2014)

Hydrogen tanks for fuel cell (FC) forklifts, which are expected to be commercialized in Japan, can now be made only of metal. This has become available as a special measure of the Safety Regulations for the Containers of the High Pressure Gas Safety Act using the "Special Scheme for Experimental Businesses" of the Strengthening Industrial Competitiveness Act. METI legislated this as a ministerial ordinance on April 24th. Under the current Safety Regulations for Containers, hydrogen tanks for industrial vehicles such as FC forklifts are expected to be made from composite materials of carbon fiber and metal. The businesses in the industry requested to make metal only tanks available for the usage the same as conventional forklifts. Being different from passenger vehicles, forklifts carry heavy goods, and metal only containers should be sufficiently strong and cheaper to produce than composite containers. The special scheme was applied within the requirements of a safe design and production system. (The Nikkan Kogyo Shimbun & The Chemical Daily, April 25, 2014)

METI will add FCV to the range of cars for the "Clean Energy Vehicle Promotion Subsidy" from the next fiscal year. As well as the cars already subject to the subsidy, price-reduction effort of automakers is taken into account for the subsidy rate. The ministry will hear expected sales and prices from manufacturers, and then decide on the amount to request for the next fiscal year' budget. (Nikkan Jidosha Shimbun, May 8, 2014)

(2) MLIT

On April 25th, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) held the first meeting of the “Investigative Committee on Diversification of Energy Transport Route”. Liquefied natural gas (LNG) suppliers have diversified due to the start of shale gas transport from North America. Liquid hydrogen transport by boat will fully start. With these facts, the committee will look into transport routes for new energy, and its report will be taken into account in governmental growth strategy and the budget request for FY 2015. New energy transport routes to be established are for example; shale gas from North America via the Panama Canal (which is under enlargement construction), resources from Russia using the Arctic Ocean route, and liquid hydrogen from Australia for FCVs which are expected to grow in the market. Once the routes are set up, they should contribute to Japanese economic activities. (The Japan Maritime Dairy, April 28, 2014)

(3) Japanese Government

France and Japan have decided to research on an unmanned underwater vehicle for warning and surveillance activities as a joint development of defense equipment. The official agreement is expected to be made at the top-level meeting of French President François Hollande and Japanese Prime Minister Shinzo Abe on May 5th. As the joint development, both governments plan defense technology related research such as FCs for unmanned underwater robots which can perform surveillance for a long period in water. Having China’s movement in the East China Sea in its mind, the Japanese government allocated approximately ¥500 million in the budget for FY 2014 for research on an unmanned vehicle for the Ministry of Defense (MOD) to increase the amount of information collected underwater. (The Kobe Shimbun, The Nishinippon Shimbun, Minami-Nippon Shimbun, The Sanyo Shimbun, The Chugoku Shimbun, The Nagasaki Shimbun, Ise Shimbun, Gifu Shimbun, Fukui Shimbun, The Ibaraki Shimbun, The Shikoku Shimbun, The Yamanashi Nichinichi Shimbun, The Shinano Mainichi Shimbun, Kumamoto Nichinichi Shimbun, Miyazaki Nichinichi Shimbun, Oita Godo Shimbun, Shimotsuke Shimbun, Yamagata Shimbun,

The San-in Chuo Shimpō, The Ryukyu Shimpō, Akita Sakigake Shimpō, Chiba Nippo, Iwate Nippo, The Niigata Nippo, The To-ō Nippo Press & The Fukushima Minyu Shimbun, April 30, 2014)

(4) MOE

On May 1st, the Ministry of the Environment (MOE) has selected six projects from 48 applications for the “Technology Development and Experiment Projects to Lead Reduction in CO₂ Emissions” for FY 2014. The “Development and Experiment of a Low-Carbon Small FC Boat to Inspect Floating Offshore Wind Turbines” was chosen for the low-carbon technological development in the transport field. Toda Corporation will lead this project, and the Nagasaki Institute of Applied Science and Nippon Kaiji Kyokai will together operate. The project will develop a scale model of a low-carbon small boat using FCs, and use hydrogen produced by excess electricity of floating offshore wind turbines as a test. The ministry chose two more projects for low-carbon technological developments in the transport field; the commercialization of FC forklifts along with the development and testing of an optimal hydrogen infrastructure; and the testing of experimental electric buses which share wireless chargers with other vehicles to allow these busses to be widely used as soon as possible. (Architectures, Constructions & Engineerings News (Daily), May 2, 2014; The Denki Shimbun & Nikkan Kensetsu Sangyo Shimbun, May 7, 2014)

2. Local Governmental Measures

(1) Kobe City

Kobe City will have a proposal competition to choose a contractor for the investigation on the “installation of an energy center” and the “promotion of FCVs” for an environmental model city of Kobe. Proposals with applications must be submitted by May 8th. The contract includes “basic knowledge collection and data organization for preparation of hydrogen filling station and an estimation of the diffusion rate of commercial FCVs in the Hanshin area by 2030 and its economic impact”. (Architectures, Constructions & Engineerings News (Daily), April 16, 2014)

(2) Osaka Prefecture

On April 10th, Osaka Prefecture received Honda’s FCV “FCX Clarity”. Honda provided it free for

research on the popularization and commercialization of FCV. The prefecture will use the car in disaster drills and other events to promote FCVs to its residents and support technological developments of smaller businesses. (Nikkan Jidosha Shimbun, April 16, 2014)

(3) Fukuoka Prefecture

Northern Kyushu Automotive Industry Promotion in Asia Project has held a forum in Kitakyushu City. “FCVs are going to be introduced into the market from 2015. We will use them and advertise their advantages.”, said Hiroshi Ogawa, the chairperson of the project, highlighting plans to build a development-to-production base in northern Kyushu in the forum. He showed recognition that northern Kyushu was expected to be a key production base on a world scale. “Our area is becoming one of the best strongholds for hydrogen related developments in Japan,” reported he. (Nikkan Jidosha Shimbun, May 1, 2014)

(4) Tokyo

Tokyo has decided to use FCVs, which use hydrogen, to transport athletes and staff at 2020 Olympics and Paralympics. Japanese advanced technologies will be advertised to the world during the Olympics and Paralympics. Tokyo will launch a committee with automakers to study strategy seriously. In the Olympics, 15,000 athletes are expected to compete, and they will be transported from the Olympic village to venues on dedicated lanes. The strategic committee will hear opinions from automakers and energy related businesses to compile a report to propose deregulation. (The Yomiuri Shimbun, May 5 2014)

On May 9th, Tokyo announced that a “Tokyo Strategic Committee” would be launched consisting of businesses and experts to promote hydrogen, as an attractive next generation energy, and the first meeting would be held on May 16th. The committee will determine a target for FCV sales in FY 2014 and suggests deregulations to the state. (The Yomiuri Shimbun, May 10, 2014; The Nikkan Kensetsu Kogyo Shimbun, May 12, 2014)

(5) Yokohama City

The Environment Creation Department of Yokohama City has started receiving subsidy applications for the installation of smart energy facility for established houses. The eligible facilities

and the subsidy amounts are; ¥10,000 for a home energy management system (HEMS), ¥60,000 for a combination of HEMS and Ene-Farm and ¥110,000 for a combination of HEMS, Ene-Farm and a photovoltaic generation system. (Architectures, Constructions & Engineerings News (Daily), May 8, 2014)

3. FC Element Technology Developments

(1) NIMS

The National Institute for Materials Science (NIMS) has announced that a memorandum of understanding was signed between Southeast University of China for an international joint development of high functional FC and research on designing graphene as a new non-platinum electrode material for FCs. The University of Tsukuba will join the project which aims to contribute to material science of both China and Japan and development of material research for FC electrodes. (Japan Metal Daily, April 16, 2014)

(2) Kureha Elastomer

Kureha Elastomer, a member of Toyobo Group, will work harder on sales activities to promote its product application as gaskets for polymer electrolyte fuel cells (PEFCs). The gaskets are installed between a membrane electrode assembly (MEA) and a separator in a single cell to increase adhesion. The manufacturer already has a three-layer type in which films and a rubber sheet are bonded. A thinner two-layer type has recently been developed. The manufacturer achieved 70 μ m thickness from the current 250 μ m to meet demands of FC manufacturers which are trying to reduce the size of materials. Samples of the new material will be shipped out to FC manufacturers while accelerating the research and development for full commercialization. Kureha Elastomer aims its product to be used for home cogeneration systems and FCVs. (The Chemical Daily, May 2, 2014)

(3) Nippon Sheet Glass

Nippon Sheet Glass has developed super thin glass paper using glass fiber. This sheet of material is made of matted glass fiber, and has characteristically high porosity of over 85 % due to it being a non-woven product which is different from cloth. The manufacturer plans to develop applications including as a reinforcement material for electrolytes of PEFC

which requires strength. (The Chemical Daily, May 8, 2014)

4. Ene-Farm Business Plans

(1) Itochu Property Development

Itochu Property Development will go ahead with smart houses. “Crevia Nakano Saginomiya” in Nakano-ku, Tokyo, started its sales on April 12th, and is the first housing development for the firm equipped with Tokyo Gas’s Ene-Farm. Each house allows an annual ¥50,000 to ¥60,000 saving on utility bills. HEMS is also installed to give further reduction in energy usage of a household. The firm intends to continue using Ene-Farm. (Jutaku Shimpo, April 15, 2014)

(2) Shizuoka Gas

Shizuoka Gas has developed a system of sharing excess energy between neighbors, the “T-Grid System”, with cooperation of Toray Construction (Osaka City). They announced that a smart town with condominiums and houses would be constructed in an eastern part of Shizuoka Prefecture. (The Mainichi Newspapers, April 17, 2014)

(3) Hokuriku Gas

Hokuriku Gas has increased its Ene-Farm sales target for FY 2014 to 360 units, 1.4 times that of FY 2013. A new product will be available from April 24th, which is 20% cheaper than the current product. The generation efficiency was also improved from 38.5% to 39%. The firm will target renovated established houses as well as new houses. With the new product, a family of four in a house can save approximately ¥73,000 in their annual utility bill. (The Nikkei Business Daily, April 23, 2014)

(4) Tokyo Gas

On April 24th, Tokyo Gas announced that its accumulated Ene-Farm sales had reached 30,000 units. Annual sales have constantly increased; approximately 1,500 units for FY2009, 2,400 units for FY 2010, 7,600 units for FY2011 and FY 2012, and 12,000 units FY 2013. The firm aims for 16,000 units for FY 2014. (The Denki Shimbun & The Nikkei Business Daily, April 25, 2014; The Chemical Daily, May 1, 2014)

(5) Sekisui House

Sekisui House, the largest house manufacturer, has started a renovation service for houses to reduce

utility bills. They will offer the service to owners of over 60,000 energy saving houses built by them. The service will offer the installation of a photovoltaic generation system and natural gas FC as well as switching to an energy saving ventilation facility. According to their estimation, a family of four can save approximately ¥260,000 of electricity and gas each year with a 4.6 kW photovoltaic generator and 700 to 750 W FC to reduce electricity usage. Electricity sale under the feed-in tariff scheme gives approximately ¥280,000 each year, which makes for a utility bill free house. (The Nikkei, April 26, 2014)

(6) Ene-Farm Partners

A promotional organization “Ene-Farm Partners” has launched a working group to encourage Ene-Farm installation in apartment units. The working group consists of about 10 firms of which the majority is housing developers and general contractors. Ene-Farm installation for apartment units has been slow due to limited fitting area compared to houses. The group will visit demonstrational facilities to find ways to sell the FCs to apartment units. Architects of housing developers will be invited to sort out problems. As well as size reduction, possibility to share a single Ene-Farm between units will be investigated, because an apartment unit does not require heat as much as house. Regular visits will be made to see actual experimental apartment houses with Ene-Farms. (The Nikkan Kogyo Shimbun, May 2, 2014)

(7) Hokkaido Gas

Hokkaido Gas started to sell new Ene-Farm in May. Having been made smaller, the new product has improved performance while reducing the suggested retail price by 20%. The current model was released in August 2011, and 145 units have been sold in Hokkaido. Price reduction was required to push the sales up. The new product has a higher heat recovery rate than current product, and 20% fewer parts to reduce its size. The suggested retail price is ¥2.2 million (excluding tax and installation), ¥0.65 million cheaper than current model. The new Ene-Farm can generate approximately 60% of the electricity consumption within an average household each year, and the initial investment will be fully recovered in just over a decade. (The Hokkaido Shimbun, May 9, 2014)

5. Cutting Edge Technologies of FCVs & EVs

(1) New Kansai International Airport Co.

New Kansai International Airport Co., which operates Kansai International Airport and Osaka International Airport, plans full usage of FC forklifts in Kansai International Airport from 2016. An experiment of FC forklift, which is developed by Toyota Industries and Toyota Motor, will start in the airport this autumn with a single vehicle. According to the plan, two vehicles will be used in FY 2015, and a dozen will operate there in FY 2016. As well as no emission of exhaust fumes, the FC forklift can be charged in about three minutes, which should improve work efficiency. These were key factors for the decision. However, a FC forklift initially costs more than a diesel or electric forklift, which is an issue. The firm will consider replacing all forklifts for its airports with FC versions if the cost issue is solved. (The Nikkei, April 16, 2014; The Yamanashi Nichinichi Shimbun, April 17; The Sankei Shimbun, April 19, 2014)

(2) Nisshinbo Chemical

Nisshinbo Chemical will advance its carbon separators for FCs. Their dominance in the market share for domestic FCs will be the base to expand their supply for FCV productions. The firm plans to improve the strength and reduce the thickness by optimizing composition and forming technology of the separators. (The Chemical Daily, April 16, 2014)

(3) Hyogo Prefecture

Hyogo Prefecture installed five quick chargers in their facilities including in prefectural offices, and they are available for public use. The five places are prefectural offices in Itami, Himeji and Sumoto Cities, Hyogo Prefectural Kakogawa Medical Center and Tamba Namikimichi Chuo Park in Sasayama City. The chargers work at 20 kW of rated output. It takes 45 minutes to charge, and is free to use for a while. (The Nikkei, April 17, 2014)

(4) FHI

On April 16th, Mr. Yasuyuki Yoshinaga, the president of Fuji Heavy Industries (FHI), revealed an intention to re-enter the EV market in the US. The manufacturer determines the states as the priority market in its mid-term management plan, to be published in May, and will meet the environmental

regulations in the states by introducing EVs. An EV based on a car class less than 660 cc “Stella” was released in June, 2009. However, the firm stopped the production of that small class of cars, and also exited from the EV business due to slow sales of EVs. The president said actual operation plans would be decided within this year. (The Nikkei, April 18, 2014; Nikkan Jidosha Shimbun, April 19, 2014)

(5) MHI

Mitsubishi Heavy Industries (MHI) has decided to stop producing lithium-ion batteries (LIBs) because the sales for EVs are slow and it is unprofitable. The production facilities in Nagasaki Shipyard & Machinery Works are under consideration for sale to a Taiwanese firm. (The Nikkei, April 18, 2014)

(6) JAMA

Automobile Manufacturers Association (JAMA) has compiled a report on the market trend of passenger vehicles for FY 2013. The report features next generation vehicles and advanced safety technologies. In environmentally friendly cars, 60% of people recognize the names and features of hybrid vehicles (HVs) and EVs. On the other hand, the awareness of plug-in hybrid vehicles (PHVs) remains approximately 30% as well as approximately 20% for FCVs. In a survey on EVs, 22 % of respondents answered “considers purchasing” or “may consider purchasing”. (The Denki Shimbun, April 18, 2014)

(7) Beijing International Automotive Exhibition

The world largest car exhibition, Beijing International Automotive Exhibition started on April 20th. Toyota Motor will introduce over 15 new cars to the Chinese market by 2017 to bring its share to the third place from the current sixth place as soon as possible. Nissan Motor plans to release an EV “Venucia e30” in China this autumn. Mr. Osamu Masuko, the president of Mitsubishi Motors, revealed that the firm would introduce more eco cars by producing PHV locally. French-based Renault will start production in China in 2016. Cost reduction will be sought by sharing procurement channels with Nissan Motor, the alliance partner, in order to improve its competitiveness. Renault will also consider local production of EVs. On April 19th, Mr. Martin Winterkorn, the chairman of the board of German-based VW, announced that two types of rechargeable PHVs under “VW” and “Audi” brands

would be produced and a FCV would be developed. (The Nikkei, April 20 & 21, 2014; Nikkan Jidosha Shimbun, April 23, 2014)

(8) Hyundai Motor

Hyundai Motor announced that FCV would be released in South Korea after Europe. They aim at 40 FCVs to deliver mainly to local governments. The FCV will sell for ₩ 150 million (approximately ¥14.8 million). The firm considers FCVs to be popularized by 2020 by cost reduction in components. (The Nikkei & The Nikkei Business Daily, April 23, 2014)

(9) Brilliance Auto

Brilliance Auto (a joint venture with German-based BMW) started to rent “ZINORO 1E” which is an EV designed and produced for the Chinese market. The rental fee is CNY 400 (approximately ¥6,500) per day, and CNY 7,400 per month with a three year contract. (The Nikkei, May 1, 2014)

(10) Prozza & Terra Motors

EV ventures are exploring the emerging market. Prozza (Ichinomiya City of Aichi Prefecture) developed “Pecolo”, an electric three-wheeler, for the Philippines, and has started the production at its own plant in the Philippines. The vehicle will sell for ¥850,000 to ¥900,000. The firm purchases parts locally as much as possible except for the core components such as the motor. For FY 2014, 700 vehicles are aimed to be sold for taxi operators. Although the three-wheeler has a short driving range of 40 km on a full charge, the battery is removable and can be replaced with charged one in about three minutes. A charger, which is also sold, makes the battery easily charged at the office. This system allows the EVs to be used in developing countries which have less charger infrastructure. Terra Motors (Tokyo) also plans to go into the Bangladeshi market this year by selling an electric three-wheeler. The three-wheeler has a simple construction to sell for about ¥250,000. The firm has been talking to local businesses for production in the area. Additionally, the government of the Philippines is working on replacing taxis with electric three-wheelers with a support of the Asian Development Bank. (The Nikkei, May 3, 2014)

(11) Nissan

On May 5th, Nissan Motor announced that a production of a business use EV “e-NV200” has started in its Barcelona plant, Spain. The sales will

start from Europe and the vehicle will be exported worldwide. The sales in Japan are planned to begin in FY 2014. The firm aims to sell the EV as an eco car for routine delivery driving. The related investment is € 100 million (approximately ¥14 billion), and dedicated facilities were installed for the EV which uses Nissan’s commercial van “NV200” as its base. This car is the second EV for the automaker after “Leaf”. (The Nikkei, May 6, 2014)

6. Hydrogen Filling Station Developments & Business Plans

(1) Iwatani

Iwatani, Osaka City, will install a hydrogen filling station in Kofu City, Yamanashi Prefecture. The station will provide hydrogen at 300 Nm³/h. Hydrogen will be transported from the refinery and gasified in the station to supply FCVs at high pressure. METI has organized a subsidy scheme which supports a half or fixed amount for installation depending on size of the hydrogen filling stations. Yamanashi Prefecture will set a subsidy scheme to fund a quarter of the installation within April, and soon take applications. (The Yamanashi Nichinichi Shimbun, April 15, 2014)

(2) Japan Metals & Chemicals

Japan Metals & Chemicals, Tokyo, will speed up improvement of its hydrogen storage alloy. For full entry into the market, hydrogen filling stations are targeted for applications in the FC related field which is expected to grow. The firm suggests four types of storage alloys composed of lanthanum-nickel or magnesium-nickel for versatile stationary hydrogen storage systems and hydrogen storage tanks for FCVs. (The Chemical Daily, April 22, 2014)

(3) Kitz

Kitz will expand its range of valves for hydrogen filling stations. In 2012, they released a high-pressure ball valve with a maximum allowable pressure of 98 MPa for hydrogen filling stations, and delivered approximately 350 units for seven places. A hydrogen filling station has three pressure levels; 70 MPa of high pressure, 50 MPa of medium pressure and 10 MPa of low pressure. Therefore, a suitable valve is required for each level. As well as ball valves, the firm also manufactures needle and check valves, and is developing these for medium and low pressures. In addition, methods for valves to be fitted to pipes will

be developed. “A cone and thread method”, the current technique, manually connects valves, and Kitz is trying to develop a mechanical fitting for cost reduction in pipe installation. (The Nikkan Kogyo Shimbun, April 22, 2014)

7. Hydrogen Production & Refining Technology Development

Mitsubishi Kakoki joins the development of a technology to produce hydrogen from biogas (digestion gas) from sewage treatment. They work for the “Hydrogen Leader City Project” in collaboration of Toyota Tsusho, Fukuoka City and Kyushu University. The project has been selected for Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH) of MLIT. They are trying to develop a technology to process digestion gas prior to treatment with membrane separation in order to commercialize a technology to stably supply FCVs with hydrogen with high efficiency. Mitsubishi Kakoki has constructed a number of hydrogen related facilities, and over half of the on-site hydrogen filling stations in Japan uses its hydrogen production equipment. Their technologies obtained from the development of large equipment, are used in “HyGeia A” which boasts the world’s highest production efficiency and a small installation area, a half that of the conventional equipment. The firm aims to promote hydrogen filling stations with HyGeia A as their cores. (The Chemical Daily, May 1, 2014)

8. FC & Hydrogen Related Business Plans by Private Organizations

(1) Ohte Giken

Ohte Giken (Tsukuba City) has established a venture “Maximator Fluid Technologies” (Tokyo) in cooperation of German-based Maximator. The venture sells Maximator’s high hydraulic unit, gas booster, and fittings and valves for high pressure system through Ohte Giken’s sales network in Japan. The hydraulic unit and gas booster are used to dispense hydrogen for fuel for FCs. (The Nikkan Kogyo Shimbun, April 15, 2014)

(2) Nissha Printing

On May 9th, Nissha Printing announced that FIS, a gas sensor manufacturer of Hyogo Prefecture, would be acquired. Having a buyout value of approximately

¥1.5 billion, FIS will become a wholly owned subsidiary of Nissha Printing on June 30th. Nissha Printing plans to stabilize its business by making its sensor technology more varied. FIS’s technologies are expected to be utilized in health care products and FCVs. Nissha Printing is strong in touch panel sensors, and plans to expand its technological application to FCV sensors. (The Nikkei Business Daily & The Nikkan Kogyo Shimbun, May 12, 2014)

(3) Noritake

Noritake has released a mass-produced type of “rotary kiln with ceramic core tubes” to produce high purity ceramic materials such as an electrode material for LIB. The production ability is 30 to 70 kg per hour, which is 10 times that of the current medium sized kiln. The new kiln will sell for ¥120 to 150 million. The firm aims for material production of LIBs, FCs and semiconductors. (The Nikkan Kogyo Shimbun, May 12, 2014)

— This edition is made up as of May 12, 2014 —