

Lightweight Portable FC with Hydrogen Generator at Low Price

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1. Governmental Measures:

(1) Experimental Electricity Feeding From FCV

The Ministry of Economy, Trade and Industry (METI) will carry out a demonstrational experiment where fuel cell vehicles (FCVs) feed electricity to houses and communal facilities in Kitakyushu city, Fukuoka prefecture, and Toyota city, Aichi prefecture in the fiscal year 2013. The Japanese government proposed FCVs as mobile generators as well as plug-in hybrid vehicles (PHVs) and electric vehicles (EVs). These vehicles are aiming to gain popularization from 2015 in four urban areas including Tokyo with governmental support of preparing the infrastructure and deregulation. METI is attracted by the fact a passenger FCV powered by hydrogen can provide four times more electricity than an EV, and prospects that one of the first steps for FCVs' popularization is their use as an emergency power source by local governments. Honda's passenger vehicle "FCX Clarity" will supply chosen houses in the smart community demonstration area in Kitakyushu city with electricity as an experiment. Also, a school, hospital and public facility in Toyota city are expected to be provided with electricity by FCHV-BUS which uses Toyota Motor's FCV system and Hino Motors' body as a joint development. (The Nikkan Kogyo Shimbun, August 30, 2012)

(2) FC Cogeneration

METI will request ¥94 billion to support cogeneration installation for a special account budget, which is separated from the general account budget, as an energy measures for the fiscal year 2013.

¥6 billion, out of 94, is planned for a "Gas Cogeneration Promotion Subsidy" which supports small and medium sized cogenerations 10 MW or under, and ¥17 billion is intended for fuel cell (FC) cogenerations as well as ¥50 billion for a "Subsidy for Rational Energy Business Operators". Also, the subsidy for Ene·Farm installation support is planned to be almost doubled to ¥17 billion from ¥9 billion of

initial budget for the fiscal year 2012. For auto related subsidies, ¥5 billion will be requested for installation of hydrogen filling stations for FCVs as well as ¥ 2.7 billion for "Advanced Technology Development Project for Application/Commercialization" which assists a top-runner approach development of lithium-ion batteries (LiBs)

(The Nikkan Kogyo Shimbun, September 7, 2012; The Mainichi Newspapers, Nikkan Jidosha Shimbun, September 8, 2012, The Chemical Daily, September 10, 2012)

(3) New Order for Hydrogen Filling Station Preparation

METI has reorganized its structure to prepare over 1,000 hydrogen filling stations for FCVs by the fiscal year 2015. The hydrogen filling station related management was transferred from the Nuclear and Industrial Safety Agency to the newly established High Pressure Gas Safety Office of the Commerce, Distribution and Safety Policy Group. As a start, the office held the first hearing to establish actual technology standards on hydrogen filling stations handling 70 MPa of pressure which fills vehicle more efficiently. The current technology standards and ministerial ordinances on high pressure gas will be amended to prepare for the infrastructure development. (Nikkan Jidosha Shimbun, September 21, 2012)

(4) Support for Hydrogen Liquefying Technology

The Japanese government plans support development of simpler mass production technologies of liquefied hydrogen, its transport and storage to make hydrogen widely available. Universities and oil companies will start the researches with governmental assistance from the fiscal year 2013 to aim at commercializing the technologies in the 2020's. METI and Ministry of Education, Culture, Sports, Science and Technology (MEXT) intend to allocate approximately ¥2 billion for the technology

developments in the budget bill for the fiscal year 2013. A method to convert hydrogen gas to liquid by refrigeration will be studied as well as changing into another liquid fuel by chemical reaction with another substance. (The Nikkei, September 21, 2012)

2. Local Governmental Measures

(1) Tokyo

On September 28th, the Bureau of Industrial and Labor Affairs of Tokyo started to take subsidy applications of technology and production projects from smaller businesses in Tokyo. The target of the subsidy is to fortify Tokyo's disaster control ability by supporting technological developments of smaller businesses. A project has to aim either to increase the disaster management ability of a local community or to utilize energy which is useful during disasters. For example, the development of renewable energies such as photovoltaic, wind and hydraulic power generations, cogeneration and FC can be the subject as well as a storage battery technology such as LiB and a building energy management system (BEMS). Larger businesses have been researching these technologies, and peripheral technologies such as system components parts are expected to be supplied by smaller businesses. The maximum subsidy is ¥20 million and their time period is from January 2013 to December 2014. Support is planned for about four projects. (Architectures, Constructions & Engineering News (Daily), August 29, 2012)

(2) Kagoshima Prefecture

Kagoshima prefecture is offering the roof of its north parking to businesses of the prefecture to display their new energy products such as photovoltaic and wind generators, highly efficient energy utilization products such as a FC and heat pump and environmentally friendly products such as a waste power generator, from early November to the end of the March. The exhibition is called "Eco Garden" and participants are being recruited. (Minami-Nippon Shimbun, August 30, 2012)

(3) Kanagawa Prefecture

On September 7th, Kanagawa prefecture announced that Daiwa House Industry was chosen as the developer of the eco town project of land belonging to Kanagawa Prefectural Business Agency. Approximately 34,869 m² of prefecture-owned land

will be sold to the firm. Daiwa House will build smart houses with equipment such as a photovoltaic generator. With a theme of "Eco town where everyone likes to live", all 128 houses come with photovoltaic generators, storage batteries and Ene·Farm as well as partial light emitting diode (LED) lighting. (The Nikkan Kensetsu Kogyo Shimbun, Architectures, Constructions & Engineering News (Daily), Nikkan Kensetsu Sangyo Shimbun, September 10, 2012)

(4) Tokushima Prefecture

Tokushima prefecture has revealed the state of the measures (new projects) which were included in the supplementary budget in June, for electricity shortage during hot days, which Shikoku Electric Power had requested to save power usage. As a measure, a third of expenses, up to ¥5 million, of a FC or storage battery newly installed or replaced is supported for hospitals and welfare facilities, and two facilities plan to apply in September. (The Tokushima Shimbun, September 8, 2012)

3. Development and Demonstrational Experiment of SOFC

A project will fully launch for an integrated coal gasification fuel cell (IGFC). The government delivered the first subsidy for a demonstrational experiment of an integrated coal gasification combined cycle (IGCC) which is the first step of IGFC. On August 30th, Hitachi was chosen as a major facility provider and JGC Corporation was selected as one of the constructors. The first stage of the experiment is an oxygen-blown IGCC to be verified. An experiment with carbon dioxide capture and storage (CCS) is to be added as the second stage. Finally, IGFC with a solid oxide fuel cell (SOFC) is to be tested as the third stage. The oxygen-blown IGCC, the first experiment, will be carried out by Osaki CoolGen (Hiroshima city) which is a joint venture of Chugoku Electric Power and J-POWER. A construction of a 167 MW output facility will start from March, 2013 and the experiment is planned from March 2017. This seven-year project costs approximately ¥90 billion in total, and a third is expected to be subsidized by the government. METI advertized for "Subsidy for the Demonstrational Test of a Coal Gasification Combined Cycle" in the fiscal year 2012 budget. Providers for the project were selected, and ¥1.37 million was given to them as the

first subsidy. The rest of the subsidy amount will be determined at budget formulation each year. However, around ¥7 billion is estimated for the fiscal year 2014 and 2015 which is to be the construction peak. The Council for Science and Technology Policy classifies the experiment of IGFC as a large scale new research development. (The Nikkei, The Denki Shimbun, The Nikkei Business Daily, The Nikkan Kogyo Shimbun, The Chemical Daily, August 31, 2012; The Denki Shimbun, September 5, 2012, The Nikkan Kogyo Shimbun, September 7, 2012)

4. Technology Developments for FC Elements

(1) ISSP

The Institute for Solid State Physics of the University of Tokyo (ISSP) will install a new supercomputer system. The system has four racks of “PRIMEHPCFX10” from Fujitsu, using the same supercomputer technology applied to “K computer”, and is consists of 384 nodes in total. The theoretical operation performance is 90.8 tera floating-point operations per second (FLOPS). With the system, ISSP will make more contributions to development of high-performance devices, highly efficient FCs and new medication as a leading institute for “new materials and energy creation”. (Johosangyo Shinbunsha, August 27, 2012)

(3) Hokkaido University

A research team with Associate Professor Tatsuya Takeguchi of Hokkaido University Catalysis Research Center has developed a new catalyst for polymer electrolyte fuel cells (PEFCs). Well alloyed Pt/Ru catalyst with higher CO tolerant characteristic is required to remove CO which causes deactivation of the catalyst. The team found out that platinum and ruthenium bonded better when the mixture was heated short time and then cooled down rapidly. The temperature was increased to 100 °C in about 10 minutes and cooled down to room temperature in 10 minutes. The technology may reduce by half the amount of electrode catalyst to be used. (The Nikkan Kogyo Shimbun; September 17, Japan Metal Daily, September 19, 2012; The Chemical Daily, September, 20, 2012; The Hokkaido Shimbun, September 22, 2012)

(3) Institute of Molecular Science

A study group with Associate Professor Mizuki Tada

of Institute of Molecular Science has succeeded in visualizing a distribution and chemical state of platinum catalyst in a membrane electrode assembly (MEA). At the synchrotron radiation facility SPring-8, the new analysis method was developed by combining X-ray laminography and X-ray absorption fine structure (XAFS) which captures the state of a specific element. X-ray laminography is a type of X-ray computer tomography, and examines the structure of a sample three dimensionally. With this method, an even distribution of platinum catalyst was confirmed in an anode catalyst layer before degradation. On the other hand, platinum catalyst was found unevenly distributed after having energized repeatedly. Also, a concentration of platinum catalyst was observed, and oxidation of platinum was visualized. (The Nikkan Kogyo Shimbun, September, 19, 2012)

5. Business Plans of Ene Farm

(1) Iwata Kensetsu

In Seihonmachi, Gifu city, Iwata Kensetsu has held a private view of two smart houses which are introduction models for “Next Generation Energy Infrastructure” promoted by the prefecture. These houses have a photovoltaic generator, a storage battery, an energy management system and Ene·Farm to save energy, and the firm is promoting smart houses with a prefectural subsidies. (Gifu Shimbun, September 5, 2012).

(2) JX Nippon Oil & Energy

On September 7, JX Nippon Oil & Energy announced that its production and sales structure for Ene·Farm would be reorganized. They will focus on sales of SOFC having higher power generation efficiency with which was released last autumn, and their subsidiary will stop producing the PEFC assembly. Operational recourses will be concentrated on the new FC SOFC, which is 80% of the firm’s whole FC orders, to be more profitable. The current price of the FC is approximately ¥2.7 million and this is aimed to be reduced to ¥0.5 million by the fiscal year 2015 at annual sales of 50,000 units. (The Nikkei, September 8, 2012; The Chemical Daily, September 11, 2012; The Denki Shimbun, The Nikkei Business Daily, September 12, 2012; The Niigata Nippo, September 13, 2012)

(3) Hokuriku Gas

Hokuriku Gas started its Ene·Farm sales from June, 2012, and the sales reached over 100 by August. The firm has focused on a dual generation system combining a photovoltaic generator and Ene·Farm, and 40% of FCs sold by the end of August was the dual system. (The Niigata Nippo, September 13, 2012)

(4) Sekisui House

On September 15, Sekisui House announced that its environmentally conscious apartment blocks “Smart Town” in three places Aichi, Mie and Gifu prefectures would be in the market as soon as they were ready from October 20th. More than 100 housing lots in total will be sold with a suggestion that the latest environmentally friendly house will combine three facilities; a FC, a photovoltaic generator and a storage battery. Electricity is provided by a FC in a day as much as possible; power from photovoltaic generator is sold to the utility firm to reverse the meter, and a storage battery supplies power in the evening and at night to reduce supply from the utility firm. 34 lots of “Smart Common Life Tempaku Hirabari will be the first. The price per a lot will be around ¥50 million including construction. (The Chunichi Shimbun, September 15, 2012; the Nikkei, September 16, 2012)

(5) Tottori Gas

Tottori Gas Group has commercialized an energy system combining a FC, storage battery and photovoltaic generator for residential application. The system has already been installed in a household of Tottori city and will be investigated for practicality over a year from October. Nearly 90% of electricity purchase is estimated to be reduced from the experiment. (Nihonkai Shimbun, September 17, 2012)

(6) The Japan Gas Association

According to an installation result of natural gas cogeneration system by the Japan Gas Association, the accumulated capacity installed was increased by 0.6% in the end of 2011 from 2010, which stayed same. However, domestic gas cogeneration system such as Ene·Farm was increased to 123 MW, a 17% rise. (The Nikkei Business Daily, September 18, 2012; the Nikkan Kogyo Shimbun, September 24, 2012)

6. Cutting Edge Technology of FCVs and EVs

(1) Tesla Motors, etc

Elon Musk, the CEO of an EV venture of USA Tesla Motors, revealed that Tesla was expected to move out

of the red by the term of December 2013. The new car with a lower price than conventional models has sold well in the market and contributed to going into the black. Tesla is likely to show stronger presence in the EV market. The newly introduced Model S is five-seater sedan, costing from \$50,000 (approximately ¥4 million) which is half the price of major conventional EVs. Also, the maximum driving range on a single charge is 480 km which is over twice than the competitors' range. 5,000 units are planned to be produced for 2012 as well as 20,000 for 2013. Tesla has already received over 12,000 orders. (The Nikkei, August 30, 2012)

On August 30th, Tesla Motors revealed its EV Model S would be available in Japan in the first term of 2013. Although the price has not been released, it is expected to be half of an electric sports car Tesla Roadster. The vehicle will be compatible with CHAdeMO, the Japanese charging standard, to stimulate demand. The shipment of Model S has already started in June in the US. Passenger vehicle sales in Japan for the fiscal year 2012 are estimated approximately 12,000 units. Although Nissan Leaf and Mitsubishi Motors i-MiEV have taken a substantial share in the market, they have a shorter driving range as a down side. Tesla's Model S potentially expands use and attracts more consumers by extending the range largely. Daimler AG of Germany plans to sell a two-seater small EV “Smart” in Japan through its subsidiary Mercedes-Benz Japan by the end of the year. (The Nikkei, August 31, 2012)

(2) BYD

The Chinese auto giant emerging in EV, BYD, Guangdong province, only sold approximately 300 units of EV for the term from January to June which is low. Having supported the EV department financially, the income of the mobile phone department of BYD has significantly dropped, which is the crucial point for the firm whether it can keep its position in EV development in China. EVs are determined as the next generation car by the Chinese government. However, fewer local governments have promoted this, which has resulted in slow sales. Shenzhen, Guangdong, where BYD's head quarter is located, has supported EVs with its own subsidies, used as taxis and prepared chargers. (The Nikkei, August 31, 2012)

(3) Honda Motor

On August 31st, Honda announced “Fit EV” had become available for lease. The vehicle can travel 225 km on a single charge. Honda aims to sell 200 units over two years targeting local governments and businesses. The 20 kWh capacity LiB of Toshiba is installed underneath the car. Having developed an efficient energy collecting system when a vehicle reduces speed, Honda cut down energy consumption to 106 kWh/km. (The Nikkei, Nikkan Jidosha Shimbun, September 1, 2012)

(4) Toyota Motor

On August 31st, Toyota Motor announced a power supply system using a FCV bus as power source. The FC bus is currently under a trial operation in places such as the Chubu International Airport. A vessel full of hydrogen on the bus can provide households with electricity. A fuel cell hybrid vehicle bus (FCHV-BUS) can produce a maximum of 3 kW output for over 100 hours, which is a monthly usage of a household. (The Yomiuri Shimbun, The Nikkei, Nikkan Jidosha Shimbun, The Chunichi Shimbun, The Chugoku Shimbun, The Nishinippon Shimbun, Fuji Sankei Business i, September 1, 2012; The Denki Shimbun, The Nikkei Business Daily, The Nikkan Kogyo Shimbun, September 3, 2012)

(5) Nissan Motor

On September 3rd, Nissan Motor announced a test car of “e-NV200”, an electric commercial vehicle, was given to the Tochigi prefecture. Utilizing the vehicle for collection and distribution of farm products to farm shops, the prefecture will investigate the convenience of charging at home in farming areas where the number of petrol filling stations has been declining. (The Nikkei, September 4, 2012)

On September 4th, Nissan, Sumitomo Corporation and JX Nippon Oil & Energy announced that the number of quick chargers for EVs would be increase to 4,000 by 2020. Additionally, each firm’s own fee-based service will be available mutually. The main operator of the installation is Japan Charge Network (JCN) which is financed by Nissan, Sumitomo Corporation, Showa Shell Sekiyu and NEC. JCN will provide about 20 quick chargers in the Tokyo metropolitan area to start with. Providing free charges to promote quick chargers, JCN will switch to fee-based service from October. Aiming to be

commercially profitable, a single charge will be from ¥420 which is to be paid with a registered credit card. JCN estimates cumulative units of more than 500,000 EVs will be out by 2020 and has partnerships with four oil providers such as JX Nippon Oil & Energy who started a members-only charging service in January and Idemitsu Kosan. The installation will be a joint project. The cost of installation is between ¥4 to 5 million per facility. Toyota Motor and Chubu Electric Power have started their own charging services. Also, Hitach and NTT Data have been carrying out demonstrational experiments to prepare charger installations. (The Nikkei, the Nikkei Business Daily, September 5, 2012)

On September 12th, Nissan Motors announced a concept model of their sport utility vehicle (SUV) FC “TeRRA” would be displayed at the Paris Motor Show. The vehicle will attract consumers as a new eco car capable of both a silent cruise in an urban area and an off-road drive. Having focused on EVs, Nissan is showing its intention to expand its business into FCV. TeRRA is a four wheel drive with the front-wheel drive system of EV “Leaf” and a newly developed trial in-wheel motor for a rear-wheel drive system. Because of in-wheel motor which eliminates the need of a drive shaft which transmits driving force, the inside space became flat and larger. The driver’s seat is allocated slightly to the center for inserting a tablet computer to the front of the driver’s seat which starts up the car and gives a futuristic design. A tablet can provide navigation, sound and images. (The Nikkei, the Nikkei Business Daily, the Nikkan Kogyo Shimbun, Fuji Sankei Business i, September 13, 2012; Nikkan Jidosha Shimbun, September 15, 2012)

Nissan EV “Leaf”, released in the end of 2010, reached accumulated sales unit of 36,000 and has approximately 60% share in the global EV market. Nissan will invest €4 billion (approximately ¥400 billion) by the fiscal year 2016 to introduce eight vehicles of three brands and produce the cars and batteries oversea. Also, Nissan-Renault alliance aims at accumulated 1.5 million EVs to sell globally by the end of the fiscal year 2016. An EV plays the role of a storage battery and information device connected to a social network in a smart community. (The Nikkan Kogyo Shimbun, September 21, 2012)

(6) Toyota Motor, NEDO and Kyoto University

On September 4th, a project team of Toyota Motor, New Energy and Industrial Technology Development (NEDO) and Kyoto University completed an analysis device to show a detailed mechanism of the inside of a storage battery and will fully start a development of a advanced storage battery for EVs and domestic emergency power source. The device will contribute to enlarging capacities of LiB, and developments of next generation storage batteries which are more efficient and durable. This neutron firing analyzer is finished in a high intensity proton accelerator facility “Japan Proton Accelerator Research Complex (J-PARC)” of the High Energy Accelerator Research Organization, and examines what happens in a working storage battery at an atomic level. 12 companies and 14 universities take parts of the project. The team aims for a storage battery which allows travel of 500 km, the driving range of a petrol car, on a single charge. (The Nikkei, September 5, 2012)

(7) Intelligent Energy

Tourist attracting classic cars and London taxis ran on FCs in the city at London Olympics and Paralympics. Intelligent Energy provided the Olympic Organizing Committee with five FC powered taxis which were used for invited guests such as government officials. (The Asahi Shimbun, September 19, 2012)

7. Demonstration Experiment and Business Plans of Hydrogen Filling Station

(1) Iwatani

Iwatani has decided to install a demonstration commercial model of a hydrogen filling station to examine a lower cost facility with Toho Gas in Toyota city, Aichi prefecture. Hydrogen supplier’s aim for the installation of 100 hydrogen filling stations, and 20 of them will be equipped by Iwatani. (The Nikkei Business Daily, September 5, 2012)

(2) Air Liquide

On September 7th, Air Liquide of France announced that its first public hydrogen filling station for private automobiles was open in Dusseldorf, Germany. The latest filling facility was installed to start with, and the firm plans to design and construct hydrogen filling stations supported by a validation project of the German government over three years. At least 50 facilities are aimed to open in Germany by 2015.

Planning to install more hydrogen filling stations in Japan, Air Liquide will actively prepare infrastructure for FCVs that auto makers will start mass production of by 2015. (The Chemical Daily, September 12, 2012)

8. Technology Development and Business Plans of Hydrogen Production and Refine

(1) JBEC

Four firms- Japan Blue Energy Co (JBEC), Diwa Lease, Toyota Tsusho and Mitsui Chemicals established the Hydrogen Innovation Town (HIT) Business Research Group, and have started demonstrational experiments on hydrogen production from sewage sludge. The research group aims to produce hydrogen from sewage sludge, which is largely incinerated now, with the BLUE Tower technology (a gasification technology) belonging to JBEC. By applying the BLUE Tower technology to sewage works, locally produced hydrogen consuming community or a hydrogen innovation town, is expected to spread wide for FCVs and stationary FCs which are also anticipated to expand in the market. Hydrogen production has started in a BLUE Tower technology experiment plant which is owned by JBEC in Izumo city, Shimane prefecture. For the coming demonstrational operation experiment of the experimental plant, HIT Business Research Group aims to establish a bio-hydrogen production technology and a model plan of a commercial size plant. (The Nikkei, The Denki Shimbun, The Nikkan Kogyo Shimbun, Nikkan Kensetsu Sangyo Shimbun, The Nikkan Kensetsu Kogyo Shimbun, Architectures, Constructions & Engineerings News (Daily), The Chunichi Shimbun, Fuji Sankei Business i, The Chemical Daily, September, 11, 2012; The San-in Chuo Shimpo, September 12, 2012; The Nikkei Business Daily, September 14, 2012; Nikkan Jidosha Shimbun, September 15, 2012)

(2) Okayama University

A study group with Associate Professor Yutaka Takaguchi has developed carbon nanotubes (CNTs) which have a highly efficient photocatalysis function. Being black and having a wide photoreaction range has caught the researcher’s eyes, the CNTs successfully produced hydrogen by breaking up water with the added photocatalysis function. Electrons start moving from a CNT, which is surrounded by

fullerene, by light, which gives a photocatalysis function and produces hydrogen. By analyzing diameter distribution in detail, the group found out that the shorter diameter CNT had the more active electrons. Quantum yield largely increased to 43% with 0.92 nm CNTs on average, and a relation between diameter of a CNT and reactivity was confirmed. The current quantum yield of visible rays was 31%. (The Chemical Daily, September 14, 2012)

9. Development and Business Plan of Renewable FC

On September 20th, Michael Denton of Boeing Japan revealed that a renewable FC system under development with IHI would be installed on a test airplane which was planned to have a test flight later in the month. Because renewable FCs are a rechargeable and a separated power source from an airplane engine, Boeing aims to commercialize it as a supplemental power source for an airplane facility such as a kitchen. The test airplane has been flying in Montana, and will have an installation of the FC system. (The Nikkei Business Daily, September 21, 2012)

10. Developments and Business Plans of Portable FC

(1) ARV& Aquamo Holdings

ARV, Shinshiro city, Aichi prefecture, and Aquamo Holdings, Kawaguchi city, Saitama prefecture have developed a FC together with a magnesium electrode. The FC's operating time was extended to between 300 to 600 hours by improving a carbon material for the separators. Copper or stainless steel is applied to the cathode as well as magnesium for the anode, and separator between the cathode and the anode uses a carbon material and water as the electrolyte. The carbon material takes out magnesium ions in the anode and oxygen in the electrolyte, and they flow into the cathode, which creates an electric current. Because magnesium becomes oxidized in the anode, the firms successfully developed a system to remove oxides by the carbon material to extend the FC's life span. A small lighting device of around 10 W will be sold first with 50 to 1500 mAh capacity batteries. The price will be from approximately ¥300. Both firms aim to sell the product largely as an emergency supply such as a torch and emergency battery from late September. (The Nikkan Kogyo Shimbun, August 29,

2012)

(2) ROHM, Kyoto University, Aquafairy

On September 18th, ROHM, Kyoto University and Aquafairy, a venture firm of Kyoto city, announced that a portable FC was aimed to be commercialized with trilateral cooperation by next spring. A credit card size charger and a portable generator are planned to be developed by combining a FC and a light and safe hydrogen generator. The product is expected to be a charger for a smart phone and an emergency battery. A technology was developed to produce large amount of hydrogen (about 4.5 L) safely by reacting water and sheeting of a small amount of a calcium compound (less than 3 cc) mixed resin. 5 Wh of generation was realized by combining the technology and a small PEFC. With the technology eliminating the need of canister to store hydrogen, the battery can be thrown away as burnable waste because it does not have poisonous substances nor emit carbon dioxide (CO₂) or toxic gas. Once the throw away battery is popularized, the price is expected to go down to that of ordinary batteries such as an AA battery'. (The Nikkei, The Nikkei Business Daily, The Nikkan Kogyo Shimbun, The Denki Shimbun, Dempa Shimbun, The Kyoto Shimbun, The Chemical Daily, September 19, 2012; Nikkan Jidosha Shimbun, The Yomiuri Shimbun, September 20, 2012; Fuji Sankei Business i, September 24, 2012)

11. Development and Business Plan of Analysis Device

Murakami Giken, Izumi city, Osaka prefecture, has developed an optical hydrogen detector. The detector measures the color change of an alloy film which reacts with hydrogen. Electrical current is not required, which supposedly makes the product safer. On the other hand, conventional detectors measure the change of electric resistance by applying an electric current. The firm expects the detector to be useful for a FC production and hydrogen storing and filling stations for both new and existing customers. An explosion-proof type is sold for ¥690,000. (The Nikkei, September 3, 2012)

— This edition is made up as of September 24, 2012—

A POSTER COLUMN

Issues of “Energy/Environment Strategy” to Stop Nuclear Power by 2030.

On September 4th, the Japanese government held a meeting of Energy and Environment Council (chairperson: Minister of National Policy Unit Motohisa Furukawa) to discuss issues and measures to eliminate nuclear power completely. The Minister of Economy, Trade and Industry Yukio Edano submitted a report that electricity supply would tighten and price would go up because nuclear power stations, the majority of which are currently stopped, would be difficult to restart. An investment of ¥150 trillion in total by 2030 is estimated as needed to promote energy saving and renewable energies. Also, monthly utility bills would go up to ¥32,243 including electricity, which is double the 2010 figure of ¥16,900.

Broken down, ¥100 trillion is required for measures such as making insulation for houses compulsory and FC installation to achieve 22% reduction (converted in primary energy) from the figure of 2010 as a energy saving measure, and ¥50 trillion was estimated as an investment to increase renewable energy output to a predicted amount of 350 TWh, from 106 TWh, the figure of 2010. Edano was asked whether the issues would be solved at the press conference.

“I think so” said he.

Some newspapers are concerned that the energy policy change may affect the security of the country by increasing fossil fuel import from abroad as well as relations between related local governments. Additionally, rising electricity prices may reduce the competitiveness of Japanese businesses and accelerate the emigration of industry. Although nuclear power lost the public perception of reliability due to the Fukushima’s accident, jumping to conclusions and shutting down all the nuclear power stations may ruin the country, is the opinion of the press.

On September 19, the Japanese government avoided approving the energy and environment strategy “to shut down all the nuclear power stations in 2030” at the Cabinet meeting and kept it under consideration. However, the basic approach of a “flexible policy to be changed through discussions with local governments

and the international society” was decided at the meeting. The Cabinet left scope to reconsider the energy policy including closing nuclear power stations all together. The decision was to show a consideration for local governments of nuclear facilities, the industry and the US who might oppose it.

The Japanese government will start detailed planning with advanced strategy. A “Green Policy Outline” will be compiled including measures against global warming, and the Basic Energy Plan determining the ratio of nuclear power and energy saving targets by the end of the year. (The Mainichi Newspapers, The Shinano Mainichi Shimbun, September 4, 2012; The Sankei Shimbun, The Kobe Shimbun, September 5, 2012; The Nikkei, September 19&20, 2012)

2013 Fuel Cell Symposium

20th Anniversary

Date: **28-29, May, 2013**

Site: **Tower Hall Funabori**

Edogawa-ku, Tokyo, Japan