HySafe Research Priorities Workshop
November 10-11, 2014

Country Safety Programs <Japan>

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Stakeholders in Hydrogen Safety

- **Policy makers / quasi-gov.**
  - Ministry of Economy, Trade and Industry (METI)
  - The Minister of Land, Infrastructure, Transport and Tourism (MLIT)
  - New Energy and Industrial Technology Development Organization (NEDO)
  - KHK
- R&D organization
  - Research Association of Hydrogen Supply/Utilization Technology (HySUT)
- Industry associations
  - Fuel Cell Commercialization Conference of Japan (FCCJ)
  - Japan Automobile Manufacturers Association (JAMA)
  - Japan Automobile Research Institute (JARI)
  - Japan Petroleum Energy Center (J-PEC)
  - Japan Electrical Manufacturers‘ Association (JEMA)
  - Engineering Advancement Association of Japan (ENAA)
  - Hydrogen Energy Test and Research Center (HyTReC)
- Industry
  - OEMs
  - Energy / Fuel providers
  - Consultancy (i.g. Technova)

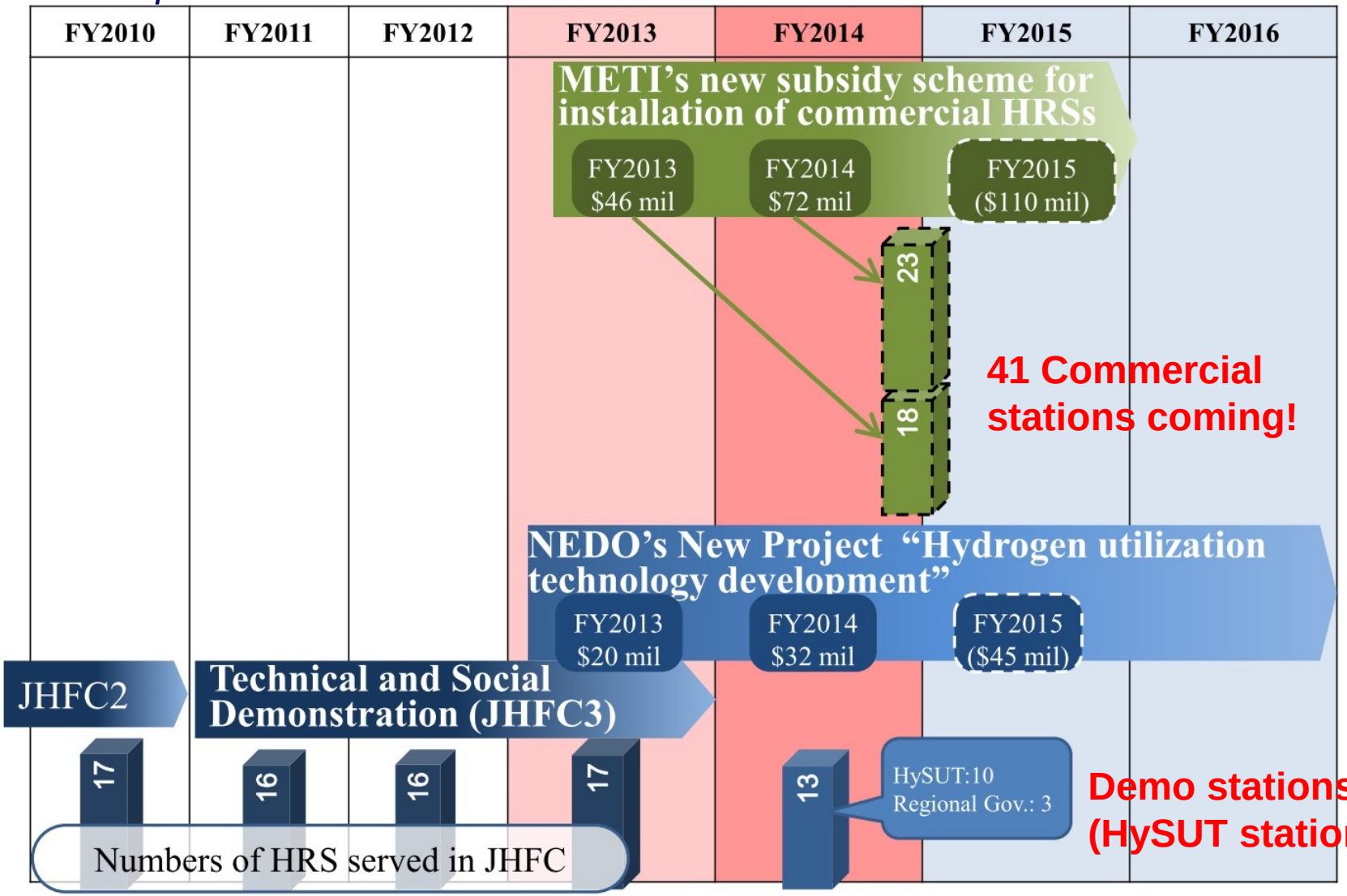
FCV Commercialization

Toyota soon makes official announcement of sales (Nov 18).
Pre-order of 700 -- the delivery starts in Dec.

Hydrogen Stations in Japan (toward 100)

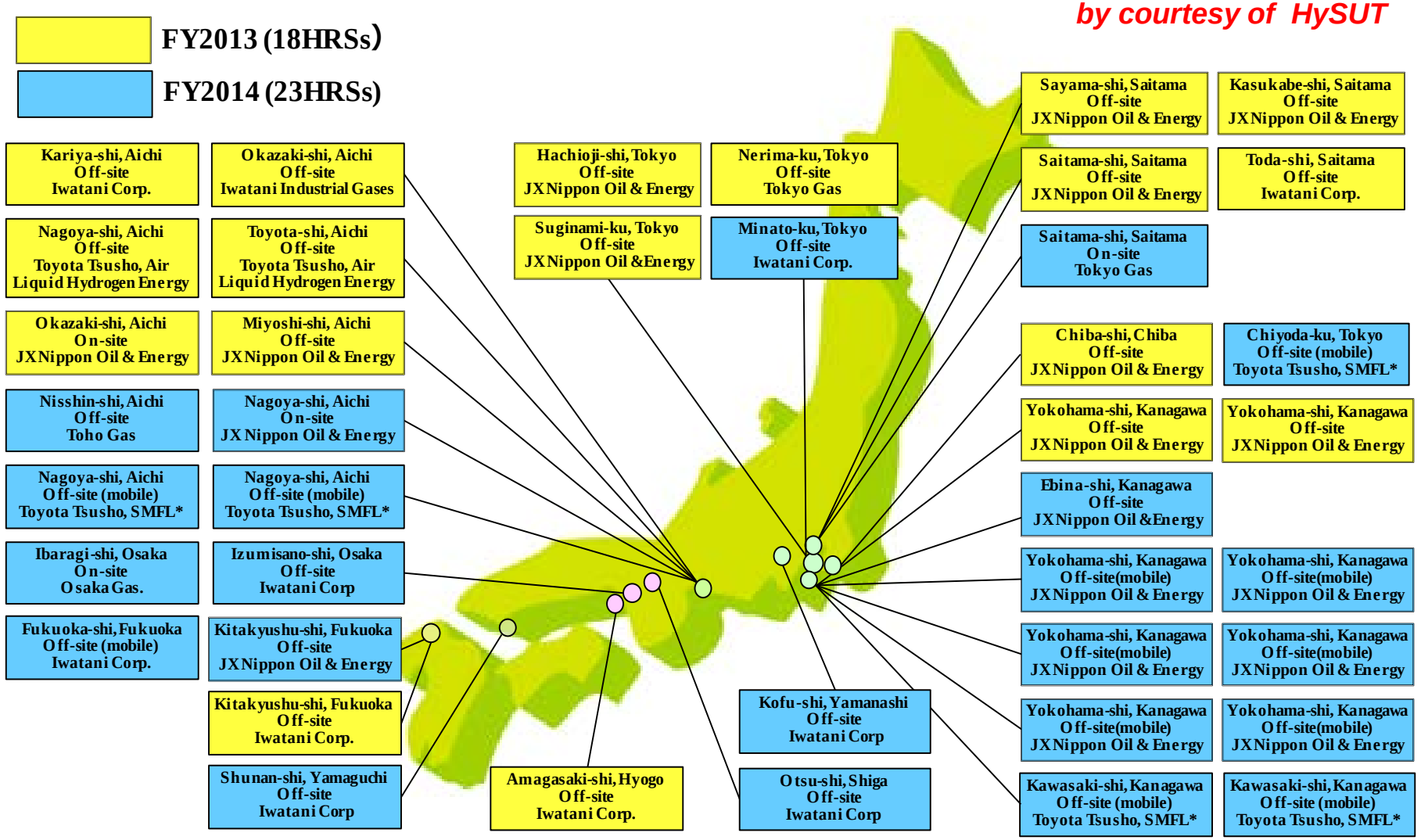
cf. FY2014: Apr 2014 - Mar 2015

by courtesy of HySUT



Approved Hydrogen Stations (as of June 2014)

by courtesy of HySUT



- This map is made by HySUT.
- Each point on the map does not show the exact site of HRS.

*SMFL: Sumitomo Mitsui Finance and Leasing

Approved Hydrogen Stations (as of June 2014)

by courtesy of HySUT

Fueling ability	100-300 Nm^3/h (FY2013/FY2014)			300< Nm^3/h (FY2013/FY2014)		Total
	CHG	LH	Mobile	CHG	LH	
on-site	**0/1**			**1/2**		**4**
off-site	**0/0**	**0/0**	**0/12**	**17/3**	**0/5**	**37**
Total	**1**	**0**	**12**	**23**	**5**	**41**

CHG: compressed hydrogen gas
LH: liquid hydrogen

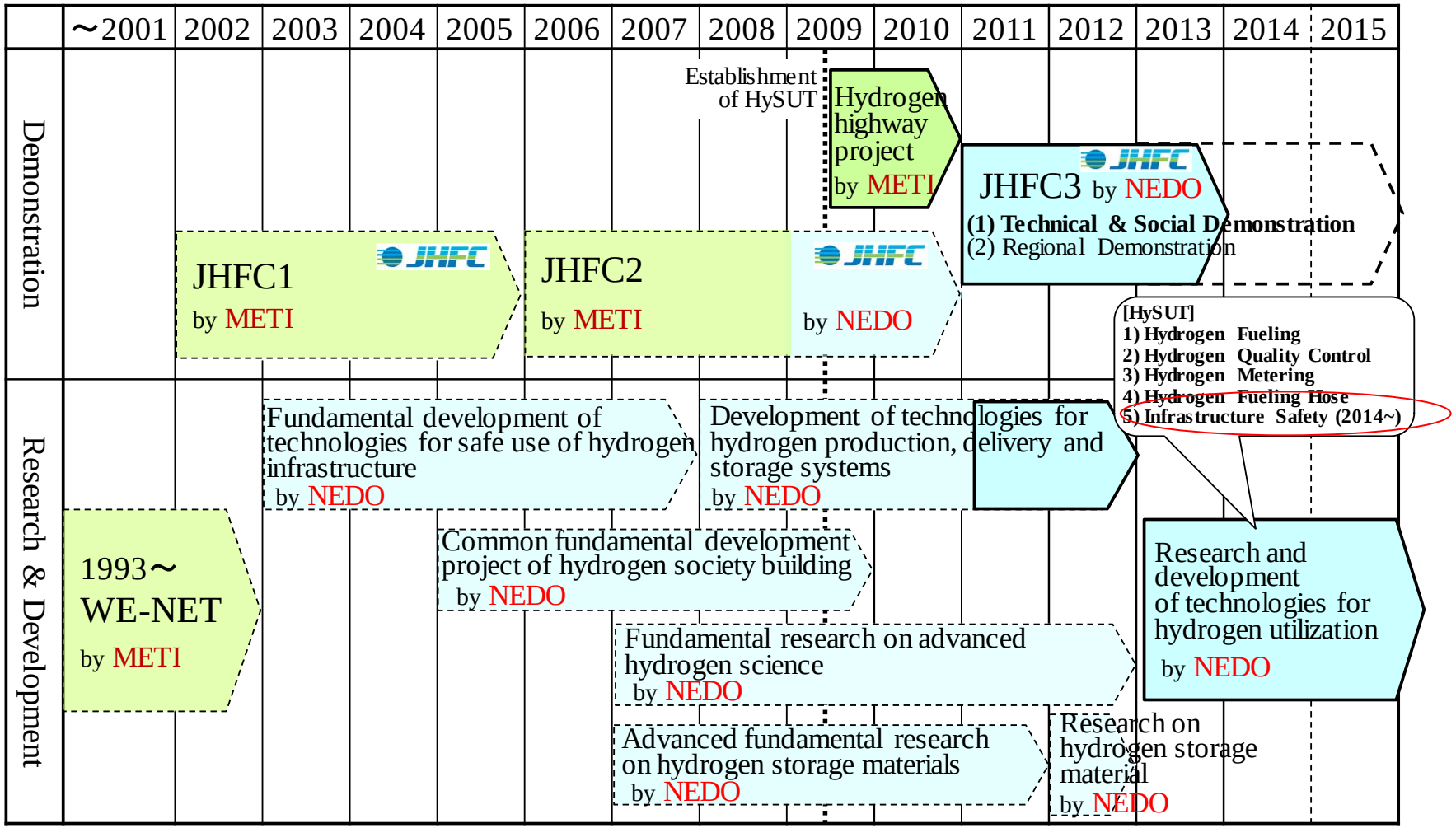
Subsidy for Commercial Hydrogen Stations (FY2014)

by courtesy of HySUT

Fueling ability [Nm^3 / hr]	Types of HRS	Grant rate	Subsidy limit (million $)
more than 300	On-site (partial / full packaging)	Fixed	2.8
	On-site (Except above)	50%	2.8
	Off-site (partial / full packaging)	Fixed	2.2
	Off-site (Except above)	50%	2.2
	Mobile	Fixed	2.5
100 to 300	On-site (partial / full packaging)	Fixed	1.8
	On-site (Except above)	50%	1.8
	Off-site (partial / full packaging)	Fixed	1.5
	Off-site (Except above)	50%	1.5
	Mobile	Fixed	1.8
One Hydrogen production equipment for On-site HRS (10 equipments are maximum by one HRS)		50%	0.6
Liquid hydrogen receiving and feeding equipment for HRS		50%	0.4

FCV / H2 Infrastructure Projects

by courtesy of HySUT



METI : Ministry of Economy , Trade and Industry
NEDO: New Energy and Industrial Technology Development Organization
WE-NET: International Clean Energy Network using Hydrogen Convention (World Energy- NETwork)
JHFC: Japan Hydrogen & Fuel Cell Demonstration Project

Key Organization - HySUT

by courtesy of HySUT

*The Research Association of **Hy**drogen **S**upply / **U**tilization **T**echnology

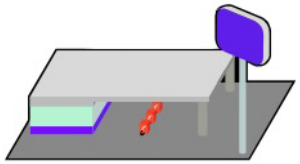
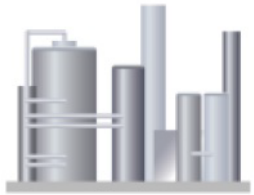
- Goal and Objective -

- ✓ Our goal is **commercialization of hydrogen supply business and FCVs** by private companies.
- ✓ Our objective is to **solve the issues of technology, consumer awareness, social acceptance and to assist business establishment** through our demonstration program.

Date of establishment	July 31st, 2009
Members	19 Companies and Organizations
	4 Petroleum / 4 City gas / 6 Industrial gas, Devices, Engineering & Materials
	3 Automotive / 2 Related organizations
Term	2009 to FY2015

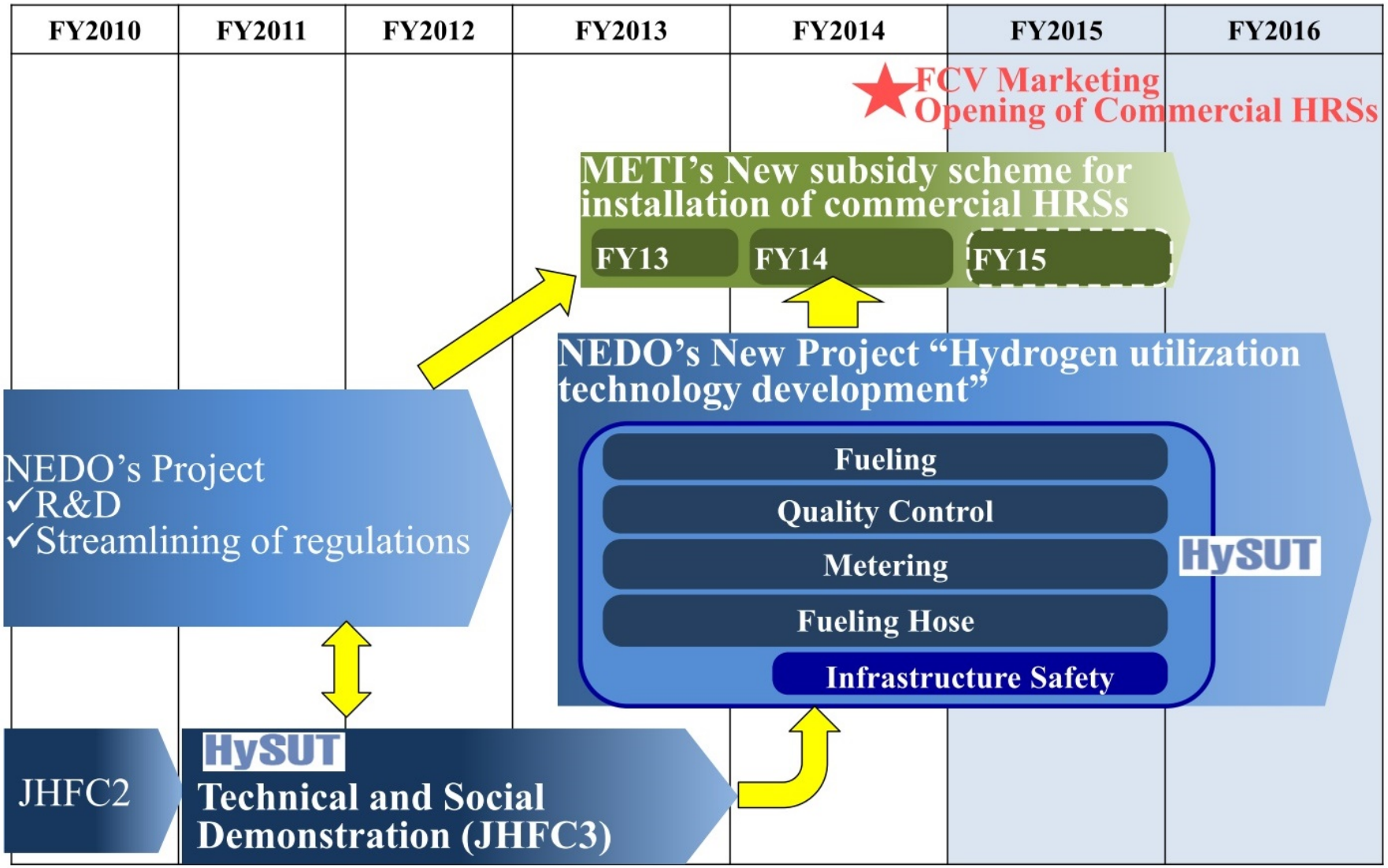
Key Organization - HySUT

by courtesy of HySUT

Members	19 Companies and Organizations (as of May, 2014)
4 	JX Nippon Oil & Energy Corporation, Idemitsu Kosan Co., Ltd., Cosmo Oil Co., Ltd., Showa Shell Sekiyu K.K.
4 	Tokyo Gas Co., Ltd., Osaka Gas Co., Ltd., Toho Gas Co., Ltd., Saibu Gas Co., Ltd
6 	Iwatani Corporation, Air Liquide Japan Ltd., Kawasaki Heavy Industries, Ltd., Mitsubishi Kakoki Kaisha, Ltd., Taiyo Nippon Sanso Corporation, The Japan Steel Works, Ltd.
3 	Toyota Motor Corporation, Nissan Motor Co., Ltd., Honda R&D CO., Ltd.
2 	Engineering Advancement Association of Japan (ENAA), Japan Petroleum Energy Center (JPEC)

Toward FCV Commercialization

by courtesy of HySUT



Fueling Performance Testing (NEDO → HySUT)

by courtesy of HySUT

Objectives

- Evaluate the fueling protocol(JPEC S 0003) through communication device
- Validate fueling performance at each hydrogen station.

HySUT Test Truck

- Tank : 36L×5
- Communication equipment
- Recording device for fueling data
- Hydrogen combustion engine vehicle (JARI approved)

Validation Test @ Senju H_2 station

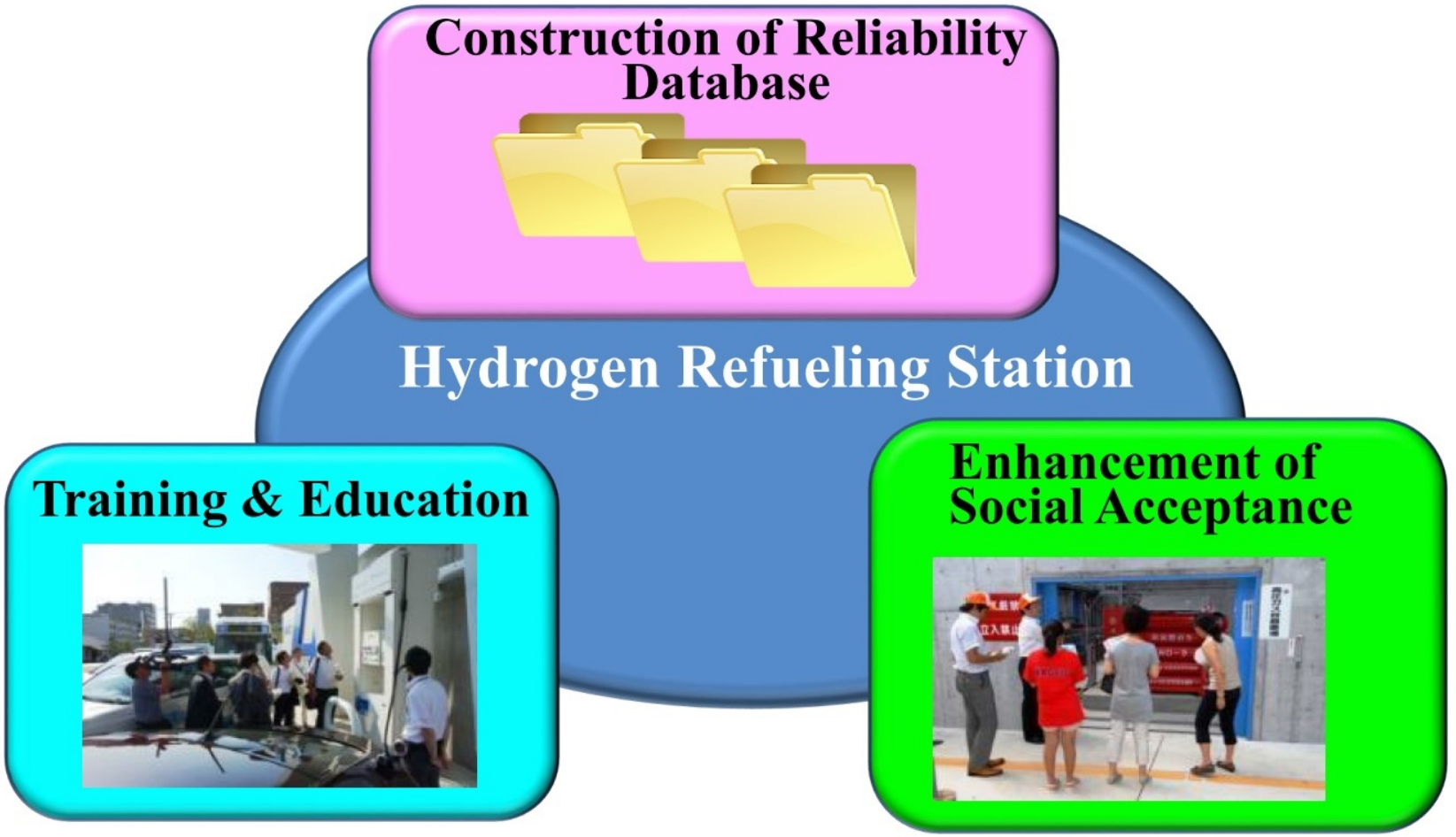
HySUT Test Truck

Test Apparatus

Infrastructure Safety Program (NEDO → HySUT)

by courtesy of HySUT

Basic Concept of the program



Infrastructure Safety Program (NEDO → HySUT)

NEDO

contract

HySUT

(3) Social Acceptance (incl. First responders' guideline)
(4) Next-generation HRS

(1) Reliability Database

- Idemitsu Kosan
- Osaka Gas
- Engineering Advancement Association of Japan (ENAA)
- Iwatani Corporation
- JX Nippon Oil & Energy
- Taiyo Nippon Sanso
- Tokyo Gas
- Toho Gas

(2) Training & Education

- Nissan Motor
- Honda R&D

Sub-contract

Technova

(1) Hydrogen information portal ← Hydrogen Information Portal Committee
(2) Training center for station operators
(3) Guidelines / tools for first responders
(4) Automatic refueling
← Safe Operation Committee

Infrastructu → HySUT)

NEDO

contract

HySUT

(3) Social Acceptance (incl. First responders' guideline)
(4) Next-generation HRS

Using existing hydrogen stations

Narita Station

Osaka Station

- Daily operations
- Maintenance

(1) Reliability Database

(2) Training & Education

- Idemitsu Kosan
- Osaka Gas
- Engineering Advancement Association of Japan (ENAA)
- Iwatani Corporation
- JX Nippon Oil & Energy
- Nissan Motor
- Honda R&D

Need new facility (for emergency exercises)

- H2 Leakage tests
- Breakaway function test
- Car collision into station devices (i.e. dispensers)
- Nozzle problems

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← Safe Operation Committee

Infrastructure Safety Program (NEDO → HySUT)

NEDO

contract

HySUT

(3) Social Acceptance
(incl. First responders' guideline)
(4) Next-genera[illegible] HRS

(1) Reliability Database

(2) Training & Education

Idemitsu Kosan

Osaka Gas

Engineering Advancement Association of Japan (ENAA)

Iwatani Corporation

Nissan Motor

[illegible]X Nippon Oil & Energy

Honda R&D

**Currently working with OEMs, JAMA, JARI to develop the emergency response guides, videos and training tools.
(JAMA and JARI are developing FCV emergency response guides)**

Sub-contract

Technova

(1) H[illegible]ogen information portal ← Hydrogen Information Portal Committee
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← Safe Operation Committee

People easily get lost in the web…

Googling "hydrogen" in Japanese

1: Wikipedia – hydrogen
2: Wikipedia – hydrogen fuel
3: Rcent news
4: NEDO's Whitepaper on Hydrogen Energy
5: Fukuoka Strategy Conference for Hydrogen Energy
6: Hydrogen Fuel Cell Roadmap by METI
7: Hydrogen Station by JX Energy

* People need to be provided with right and unbiased information.
* Central / local governments need to provide right and unbiased information.

This webpage will be ready in December

Sub-contract

Technova

(1) Hydrogen information portal ← Hydrogen Information Portal Committee
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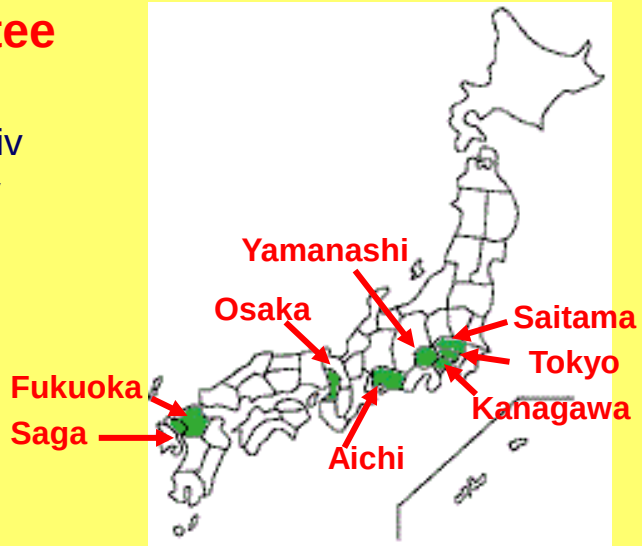
(4) Automatic refueling
← Safe Operation Committee

Committees

Hydrogen Information Portal Committee

- **Experts:**
  - Prof Ken-ichiro Ohta, Yokohama National Univ
  - Prof Miki Saijo, Tokyo Institute of Technology
  - Visiting Prof Kuniaki Honda, Kyushu Univ
- **Prefectural Gov members:**
  - Saitama
  - Tokyo
  - Kanagawa
  - Yamanashi
  - Aichi
  - Osaka
  - Fukuoka
  - Saga
- **City Gov members:**
  - Saitama city
  - Yokohama city
- **Industry association members:**
  - Fuel Cell Commercialization Conference of Japan (FCCJ)
  - Japan Automobile Research Institute (JARI)
  - Japan Automobile Manufacturers Association (JAMA)
  - Japan Petroleum Energy Center (J-PEC)
- **Observers:**
  - FC Promotion office, METI
  - NEDO
  - HySUT
- **Secretariat:** Technova



Safe Operation Committee

- **Experts:**
  - Prof Atsumi Miyake, Yokohama National Univ
- **Industry association members:**
  - Fuel Cell Commercialization Conference of Japan (FCCJ)
  - Japan Automobile Research Institute (JARI)
  - Japan Automobile Manufacturers Association (JAMA)
  - Japan Petroleum Energy Center (J-PEC)
- **Observers:**
  - NEDO
  - HySUT
- **Secretariat:** Technova

And, ICHS 2015

- Date: Oct 19 (Monday) – 21 (Wed), 2015
- Venue: City of Yokohama

ICHS Preparation Committee

- Chair: Prof Ken-ichiro Ohta, Faculty of Engineering, Graduate School, Yokohama National Univ
- Industry Associations:
  - Research Association of Hydrogen Supply/Utilization Technology (HySUT)
  - Hydrogen Energy Systems Society of Japan (HESS)
  - Fuel Cell Commercialization Conference of Japan (FCCJ)
  - Japan Automobile Research Institute (JARI)
  - Japan Automobile Manufacturers Association (JAMA)
  - Japan Petroleum Energy Center (J-PEC)
  - Engineering Advancement Association of Japan (ENAA)
- Industry
  - Kawasaki Heavy Industries
  - JX Nippon Oil & Energy Corporation
  - Iwatani Corporation
  - Tokyo Gas
  - Chiyoda Corporation
- Secretariat: Technova

Ideas for ICHS 2015

Committee started the discussion / planning on side events.

Ideas:

- Educational events for kids / public (Sunday)
- Ride & Drive (FCVs)
- Exhibition
  - For public
  - For ICHS participants
- Workshops
  - Education / First Responders' Training
  - Regulation review
  - HySAFE activities
  - IEA HIA activities

Your ideas are welcome!

Conclusion

- FCV Commercialization
  - Toyota soon makes official announcement of sales.
  - Delivery starts in December.
- Hydrogen Safety:
  - New hydrogen safety program started in 2014 (by NEDO), focusing on training, education and public acceptance.
  - First Responders Training / Tools -- Just started.
  - Improvement of public acceptance is critical issues (portal project, etc)