THE LATEST NEWS NUMBER 190, 2012 FCDIC

Merged Companies for the Development and Manufacturing of FC System for Automobile

Arranged by T. Homma

1. National Policies:

The operation for promoting zero・energy plan for housing/building is included in the 2012 natural resource/energy related budget plan of the Ministry of Economy, Trade and Industry as the energy conservation measure for the household related category and 7 billion yen was newly allocated to the operation. In the 2011 third supplementary budget, the ministry also allocated 119.4 billion yen for the concentrated introduction of photovoltaic power generation system as energy saving measure for the household related category, 21 billion yen for introduction support plan of stationary LiB, and 30 billion yen for introduction subsidy of new construction for energy management system such as HEMS; therefore, the ministry will take all possible measures to ensure the immediate electric supply/demand measure even for the household related category with all necessary measures. For other, in the 2012 budget plan of energy saving measure related matters, the subsidy of 29.2 billion yen was allocated to support EV introduction and the plan will be proceeded for the popularization of the automobile and charging facility with total operation amount 44.4 billion yen including carry-over of the budget from the previous year. (February 1 2012 The Denki Shimbun)

2. Policy by local government:

(1) Yamanashi Prefecture

On January 18, Yamanashi prefecture summarized the reflected conditions from the requested/proposed items to the 2012 national government's budget and the national policies. In addition to the policy for reinforcing to attract foreign visitors, many reflections to the budget plan were confirmed in respect to the request of fulfillment/enhancement of new energy measure with the budget amount of 3.06 billion yen for infrastructure technology of hydrogen supply/socially verified operation increased by approximately 3 times from the 2011 budget. (January 19 2012: The Yamanashi Nichinichi Shimbun)

For facilitating a renewable energy introduction for ordinary housing and energy saving, Yamanashi prefecture agreed on the principle of a new policy to assist households to introduce an energy saving facility to be connected with FC for domestic use. The prefecture desires to accelerate the flow of energy saving in the prefecture in addition to already-executed subsidy for photovoltaic power generation facility. (February 7 2012: The Yamanashi Nichinichi Shimbun)

(2) Gifu prefecture

For supporting new energy popularization at general households, Gifu prefecture launches a new approach mechanism in 2012 as providing low-interest loan for initial investment and amortize the loan by decrease of heating and lighting cost. It aims to establish a project team consisting of financial institution for the loan and private company for facility introduction and approximately 30 million yen for the investigative research will be included in the new year budget plan. Gifu prefecture aims for popularization of the facility to ordinary households in combination with photovoltaic power generation, FC and rechargeable battery. (January 20 2012 The Chunichi Shimbun)

For introducing an energy infrastructure of the next generation to "Hoshino-Furusato (Star-filled Hometown) Fujihashi" as a roadside station in Higashi Yokoyama of Ibikawa-cho, Gifu prefecture requests approximately 53 million yen of the business operation for the 2012 initial budget plan. The place will be reinforced as a local evacuation center with constructing an effective energy infrastructure of the next generation for disaster prevention aspect in terms of the roadside station to be positioned as a center of local disaster prevention. The prefecture utilized the subsidy system of the Ministry of Land,

Infrastructure, Transport and Tourism. In the operation of functional enhancement for roadside station, it constructed one photovoltaic power generation (approximately 5kW), FC (approximately 0.7kW), and EV rapid charger for "Hoshino-Furusato (Star-filled Hometown) Fujihashi". It maintains the system which can supply energy even at the time of disaster. (January 25 2012 The Nikkan Kensetsu Kogyo Shimbun)

(3) Mie Prefecture

The governor's assessment of the 2012 Initial Budget Plan for Mie prefecture was initiated on 20th at the prefectural government. The target operations for the governor's assessment are 95 operations and the target amount including public-work spending is 94.8 billion yen. The part of explanation for the requested amount of 9.154 million yen in respect to the promotional operation of clean energy research under the agriculture and commerce department was released. Director Yamakawa of the department mentioned that he would like to deal with the research group establishment and development support for FC/photovoltaic power generation, requested as the governor's special budget reserve.

(4) Hyogo Prefecture

The enterprise agency of Hyogo prefecture decided to establish the policy to develop medium-rise housing in "Shioashiya" in the coastal area of Ashiya-city and initiated the discussion with the city from 2012. The development of medium-rise housing will be proceeded in the south district of Ashiya Marina with 3.48 ha and triangle site shape. The sales of Eco-housing in combination with photovoltaic power generation and Enefarm was already started for the residential area in south and the housing design for unsold subdivisions will be started from 2012. The medium-rise housing will be built with environmental consideration and the business partners will be recruited with the premise of introduction of Eco-facilities such as photovoltaic power generation and rechargeable battery. In addition, the housing zone of unsold subdivisions will become the district of Smart House and will be sold to private companies after 2013. Domestic electric appliances, housing equipment, and solar cell will be connected with energy equipment and meter of electricity/gas/water by network and it is expected to introduce a single family housing with automatic control of electricity consumption at home. (January 26 The Nikkan Kensetsu Kogyo Shimbun)

(5) Niigata City

Niigata city will expand the subsidy operations for earthquake-resistant renovation and Eco-renovation of individual housing. Among the operations, the Eco-renovation subsidy will add not only photovoltaic power generation but also Enefarm, introduction of pellet stove, LED lighting for fluorescent light replacement as subsidy items. (January 26 The Nikkan Kensetsu Kogyo Shimbun)

3. Development and operation for FC element technology

(1) The National Institute of Advanced Industrial Science and Technology

The National Institute of Advanced Industrial Science and Technology will accelerate the development of new high molecular nanocomposite with using high-shear molding process (HSP). The institute was successful to develop electrode material for FC (bipolar plate) and window material for automobile. HSP is a technology of mixing/dispersion at nano-level without using additives such as compatibilizing agent for polymer as not easily being compatible with each other and reinforced filler. (January 23 2012 The Chemical Daily)

(2) Showa Denko

Showa Denko has been developing carbon separator in fusion type with using composite material of conductive graphite fine powder and resin for PEFC and the most distinctive feature is low cost and lightweight. The company decided to aim for the operation expansion with the global expansion prospect for the FC market. In particular, the company aims for the share expansion at a stretch since both cost and lightweight will be important for FCV separator with the prospect of the market establishment after 2015. (February 3 2012 The Chemical Daily)

4. PAFC operational development:

Fuji Electric company enters into the foreign market with its industrial FC. The company acquired the necessary international standards for the distribution in Europe and received the industrial FC order for

retail stores from the Daimler group of Germany. The order was for " FP-100i " with 100 kW and the order amount was 100 million yen. The company will deliver the product to Daimler's retail stores in Hamburg from summer 2012. In future, the company will expand the order with consideration of the local manufacturing and aim for the sales of 1 billion yen in the European market within 2 years. (February 11 2012 The Nikkei)

5. EneFarm operational development:

(1) FC popularization and promotion association

With the concern of electricity supply after the East Japan Great Earthquake, the popularity of Enefarm has been increasing. The number of Enefarm equipments applied for the 2011 subsidy from the government (based on the number of acceptances by the association) was 12,437 as of December 27 2011.

The subsidy limit was expanded with the additional capital funding and the application was concentrated in Tokyo, Nagoya, and Osaka in where each gas company focused on its sales activities. The association expects "The equipment types for cold regions have been currently expanding and it will support the popularization in future." (January 19 2012 The Nikkei)

(2) Sanin Sanso Corporation and Aqura home

Sanin Sanso Corporation (Yonago city, Tottori prefecture) started selling a double electric generation with the combination of EneFarm and solar battery. It was already installed at two houses in Yonago city and received a good evaluation from the purchasers. (January 16 The Nihonkai Shimbun)

Aqura home opened its show house with photovoltaic power generation system, EneFarm, and system for electricity storage at the Housing Exhibition "Yokohama Seya Housing Park" in Yokohama city. The show house was the 37th in Kanto region and the 55th in the entire nation. (January 17 2012 Jutaku-Shimpo)

(3) Chofu Seisakusho

Chofu Seisakusho as one of the largest water heater manufacturers reinforces its production and distribution for the high value-added products with energy saving/environmental responsiveness. The company plans to expand the production capacity for water heater/heater in relation to EneFarm from the current 5,000/year to 13,000/year by March. It has the production line for water heater/heating system for PEFC and SOFC and both lines will be reinforced. (January 25 2012 The Nikkei Business Daily)

(4) Nichicon

Nichicon delivered the energy management system with energy saving/energy storage to the PR facility for Yonekurayama mega-solar in Yamanashi prefecture. It charges electricity from photovoltaic power generation and hydraulic power generation to LiB (lithium-ion battery) and electric double layer condenser and supplies it to the PR facility and EV rapid charger. In addition, it executes self-sustained operation without using the system electricity as much as possible while using FC. As using LiB in combination with electric double layer condenser, it absorbs intensive changes of renewable energy and attempts to extend the LiB usage life. (January 31 2012 The Denki Shimbun)

(5) Panahome

On February 1, Panahome announced to promote the subdivision sales for single family house under the name of "Panahome Smart City". Subsequently to the initiation of "Fujisawa Sustainable Smart Town" in May 2011, it also revealed the operation plan in two areas for "Panahome Smart City Shioashiya (Ashiya city)" and "Panahome Smart City Hatsushiba (Sakai city)" on the same day, and the company aims for actualization of Net・Zero Energy with the entire city's buildings in both areas. 109 sections for building land/subdivision will be developed in Shioashiya and all houses will be equipped with photovoltaic power generation and LiB. Furthermore, the development in Hatsushiba of Sakai city is a joint business with Nomura Real Estate company and total project cost for Nomura is approximately 3 billion yen. The building land of 58 sections will be developed and sold, and all houses will adopt photovoltaic power generation and Enefarm. (February 2 2012 The Mainichi Newspapers & The Nikkan Kensetsu Kogyo Shimbun/February 3 2012 The Sankei Shimbun/February 7 2012 Jutaku-Shimpo)

(6)JX Nippon Oil and Energy

JX Nippon Oil and Energy entered into the entrustment contract with OKI Custom AdTec of the OKI group (OKI Electric Industry) for maintenance services such as periodical check and repairing for

EneFarm. The contract is for both PEFC and SOFC that JX Nippon Oil and Energy has been distributing. (February 6 2012 The Denki Shimbun/February 6 2012 The Nikkei Sangyo Shimbun/February 7 2012 The Nikkan Kogyo Shimbun)

(7) Toho Gas

Toho Gas announced that the number of EneFarm unit sales is expected to reach to around 1,170 units, approximately doubled in comparison with the initial plan. The number of the targeted unit sales for 2011 was 600 units, approximately 20% higher than the actual unit sales in 2010. (February 6 2012 The Nikkei)

6. The frontline of Eco-car:

(1) "Dream club" by employees at Kansai Bureau of Economy, Trade, and Industry

In the Osaka Motor Show held at Index Osaka on January 20, "Dream club" as an independent study group by employees at Kansai Bureau of Economy, Trade, and Industry exhibited the hand-made concept car with Hybrid EV and gained much attention. The concept car is equipped with LED lights and PEFC (70W) which uses the fuel source of solar panel (150W), lead battery (2.3 kWh), hydrogen storing alloy cartridge on the premise of usage at affected sites by earthquake. In addition, solar panel on the car can adjust its direction to match with the movement of sun and is removable for electric generation usage. The car can generate electricity as maximum 250W per day from solar panel. It also can run 30km/hour for a distance of 100km with one battery charge and a distance of 15km with auxiliary charge by cartridge with hydrogen 300L. (January 21 2012 The Sankei Shimbun/January 25 2012 The Nikkan Kogyo Shimbun)

(2) Review of Osaka Motor Show

Many odd cars such as EV created by small-medium sized companies or high school students and some vehicles of Japan Ground Self-Defense Force are exhibited in Osaka Motor Show and gained much attention from the visitors. EV "HIMIKO" created by TGMY (Osaka-city) as a battery manufacturer is based on a gasoline-fueled convertible vehicle and can run a distance of 587.3km per battery charge. The manufacturing cost is 20 million yen but the cost could be reduced with smaller storage battery and shorter running distance. The company developed the car with the advice of EV manufacturing technology from the EV development center of Osaka Prefecture University for the purpose to activate small-medium sized companies. At this time, total 3 original EV created by local companies with the advice of the EV development center are exhibited in the show. Furthermore, there is also an EV created by high school students. The automobile course at Sano Technology High School of Osaka prefecture exhibited EV which was converted from "Subaru 360" while 9 students took 4 months to create it. (January 22 2012 The Yomiuri Shimbun)

Toyota and Honda exhibited PHV and EV that can be charged at home and Nissan also exhibited EV that is integrated with communication technology as an owner can call for the vehicle by using mobile phone.

(3) The state of California, the US

The state of California in the US revealed to reinforce the automobile emission regulations. The Air Resource Bureau (ARB) of the state announced "Advance Clean Car regulation (ACCR)" for ordinary automobiles and light-weight trucks. The purpose for this regulation is to increase the distribution rate to 15% for environmentally-friendly cars with almost no CO2 emission such as EV, PHV, and FCV The regulation promotes technology developments such as PHV, FCH, and their related infrastructure, and also aims for emission reduction of greenhouse effect gas. (January 29 2012 The Mainichi Newspapers/February 1 2012 The Chemical Daily)

(4) The 11 major global automobile companies

The 11 major global automobile companies of Toyota, Daimler, GM, Nissan, Honda, Suzuki, Renault, Volkswagen, BMW, Ford, Hyundai will consolidate the standards of hydrogen supply system for FCV. Those companies largely agreed to the connector specification for hydrogen supply from storage tank to vehicle as a common specification among the companies. The certified standard of ISO will be prepared during 2012. Since there are various forms such as for plug configurations in EV, each automobile company and energy company has to respond to the differences in each region and it prevents the popularization of EV. For FCV, each company will cooperate in standardization from the initial stage. (February 2 2012 The Nikkei)

(5) Suzuki

On February 7, Suzuki announced to establish a joint company with "Intelligent Energy Holdings (IEH)" , a FC development venture company in UK, for developing and manufacturing the automobile FC system.

Suzuki plans a lease and sales of scooter with the system in Europe during 2012 and will discuss with the new company for battery system and mass-production technology of the vehicle body. In the new company, it is also considered to proceed the system development for automobile in future. The new company will be named as "SMILE FC SYSTEM" (Capital: 750 million yen) with approximately 10 employees in the beginning and the head office will be located within Suzuki's headquarter in Hamamatsu-city, Shizuoka prefecture. If the scooter can run 30km/hour, it has an ability to run a distance of 350km with one full tank of hydrogen. (February 8 2012 The Asahi Shimbun, The Mainichi Newspapers, The Nikkei, The Nikkan Kogyo Shimbun, The Denki Shimbun, Nikkan Jidosha Shimbun, The Kobe Shimbun, The Shizuoka Shimbun, and Fuji Sankei Business i)

7. Development of Hydrogen station:

The Fukuoka Hydrogen Energy Strategic Conference announced "Promotion vision of FCV popularization for Northern Kyushu". It aims to implement the vision of main promotional location for advanced FCV. It is a plan proceeded by a cooperation of government-industry-academia collaboration, and in concrete terms, one hydrogen supply infrastructure for each Kita-Kyushu city and Fukuoka at present will be increased to 19 by 2015. (February 2 2012 The Nikkan Kogyo Shimbun and The Saga Shimbun)

8. Development of hydrogen formation/refinement technology:

(1) Tokyo Gas and NGK Spark Plug Co.

Tokyo Gas and NGK Spark Plug Co. developed the technology to increase the equipment durability for producing hydrogen. The cost of reaction tube as a core of the equipment becomes 1/10 by providing a ceramic catalytic function at the time of hydrogen production from natural gas. The hydrogen production equipment collects only hydrogen after obtaining the reaction with steam by putting natural gas into the reaction tube, producing mixed gas including hydrogen and CO_2 by catalytic function, and then filtering it with separation membrane. For reducing the cost, Tokyo Gas integrated a basal plate as a foundation of separation membrane with catalyst. However, if they are integrated, there would be the issue for the durability of separation membrane. For that reason, when the cause of defect in separation membrane was investigated, iron and aluminum in the membrane were the cause of adverse effect. Therefore, for avoiding to contain impure substances, the company made an improvement for the method of membrane formation with using plating technology and then the operation time which used to be normally remained as 125 hours eventually exceeded 1600 hours or more than 10 times. The company plans to start the equipment development for verification test at the end of 2012.

(2) Kobe Steel Environment Solution

On February 9, Kobe Steel Environment Solution (Kobe city) announced that the company started the verification test for the equipment of High-purity Hydrogen Oxygen (HHOG) with using renewable energy such as photovoltaic power generation at the PR facility of "Yume Solar-kan Yamanashi (Solar power facility)" in the Yonekura photovoltaic power plant of Kofu city, Yamanashi prefecture. This verification test was conducted by receiving the electric power supply and testing field from Yamanashi prefecture, and hydrogen will be generated by water electrolysis as supplying the electric power from photovoltaic power generation to HHOG. It is a plan to cover a part of electric power demand at the facility by storing the generated hydrogen once and generating electricity though supplying it to the pure hydrogen FC for verification test as needed. (February 2 2012 The Nikkan Kogyo Shimbun, Japan Metal Daily, and The Chemical Daily)

9. New type FC

Tohoku University announced that it developed the magnesium FC that generates electricity using salt water as an electrolyte. Unlike a lithium battery, it does not have electric discharge by long-term storage

and can be expected for the utilization at medical facility, telecommunication base, and home as emergency power source at the time of disaster. It can also be used for EV; therefore, Furukawa Battery Company as a cooperative development partner in the battery manufacturing industry will commercialize it within this year. The company aims to set the price as the half price of lead battery. Since magnesium is found in sea water, the product has an advantage as the resource would not be depleted or would not face a sudden sharp price increase. Although it has been getting attention as a FC material so far, there were some difficult issues such as being easily-burned or dissolved in electrolysis solution for electric generation. The company explained that those issues are solved with using "Flame-retardant magnesium" developed for a different research by the National Institute of Advanced Industrial Science and Technology. Professor Ohama (fluid dynamics) who was involved in the development mentioned, "It is now possible to install an inexpensive emergency power source at each house". (January 27 2012 The Hokkaido Shimbun and The Kahoku Shimpo / January 30 2012 The Denki Shimbun)

— This edition is made up as of February 10, 2012—

A POSTER COLUMN

Development and selling plan of EV by German automobile manufacturers:

Dieter Zetsche, the president of German Daimler, revealed to sell a compact EV with the price of 16,000 Euro (approximately 1.6 million yen) in this summer at the press conference of the 2011 December financial result. The mass produced EV is manufactured on the basis of Daimler's compact car "Smart". The company holds the base price down by leasing the car battery with 60 Euro per month. The company aims for selling more than 10,000 cars per year mainly in the European market. Volkswagen of Germany is also planning to enter the market and the price competition is expected to be fierce for the EV market in future.

Volkswagen is planning to sell a small EV in next year. The company aims to introduce a low price strategy by utilizing the strategic compact car "Up" that was launched in Europe during the end of last year. EV for the main compact car "Golf" and the luxury car "Audi" will be sequentially introduced and the company will reduce the battery cost to the half from the present price as aiming for the sales of annual 300,000 EV by 2018. Furthermore, Volkswagen has already revealed the plan to introduce more than 10 types of electric automobile in the group by 2015. (January 19 2012 The Nikkei)

BMW will launch a compact EV by 2013 and has installed the manufacturing line at the factory in eastern German region. The EV can reduce energy consumption by utilizing carbon fiber reinforced resin as lightweight material for the vehicle body and using adhesive agent instead of welding. The method also can simplify the manufacturing process. (February 10 2012 The Nikkei)