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Oil, Gas & Energy Law Intelligence

Japan's Hydrogen Energy Development
by Y. Otsuki

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Japan's Hydrogen Energy Development

Yoshiaki Otsuki[*]

I. Introduction: The Role of Hydrogen in Japan's Energy Policy

Japan's policy and specific strategy for hydrogen energy development has proceeded by both public and private sectors closely working together in accordance with the "Basic Strategy for Hydrogen", as formulated at the "Ministerial Conference on Renewable Energy and Hydrogen" of the Japanese government on December 26, 2017 (the "**Basic Strategy**") and the "Road Map of Hydrogen and Fuel Cell Strategy", as formulated in June 2014 by the Hydrogen and Fuel Cell Strategy Council, which is a meeting of experts in industrial, governmental, and academic fields (the "**Road Map**"). I will first outline the origins of the Basic Strategy and the Road Map, and the respective legal bases for both.

Japan's comprehensive energy policy, which includes hydrogen energy, has been formulated and implemented in accordance with the Basic Act on Energy Policy (Act No. 71 of 2002, the "**Basic Act**"). Article 12 of the Basic Act states that the government must establish a basic plan for energy supply and demand in order to promote long-term, comprehensive, and systematic measures for energy supply and demand (the "**Basic Energy Plan**"). The Basic Act further states that the Basic Energy Plan must set out the following:

(i) a basic policy on measurements related to energy supply and demand;
(ii) measurements to be undertaken in a long-term, comprehensive, and systematic manner for the purpose of energy supply and demand; and
(iii) pursuit of energy-related technology and measures necessary for intensive research and development for the purpose of long-term, comprehensive, and contemplated measures for energy supply and demand.

Further, the same article of the Basic Act states that the government must review the Basic Energy Plan at least once every three (3) years, taking into account the changes in the circumstances regarding energy and natural resources, and also the performance of the energy-related measures of the country. Pursuant to this requirement under the Basic Act, the latest version of the Basic Energy Plan is the 5th Basic Energy Plan, which was approved by the Cabinet in July 2018. In the 4th Basic Energy Plan, which was approved by the Cabinet in April 2014, a new description was introduced stating that "*we will formulate a roadmap for the realization of a 'hydrogen society'. For this purpose, a council of experts in industrial, academic, and governmental fields responsible for implementation of the policy will be formed, and will firmly proceed with that policy.*" The Road Map was formulated in June 2014 in response to the inclusion of such description in the 4th Basic Energy Plan. The Road Map was revised in March 2016 in line with the results of the efforts of both the government and the private sector, and now includes descriptions of the quantified targets for household fuel cells (so-called 'ENE-FARM'), fuel cell vehicles (FCVs), and hydrogen stations.

In response to such private and governmental efforts under the 4th Basic Energy Plan, as well as formulation and revision of the Road Map under then-Prime Minister Abe, the "Ministerial Conference on Renewable Energy and Hydrogen" was held in April and December of 2017, respectively, at which the Basic Strategy was formulated. Thereafter, the 4th Basic Energy Plan

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was revised and approved by the Cabinet in July 2018, resulting in the 5th Basic Energy Plan, which is the current Basic Energy Plan of Japan.

As mentioned above, the Basic Strategy, which defines the basic policy for development and utilization of hydrogen energy in Japan, and the Road Map, which describes specific action plans for that purpose, have been formulated under the Basic Energy Plan approved by the Cabinet pursuant to the Basic Act. As such, from a legal point of view, if the Basic Energy Plan is revised (as mentioned above, the Basic Act requires that it be reviewed once every three (3) years), both the Basic Strategy and the Road Map will be revised accordingly.

In this context, it is helpful to examine how the current Basic Energy Plan (the 5th Basic Energy Plan) changed from its previous version (the 4th Basic Energy Plan) with respect to hydrogen energy.

The 4th Basic Energy Plan included the following description under the title of "Realization of a Hydrogen Society":[1]

> "*Hydrogen is expected to play a key role as a future secondary source of energy, in addition to electricity and heat. Hydrogen is a highly convenient and efficient source of energy, although safety must be ensured when it is handled in its gaseous form. Moreover, hydrogen has many advantages over other sources of energy, such as greenhouse gases not being emitted from its use, and being effective in emergency situations. For the purpose of introducing hydrogen energy, various kinds of research and development of elemental technologies and demonstration projects thereof have been undertaken in Japan. However, in order to realize a society that utilizes hydrogen to generate energy for daily and industrial activities (i.e., a 'hydrogen society') there are still many issues in terms of technology, cost, related institutions (including the legal system), and infrastructure. Accordingly, the legal system and infrastructure must be strategically developed with a view toward promoting technology development and cost reduction, as well as further implementing more feasible technologies applicable to society.*"

Thereafter, in the 5th Basic Energy Plan, the underlined description below has been added:[2]

> "*…Accordingly, the legal system and infrastructure must be strategically developed with a view toward promoting technology development and cost reduction, and further implementing more feasible technology applicable to society,* ***so that hydrogen will play a key role in the medium/long-term energy security and reduction of greenhouse gas emissions by utilizing technology developed in our country***."

As mentioned above, from the 4th Basic Energy Plan to the current 5th Basic Energy Plan, no major changes have been made with respect to the basic development policy of hydrogen energy while advocating for the realization of a "hydrogen society". Accordingly, the stance of the Japanese government in this respect can been viewed as being relatively firm. Moreover, the 5th Basic Energy Plan sets more ambitious goals than that of the 4th Basic Energy Plan by emphasizing energy security and climate change countermeasures (as indicated in the

[1] https://www.enecho.meti.go.jp/category/others/basic_plan/pdf/140411.pdf (relevant part translated by author)

[2] https://www.enecho.meti.go.jp/category/others/basic_plan/pdf/180703.pdf (relevant part translated by author)

underlined part cited above). As such, it is possible to predict that Japan's basic policy in regard to hydrogen energy in the future will not change significantly from the current policy (however, as mentioned above, please note that it is possible for the government to revise the Basic Energy Plan from time to time, since the Basic Energy Plan itself is not a statute). In this regard, the new Japanese administration established in September 2020 declared that Japan will strive to become a carbon neutral society, with zero net emissions, by 2050. Given this declaration by the new Prime Minister, it can be expected that the movements towards "hydrogen society" as mentioned in the Basic Energy Plan will be accelerated.[3] It will be important for us to take note of any further actions by the government with respect to its hydrogen energy policy.

II. Development of FCVs and Related Regulatory Reforms in Japan

As you might be aware, fuel cell vehicles (FCV) are referred to as one of the "more feasible technologies" contributing to a "hydrogen society" in the 5th Basic Energy Plan, as cited above. Thus, in this article, I will examine the respective descriptions contained in the current Basic Energy Plan, the Basic Strategy, and the Road Map with respect to the development of fuel cell vehicles (FCVs).

In the current 5th Basic Energy Plan, the strategy for FCV development by the government is described as follows:[4]

> "*It is important to promote fuel cell vehicles (FCVs) and hydrogen stations, which are the core of hydrogen utilization in mobility, as two linchpins of our strategy. Specifically, we are targeting the creation of 320 hydrogen stations by 2025, while aiming at independent business operation of hydrogen stations by the latter half of the 2020s. We also aim to promote the spread of approximately 200,000 FCVs by 2025, and approximately 800,000 of the same by 2030. In order to achieve these goals, the following must be achieved: mass production and price reduction of FCVs, extension of the cruising range of FCVs, the introduction of vehicle models targeted for the largest market around 2025, as well as installation of hydrogen stations capable of generating consistent profits, and further, the establishment of independent hydrogen sales businesses via the reduction of both the operating costs of hydrogen stations and hydrogen supply costs themselves. For these purposes, we will promote regulatory reforms, technological developments, and strategic development of hydrogen stations by both public and private sectors working in collaboration with one another.*"

With respect to FCVs, the Basic Strategy follows the description contained in the Basic Energy Plan. However, the Basic Strategy further mentions regulatory reforms in order to facilitate the development of FCVs by the domestic companies, as cited below:[5]

> *"…When it comes to regulatory reforms, we will accelerate our current efforts based on the Regulatory Reform Implementation Plan (decided by the Cabinet on June 9, 2017), and will consider the ideal regulatory system in consideration of actual hydrogen utilization.*"

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[3] https://asia.nikkei.com/Spotlight/Environment/Suga-s-2050-zero-carbon-goal-thrusts-Japan-into-green-tech-race

[4] https://www.enecho.meti.go.jp/category/others/basic_plan/pdf/180703.pdf (relevant part translated by author)

[5] https://www.meti.go.jp/press/2017/12/20171226002/20171226002-1.pdf (relevant part translated by author)

As you can see in the description above in the Basic Strategy, it mentions regulatory reforms in consideration of the actual state of hydrogen utilization. For further information on this regulatory reform issue, please refer to the description below in regard to the deregulation of some domestic laws for the handling of hydrogen gas for the purpose of FCV development.

Furthermore, the Road Map (which is the action plan for Japan's hydrogen strategy) specifically describes the targeted sales prices of FCVs, in addition to targeted FCV sales figures:[6]

> "*…the price difference between a FCV and a hybrid vehicle is currently around JPY 3 million, whereas the price difference between an electric vehicle, the sales number of which is increasing, and a hybrid vehicle is about JPY 700,000. Given the current price differences between a FCV and hybrid vehicle, we aim to reduce such price difference to around JPY 700,000 by approximately 2025, through a combination of efforts by both public and private sectors toward technological development and promotion of FCVs. In aiming to introduce FCVs targeted for the largest market, such as SUVs and minivans, in approximately 2025, while appealing to the diverse tastes of various consumers, we will expand the sales volume and reduce production costs of FCVs through intensive development of a suitable vehicle model. In fact, several domestic motor companies have been developing FCVs, although at this moment, only two of them are actually selling such FCVs. As such, compared to conventional vehicles of the same vehicle model, the price of a FCV is still high. That is why we have clarified the target of FCV prices from the viewpoint of making them acceptable to individual consumers, while considering future technological innovations and other factors. For example, Toyota's 'Mirai' is now sold at a price of JPY 7.6 million, including car navigation systems, while the 'Crown Hybrid', a hybrid car of the same model, is sold at a price of only JPY 5 million, making the price difference between the two models approximately JPY 2.6 million. In order to reduce the price difference between the two (to approximately JPY 700,000, as mentioned above), the price of a FCV must be reduced by JPY 1.9 million.*"

I have reviewed the specific numerical targets described in the current Basic Energy Plan, the Basic Strategy, and the Road Map. For the purpose of the government's expected development and actual use of FCVs, the government is discussing certain domestic regulatory reforms. However, before going over the details of the reforms, it is important to generally outline Japan's regulation of FCVs.

First of all, hydrogen gas (in its gaseous state), which is the power source of FCVs, is subject to the High Pressure Gas Safety Act of Japan (Act No. 204 of 1951, the "**Security Law**").[7] This is a domestic regulatory law that requires safe handling of any compressed gas, such as natural gas and oil gas. As such, if a business operator (a "**Container Manufacturer**") manufactures a high-pressure hydrogen gas container to be installed in a FCV (a "**Hydrogen Container**"), such manufacturing must be performed in accordance with the technical standards set by the Ministry of Economy, Trade and Industry of Japan ("**METI**") as per Article 41 of the Security Law. Furthermore, as per Article 44 of the Security Law, it must be tested

[6] https://www.meti.go.jp/press/2018/03/20190312001/20190312001-1.pdf (relevant part translated by author)

[7] According to the definition of "high pressure gas" under Article 2 of the Security Law, compressed gas contained at a pressure of one (1) megapascal or more at room temperature and the pressure of which is actually one (1) megapascal or more shall be subject to the Security Law.

by a nationally designated inspection agency to determine whether the Container Manufacturer has complied with such technical standards set by METI. Unless it has passed such inspection, the manufacturing of a Hydrogen Container is prohibited. However, according to Article 44, Paragraph 1, Item 1 of the Security Law, the inspection by such an inspection organization may be omitted if the subject Hydrogen Container is manufactured by a Container Manufacturer who has registered with METI beforehand (a "**Registered Container Manufacturer**"). In order to be registered as a Registered Container Manufacturer, a manufacturer must apply to METI with respect to each factory or operation site pursuant to Article 49-5, Paragraph 1 of the Security Law. In the application for registration as a Registered Container Manufacturer, in addition to an application form that outlines the manufacturing method of the relevant Hydrogen Containers and equipment for the inspection of the same, the relevant internal rules of such Container Manufacturer setting forth the method for conducting the inspection of the container must also be submitted to METI, according to Article 49-5, Paragraphs 2 and 3 of the Security Law. Once registered as a Registered Container Manufacturer, the model (type) of the Hydrogen Container it manufactures (and the accessories thereto) may be registered prior to the actual manufacturing upon approval by METI, according to Article 49-21 of the Security Law.

We shall now examine at the recent movement to reform domestic regulations (as outlined above) in support of the development plan of FCVs.

(a) Simplification of permission procedures for Hydrogen Containers of FCV

As mentioned above, according to Article 49-21 of the Security Law, a Container Manufacturer may obtain approval for the model of the Hydrogen Container it manufactures. Under the current regulations, the manufacturer must have registered as a Registered Container Manufacturer beforehand. However, it has been pointed out that this results in a significant amount of wasted time, because in order to apply for approval for the model of the container, registration as a manufacturer is required in advance. Accordingly, some revised operational practices to be taken by METI are being discussed, whereby both an application for a Registered Container Manufacturer and an application for approval of the model of the Hydrogen Container can be made at the same time.

(b) Simplification of licensing procedures for filling of hydrogen gas

Article 48, Paragraph 1 of the Security Law requires that a Hydrogen Container be equipped with a valve, if such Hydrogen Container is actually filled with hydrogen gas. However, in the event that special permission from METI under Article 48, Paragraph 5 of the Security Law has been obtained, a Hydrogen Container without a valve can be filled with hydrogen gas ("**Special Filling Permission**"). Special Filling Permission will be granted by the governor of the prefecture that has jurisdiction over the place of business where the Hydrogen Container is to be filled with hydrogen gas, as per Article 23 of the Container Safety Regulation (METI's Ordinance No. 50 of 1966, the "**Container Safety Regulation**"). However, under the current regulations, which requires Special Filling Permission to be approved by each prefecture, with respect to FCVs that can move between multiple prefectures, whether the Special Filling Permission obtained from one prefecture would be applicable in other prefectures is an unresolved issue. Accordingly, with respect to a Hydrogen Container to be installed in a FCV, either of the following measures is being discussed by the government: (i) the Special Filling Permission granted by a prefecture can also be applied to other prefectures, or (ii) the issuer of Special Filling Permissions will be METI, instead of individual prefectural governors.

(c) Simplification of Registered Container Manufacturer registration procedures

As mentioned above, inspection by an inspection agency to determine whether the Hydrogen Container meets the technical standards set by METI can be omitted if such Hydrogen Container is manufactured by a Registered Container Manufacturer. However, under the current regulations, such registration must be made "by factory or by operation site", as per Article 49-5 of the Security Law. As such, if there is more than one (1) factory to be registered, they must be registered individually, even if they belong to a single Container Manufacturer. It has been pointed out that this kind of regulatory framework is not only inefficient but also would prevent flexible production between the factories within a single Container Manufacturer. Accordingly, certain measures are now under discussion, such as amending said Article 49-5 of the Security Law to enable a manufacturer to apply for registration on a company basis (manufacturer basis).

(d) Simplification of Registered Container Manufacturer renewal procedures

The duration of registration as a Registered Container Manufacturer is five (5) years, as per Article 49-9 of the Safety Law and Article 11 of the Enforcement Ordinance of High Pressure Gas Safety Law (Cabinet Order No. 20 of 1997). In order to continue registration beyond such period, renewal of the registration is required before the expiration thereof, pursuant to Article 49-9 of the Security Law. When it comes to procedures for registration renewal, Article 47 of the Container Safety Regulation requires the same application procedure as that of a new registration. However, it has been pointed out that this is not only unduly burdensome for a manufacturer, but also would cause confusion in practice, particularly where a new registration number given to a manufacturer in the renewed period differs from such manufacturer's prior number. Accordingly, new rules for renewal registration application procedures, which would differ from those of a new registration application, are now being discussed.

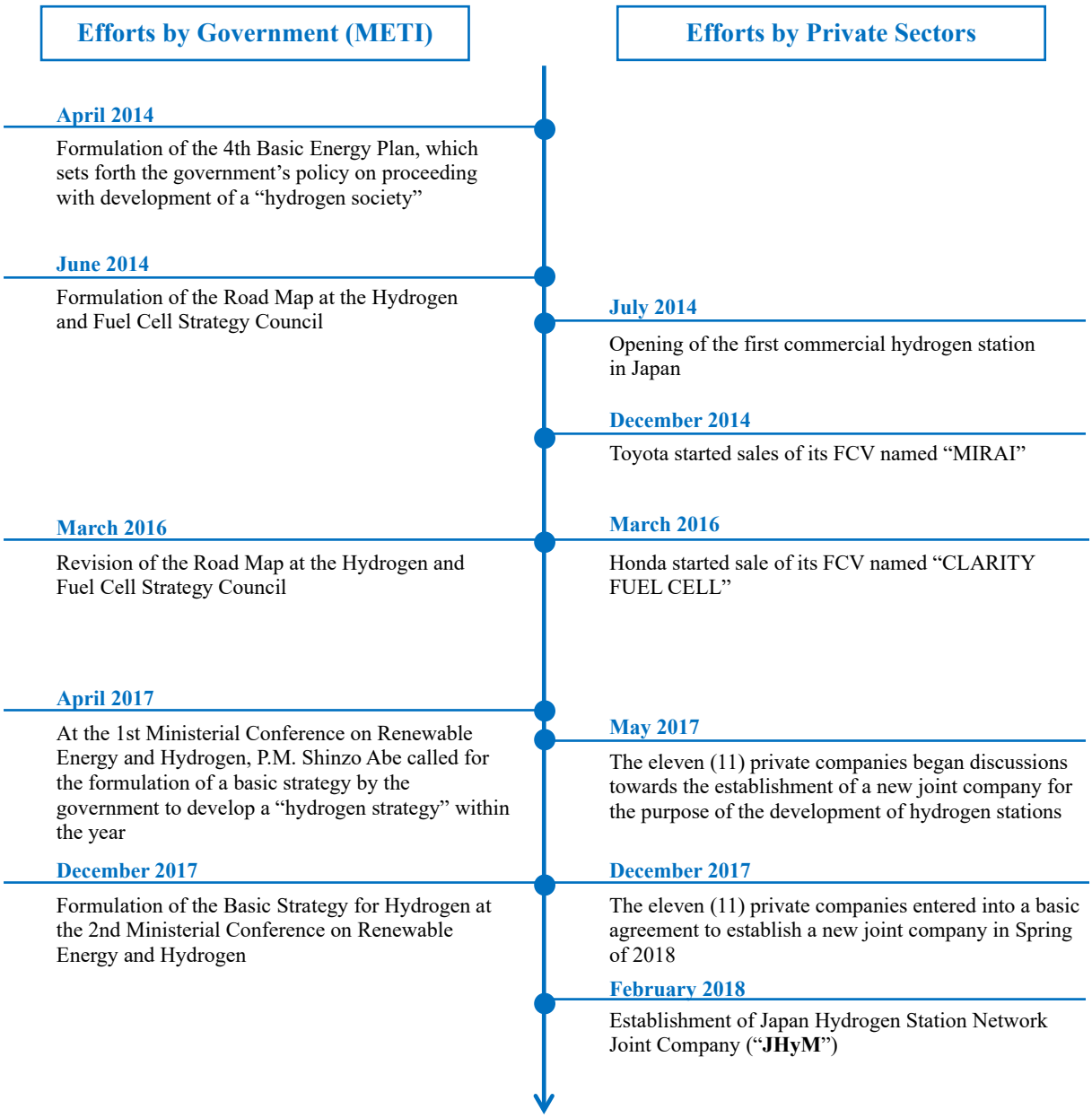
The sections above constitute an outline of the recent regulatory reforms applicable to the treatment of hydrogen gas and its containers for use by FCVs.

Next, I would like to describe some of the efforts being taken by the Japanese government and Japanese companies to develop FCVs and hydrogen stations, some of which are derived from publicly available information.

In Japan, the first FCV was introduced into the market in December 2014,[8] and the second model thereof was introduced in March 2016, which was the fastest timing in the world for the introduction of a FCV into the market, and the number of FCVs in the current market is approximately 3,400 cars as of September 2019. The first commercial hydrogen station in Japan became operational in 2013, and the "Japan Hydrogen Station Network Joint Company" ("**JHyM**") was established in February 2018 by and among eleven (11) private companies,

[8] https://global.toyota/en/newsroom/toyota/22740159.html?_ga=2.21294782.448194961.1602495618-174264284.1602236608

with the goal of the development of hydrogen stations. The process up to the establishment of JHyM is shown as below (from the website of JHyM).

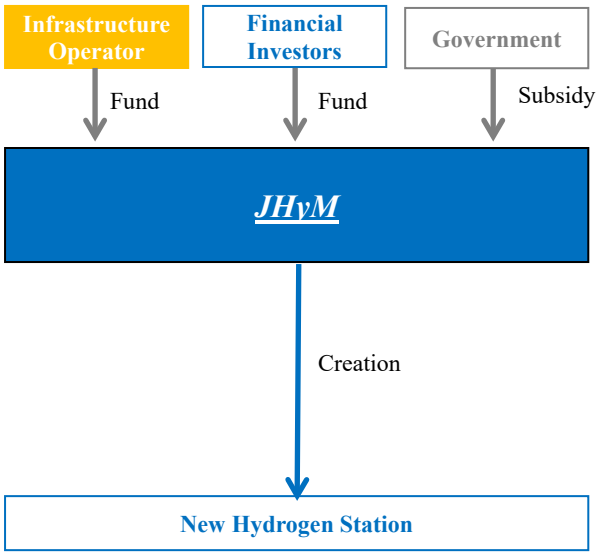


As of May 2020, the following twenty-five (25) companies are participants in JHyM:

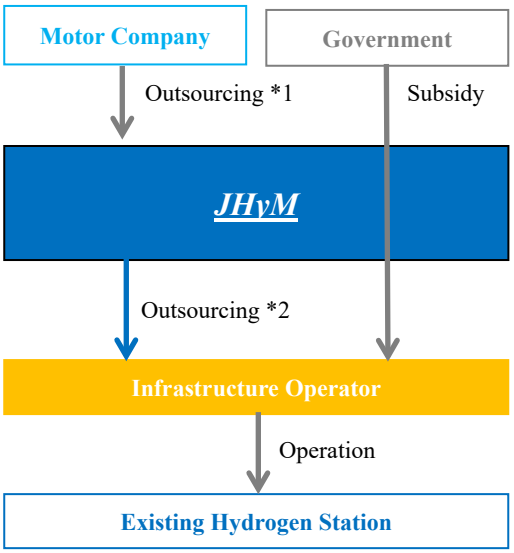
- Toyota Motor Corporation
- NISSAN MOTOR CORPORATION
- Honda Motor Co., Ltd.
- ENEOS Corporation
- Idemitsu Kosan Co., Ltd.
- Iwatani Corporation
- Tokyo Gas Co., Ltd.
- TOHO GAS Co., Ltd.
- Air Liquide Japan G.K.
- Nemoto Tsusho Group Inc.
- SEIRYU POWER ENERGY CO., LTD.
- Toyama Hydrogen Energy Promotion Council
- FUKUOKA OXYGEN CO., LTD.
- Marui Transport Co., Ltd.
- Tama Koun KK
- NANGOKU CORPORATION
- KONAN KOGYO CO., LTD.
- TOAGOSEI CO., LTD.
- Toyota Tsusho Corporation
- Development Bank of Japan Inc.
- JA Mitsui Leasing, Ltd.
- Sompo Japan Insurance Inc.
- Sumitomo Mitsui Finance and Leasing Co., Ltd
- NEC Capital Solutions Limited
- SPARX Group Co., Ltd.

JHyM has organized two kinds of schemes, as follows: (1) a business scheme for the creation of hydrogen stations and (2) a business scheme for the operation of hydrogen stations:

(i) Creation of Hydrogen Stations



(ii) Operation of Hydrogen Stations

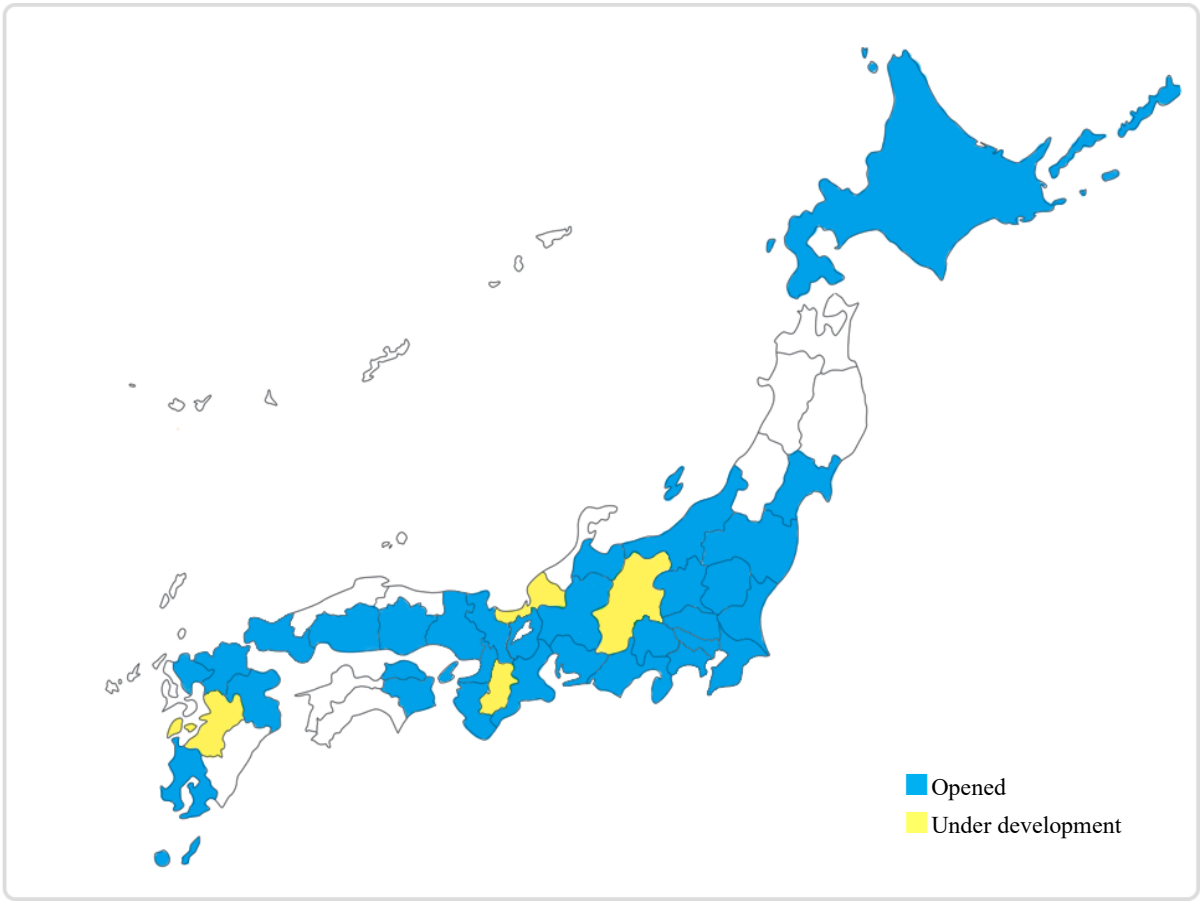


*1…Outsourcing of business for maximizing FCV demand

*2…Maintenance and management of new hydrogen stations and provision of information.

In May 2020, JHyM submitted twenty (20) joint applications for the government project "Subsidy for Hydrogen Supply Facility Installation of FCVs and Hydrogen Station's Maintenance", which were then approved by the government. As a result, the total number of hydrogen stations maintained by JHyM has reached fifty-five (55) units, and with those approved in the past, the total number has reached one-hundred forty three (143) units (at one-

hundred fifty seven (157) locations[9]). For reference, the status of the installation of hydrogen stations nationwide as of May 2020 is described below:



When it comes to the development of fuel cell technology under the government's initiatives, the New Energy and Industrial Technology Development Organization ("**NEDO**"), an independent administrative agency under the control of METI, announced in September, 2020 that it will engage in a large research and development project with a budget of JPY 5 billion to improve the performance and durability and reduce the cost of fuel cells.[10]

As described above, both the Japanese government and the private sector are closely working together to develop models of FCVs and hydrogen stations. For this purpose, the government has intensively discussed regulatory reforms to allow the development of FCVs to proceed more easily and smoothly. I will monitor the progress of these regulatory reforms as well as the actual development of FCVs and hydrogen stations with the goal of realizing a "hydrogen society" in Japan.

[9] This figure is calculated by counting the number of movable stations operating in different locations.
[10] https://www.nedo.go.jp/news/press/AA5_101351.html

III. Establishment of International Hydrogen Supply Chain

Next, I would like to discuss the international hydrogen supply chain and its use in Japan, including FCVs as described above. In this regard, the 5th Basic Energy Plan has declared as follows:[11]

> "*With the goal of reducing the procurement cost of hydrogen from overseas, we will develop the technology of energy carriers for hydrogen such as methylcyclohexane (MCH) and ammonia, as well as that of liquefied hydrogen. For this purpose, we will develop the basic technology for producing hydrogen from brown coal and other sources of hydrogen and for transportation of hydrogen from overseas, aiming at the construction of a commercial international supply chain in or around 2030. Our goal for the supply cost of hydrogen on a delivered-at-plant basis around the year 2030 is JPY 30 per Nm3, and amounting to 300,000 tons per year.*"

By the same token, the Road Map refers to the international hydrogen supply chain as follows:[12]

> "*The unused fossil resources in overseas countries can be utilized as a CO2-free energy resource in combination with CCS. For this purpose, the international hydrogen supply chain has been developed, starting from production to storage and transportation of hydrogen. The project between Japan and Australia aims at the establishment of basic technology through the demonstration of marine transportation of liquefied hydrogen. We will develop the basic technology necessary for reduction of hydrogen costs and the establishment of a commercial hydrogen supply chain by around 2022. With respect to the production of hydrogen, we will develop technology for large-scale and energy efficient facilities for gasification of brown coal, and technology to improve the efficiency and durability of water electrolyzers. We also will develop technology to monitor and reduce the cost of CCS, and for this purpose we are looking forward to the CCS project led by the Australian government. With respect to transportation of liquefied hydrogen, we will develop large-scale storage tanks and ships. We also have to establish standardized rules for marine transportation of liquefied hydrogen. With respect to the utilization phase of hydrogen, we have to develop regasification facilities and pipelines.*"

In relation to the government's abovementioned strategy for the establishment of an international hydrogen supply chain, in 2017, Chiyoda Corporation, a large engineering company, together with three other major Japanese companies, entered into a partnership for technology development named "Advanced Hydrogen Energy Chain Association for Technology Development" ("**AHEAD**") in order to conduct experimental research on practical application of hydrogen supply chains that supply an existing but unused energy source transported in a stable manner from overseas locations to Japan via the Organic Chemical Hydride Method.[13] Further, in June 2020, Chiyoda announced that its pilot hydrogen project had begun to provide clean fuel for gas turbine power generators at a Japanese power plant

[11] https://www.enecho.meti.go.jp/category/others/basic_plan/pdf/180703.pdf (relevant part translated by author)

[12] https://www.meti.go.jp/press/2018/03/20190312001/20190312001-1.pdf (relevant part translated by author)

[13] https://www.ahead.or.jp/en/organization.html

using hydrogen imported from Brunei.[14] This project is the world's first implementation of an international hydrogen supply chain and the first example of foreign-produced hydrogen being used for power generation in Japan.

In 2018, Australia's Chief Scientist, Dr. Alan Finkel, visited Japan to discuss the development of a supply chain between the two countries. Thereafter, there has been increased cooperation between Australia and Japan with respect to hydrogen supplied by Australia. Recently, "CO_2-free Hydrogen Energy Supply-chain Technology Research Association" ("**HySTRA**"),[15] which was incorporated in 2016 among various Japanese companies, has been working towards the production and transportation of liquefied hydrogen. The website of HySTRA contains the following description of the ongoing project with its Australian partners:

> "*In 2020-2021, the pilot project will demonstrate brown coal gasification and hydrogen refining at Latrobe Valley in Australia, hydrogen liquefaction and storage of liquefied hydrogen at Hastings, marine transportation of liquefied hydrogen from Australia to Japan, and the unloading of liquefied hydrogen in Japan. With the assistance of NEDO in the hydrogen energy supply chain pilot project, HySTRA is undertaking the development of:*
>
> - *brown coal gasification technology*
> - *technology for long distance transportation of mass liquefied hydrogen*
> - *liquefied hydrogen loading and unloading technologies*"

In addition, an international pilot project between Japan and the State of Victoria in Australia headed by Kawasaki Heavy Industries is now ongoing, with the goal of developing hydrogen production plants and transportation of hydrogen gas to a liquefaction and loading terminal in Australia.[16] As a result, in December 2019, the "SUISO FRONTIER" was launched,[17] which is the world's first liquefied hydrogen carrier, and in March 2020, a liquefied hydrogen storage tank for marine transport applications with the capacity of 1,250 m3 was installed on the SUISO FRONTIER.[18] In October 2020, it was reported that in early 2021, Kawasaki will undertake a commercial plan to ship liquefied hydrogen from Australia to Japan for the first time ever via the SUISO FRONTIER.[19]

In addition, a larger storage tank for liquefied hydrogen with a capacity of 50,000 m3 to be installed on land is also under development through an initiative by NEDO. Also, a liquefied hydrogen receiving terminal has recently been constructed in Kobe to receive liquefied hydrogen shipped from overseas.[20]

IV. Final Remarks

I have summarized the basic strategy and development plan for a "hydrogen society" in Japan, and their respective legal bases. According to such strategy and plans, there has been intensive

[14] http://www.hazardexonthenet.net/article/179320/World-s-first-international-hydrogen-supply-chain-begins-fuelling-power-plant-with-hydrogen.aspx
[15] http://www.hystra.or.jp/en/about/
[16] https://www.invest.vic.gov.au/jp/resources/case-studies-search/case-studies/hesc-case-study
[17] https://global.kawasaki.com/en/corp/newsroom/news/detail/?f=20191211_3487
[18] https://global.kawasaki.com/en/corp/newsroom/news/detail/?f=20200309_3090
[19] https://gcaptain.com/japan-hydrogen-ship-plan/
[20] https://www.jwnenergy.com/article/2020/11/9/japan-eyes-replacing-oil-with-hydrogen-amid-carbon/

development of FCVs by both the government and the private sector, and regulatory reforms are now under discussion by the government with a view toward promoting further development of FCVs. I also have discussed recent developments on the installation of hydrogen stations throughout the country, which are necessary for the use of FCVs.

Also, I have discussed some of the key movements for the establishment of a stable international hydrogen supply chain between Japan and hydrogen-producing countries, such as Australia and Brunei, particularly with respect to the development of transportation technology for liquefied hydrogen. I will continue to monitor developments in the international hydrogen supply chain, which is an essential component of the realization of a “hydrogen society” in Japan in the future.

Based on the recent announcement by the new administration headed by Prime Minister Yoshihide Suga, Japan’s society is now aiming at becoming carbon neutral by 2050. As such, it is expected that the ongoing developments towards a “hydrogen society” I described in this article will be accelerated. I will carefully examine these developments and report them to you in the near future.