APEC EGNRET 36, Washington DC

New and Renewable Energies in Transportation
Japan

March 1, 2011

Takao Ikeda
The Institute of Energy Economics, Japan (IEEJ)

Mie Okada
Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry (METI)

Plan for new and renewable Energy in transport sector

Basic Act on Energy Policy (2010)

Biofuels:

- Aim over 3% introduction in gasoline in 2020
- Establish next generation technologies (Cellulosic and Micro Algae etc.) and maximum usage

EV, HEV, PHEV, FCV (Clean Diesel, CNG)

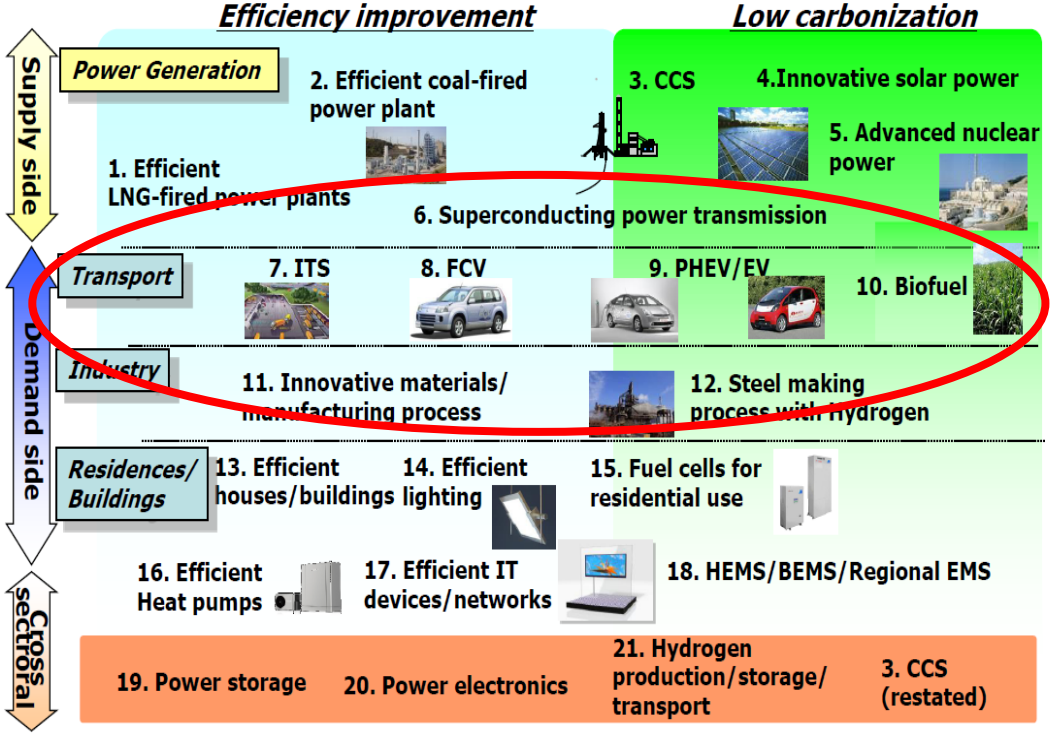
- Introducing maximum 50% among new passenger car in 2020.
- Maximum 70% in 2030.

FCV

- Increase Hydrogen Station to support commercial usage start from 2015.

Cool Earth - Innovative Energy Technology (2007)

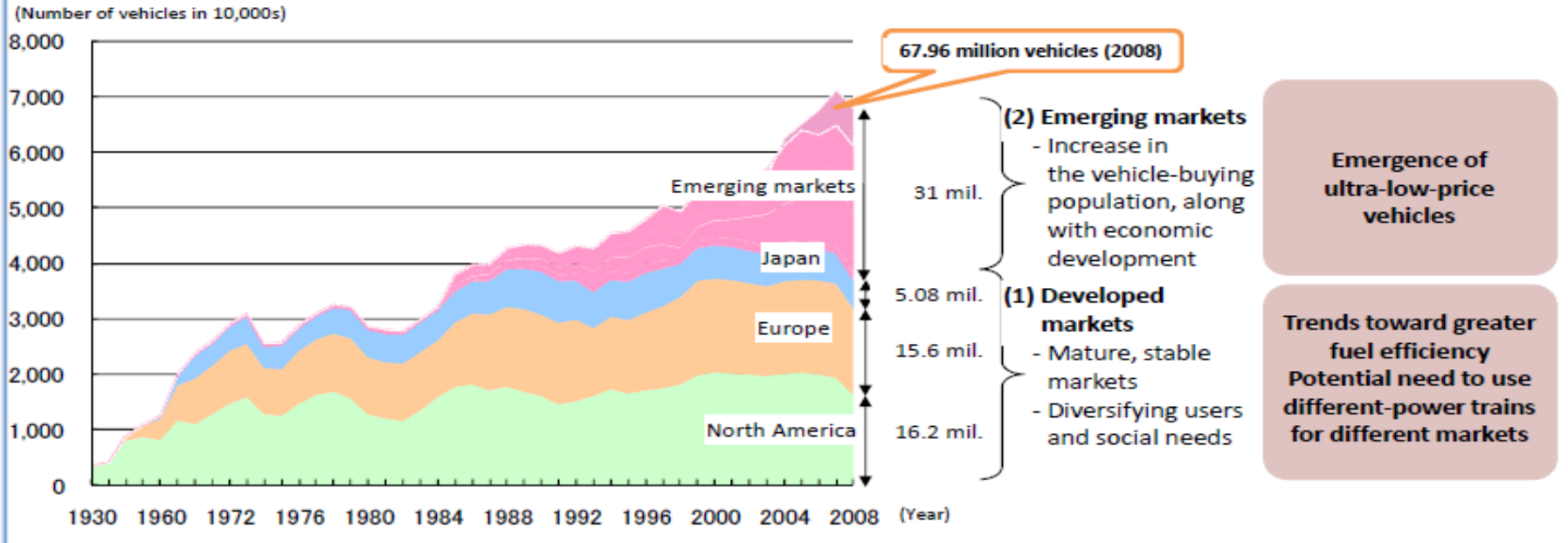
Innovative Energy Technology which is important for reducing CO2 emission level drastically until 2050.



Next-Generation Vehicle Plan2010

Structural change in the auto market

- Rapid growth of emerging markets and trends toward green vehicles in developed markets



External factors affecting the auto industry

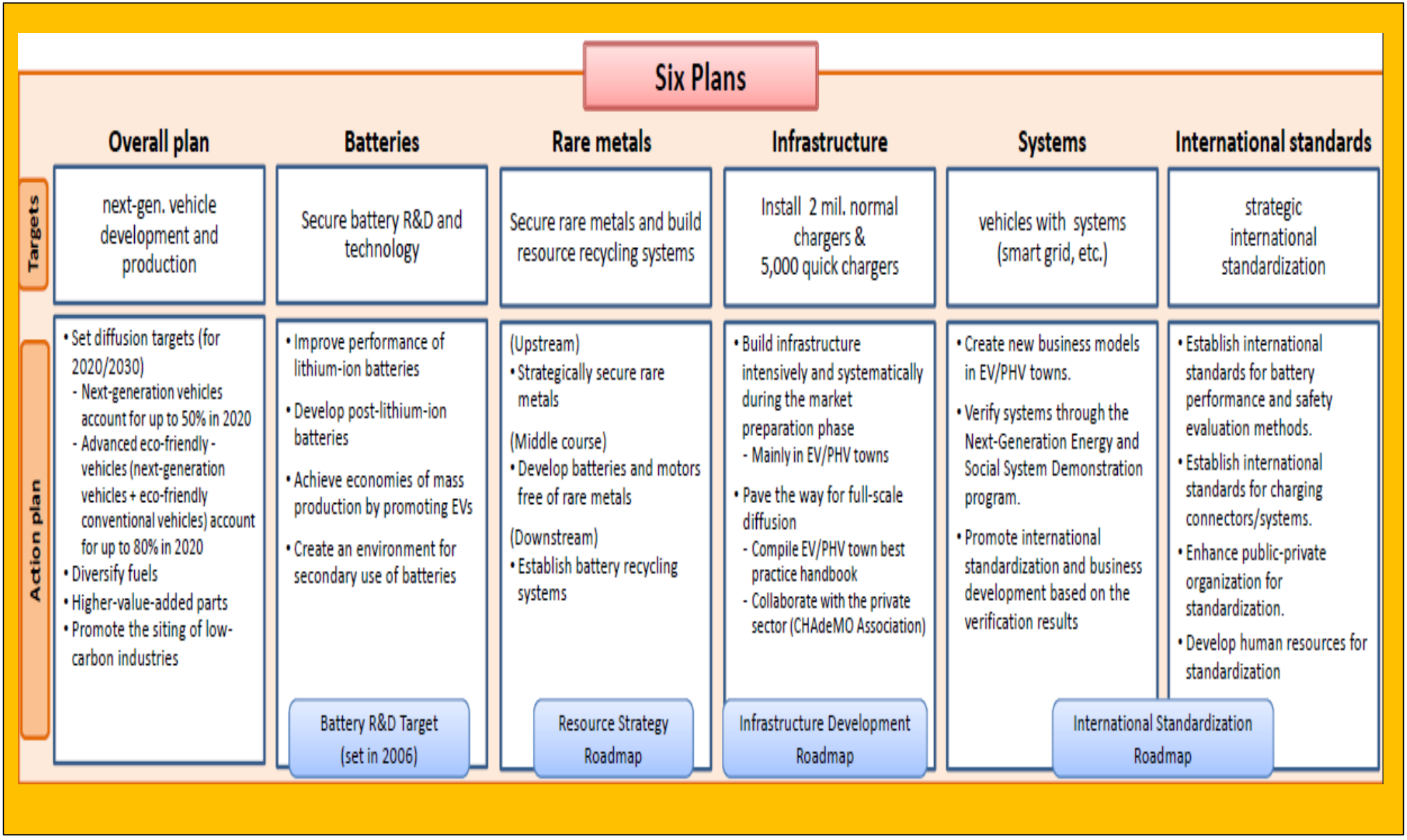
1.Great Change in the Competition environment
Alliance based on environment technology

2.Energy Constraints
High oil prices in the medium-to-long term

3. Global warming prevention
Target of reducing GHG by 25% from the 1990 level by 2020

4. New industry
Marking EVs and batteries the growth driver

Next-Generation Vehicle Plan2010



Next-Generation Vehicle Plan 2010
(Diffusion Projections for 2020 and 2030; Government Targets)

Diffusion projections by type of vehicle (with private-sector efforts)

- Diffusion projections assuming private-sector efforts (scenario where auto makers make the utmost efforts to improve fuel efficiency and develop next-generation vehicles) were made.
- Next-generation vehicles will account for less than 20% of new vehicle sales in 2020 and 30-40% in 2030.

		2020	2030
Conventional vehicles		**80% or more**	**60 - 70%**
Next-generation vehicles		**Less than 20%**	**30 - 40%**
	Hybrid vehicles	10 - 15%	20 - 30%
	Electric vehicles Plug-in hybrid vehicles	5 - 10%	10 - 20%
	Fuel-cell vehicles	Miniscule	1%
	Clean diesel vehicles	Miniscule	- 5%

Next-Generation Vehicle Plan 2010
(Diffusion Projections for 2020 and 2030; Government Targets)

Diffusion targets by type of vehicle (government targets)

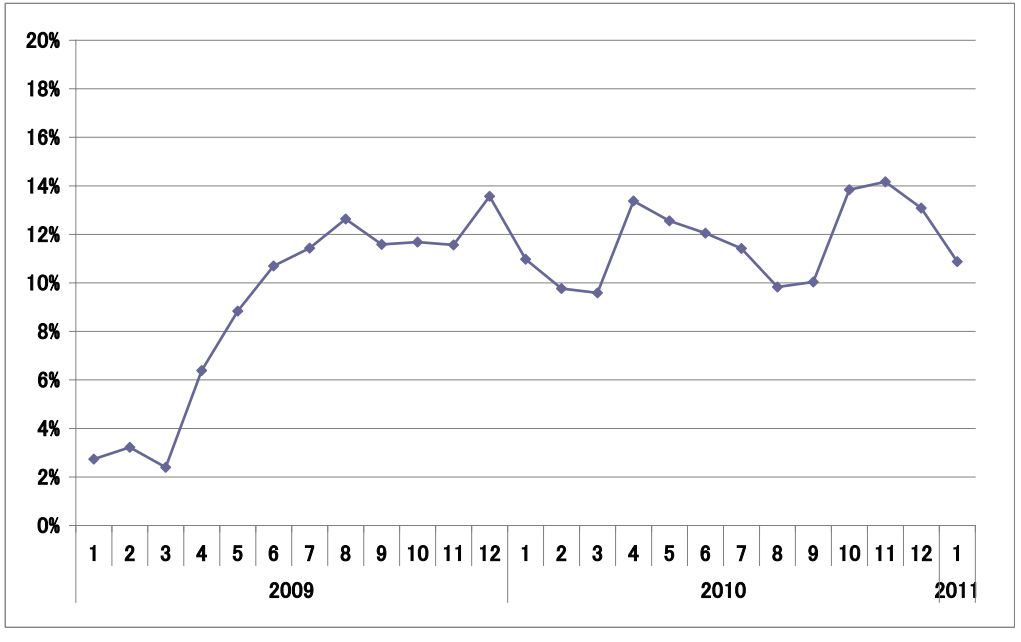
- The government has set diffusion targets to pursue for each type of vehicle for accelerating the spread of next-generation vehicles.
- Next-generation vehicles should account for up to 50% of new vehicle sales in 2020.
- To achieve this target, the government should provide effective incentives.

		2020	2030
Conventional vehicles		**50 - 80%**	**30 - 50%**
Next-generation vehicles		**20 - 50%**	**50 - 70%**
	Hybrid vehicles	20 - 30%	30 - 40%
	Electric vehicles Plug-in hybrid vehicles	15 - 20%	20 - 30%
	Fuel-cell vehicles	- 1%	- 3%
	Clean diesel vehicles	- 5%	5 - 10%

EV & HEV

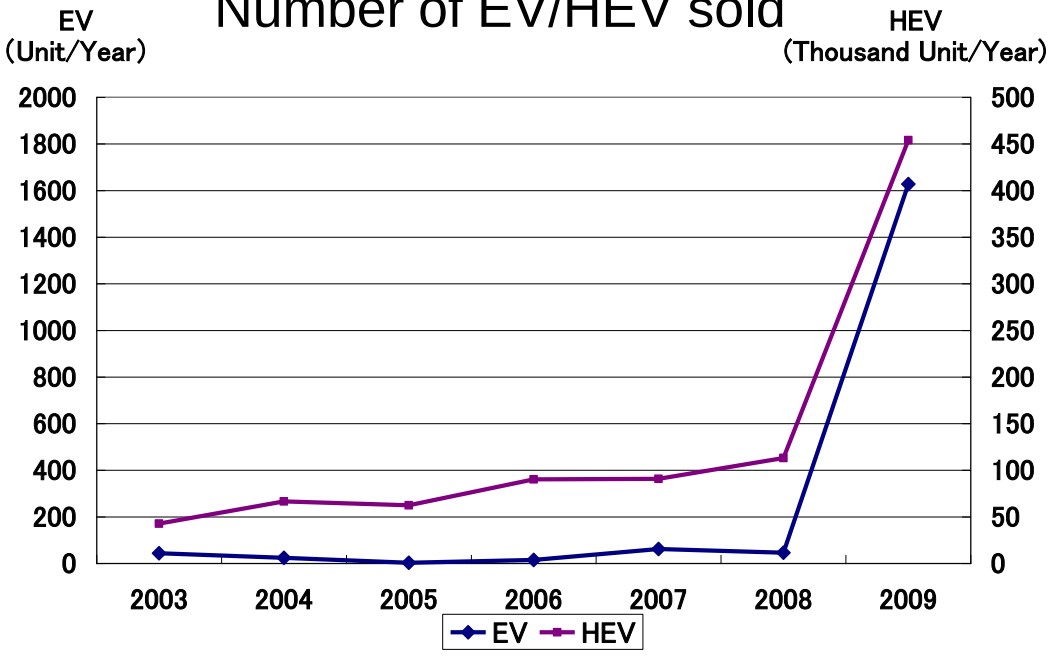
EV/PHEV Introduction and Promotion

Next-generation Car Ratio in New Car Sales



Source : Japan Automobile Manufacturers Association

Number of EV/HEV sold



Source : Next Generation Vehicle Promotion Center

<u>Eco-Car Subsidy (2009 Apr.-2010.Sep)</u>

Already Finished.

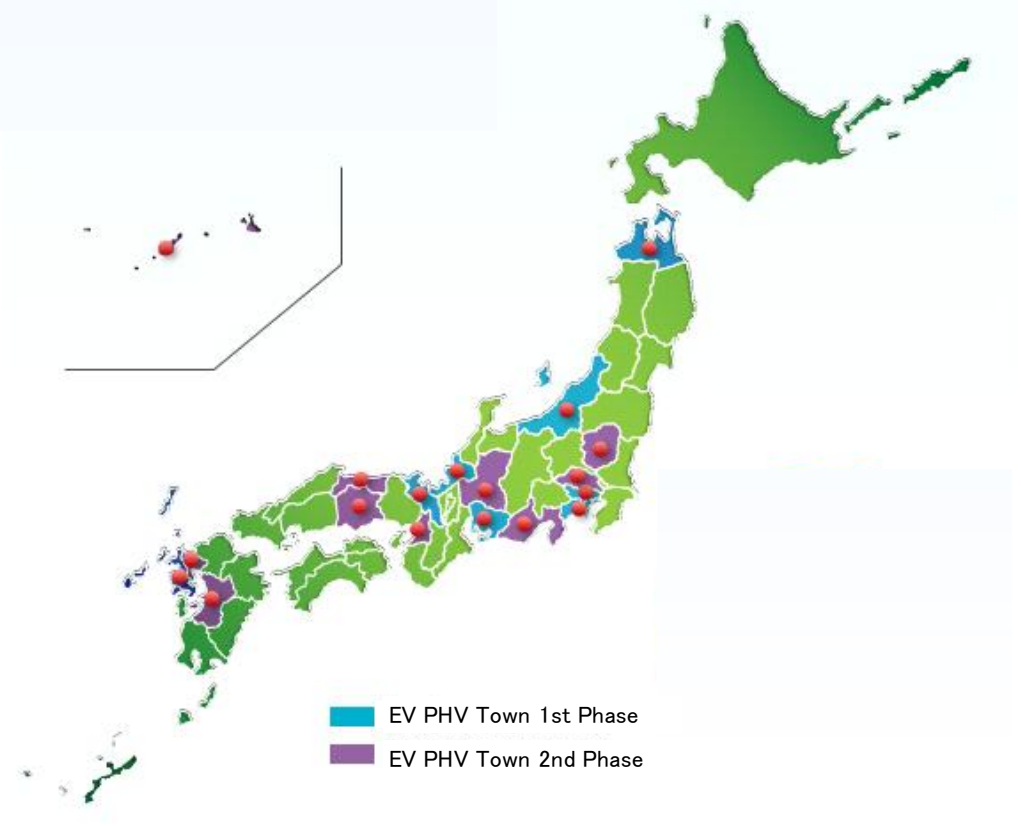
250 thousand yen subsidy for purchasing new car for the owner who replace the car more than 13 years old(one example)

<u>EV Subsidy</u>

(Nominal Price – Base price) x 1/2 = Subsidy Nominal Price means price before discount.

EV/PHEV Introduction and Promotion

EV・PHEV Town

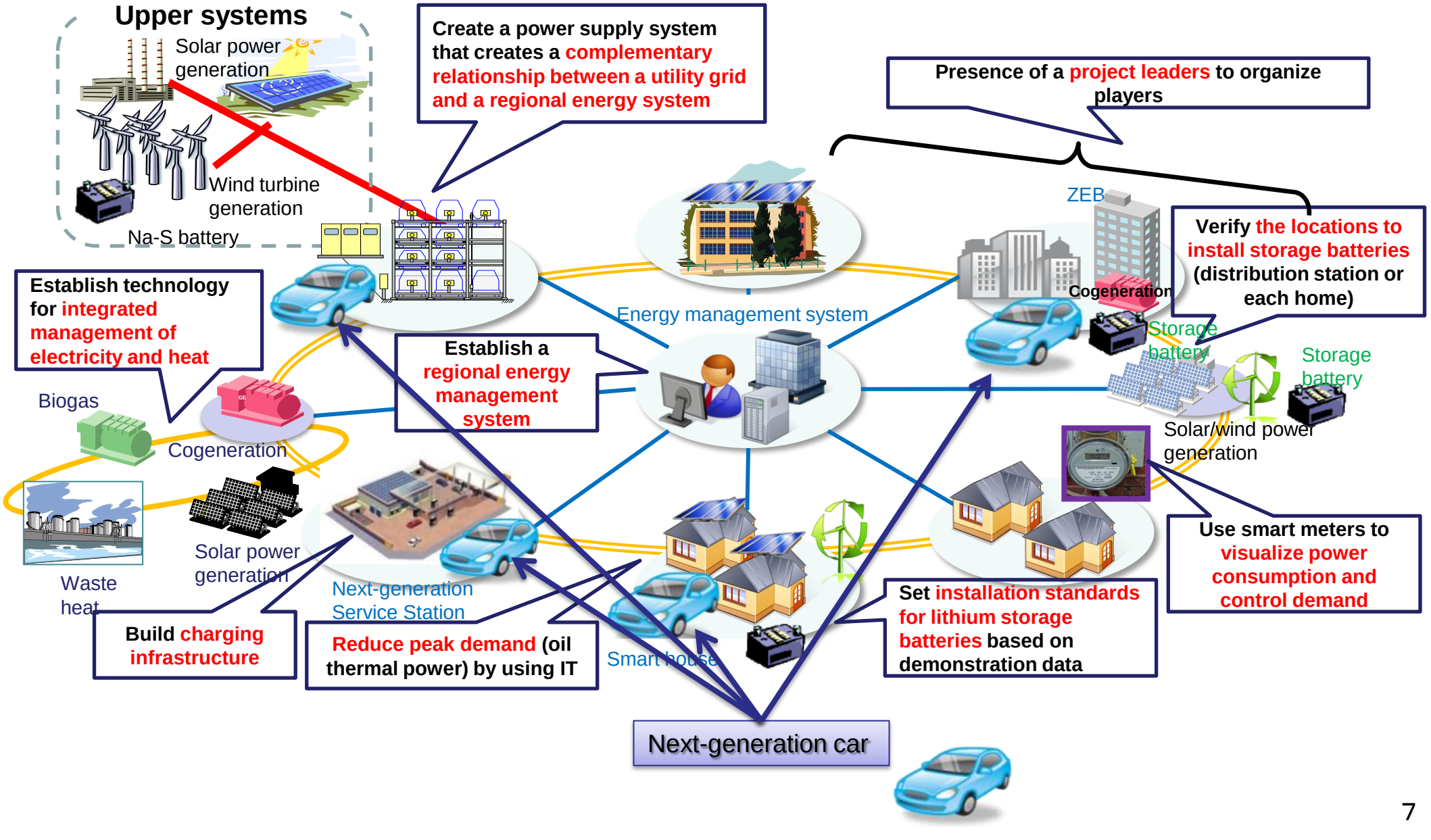


Kyoto (EV tour at historic area)

Niigata (EV Taxi)

Picture: METI Journal

Smart Community and EV



Smart Community and EV

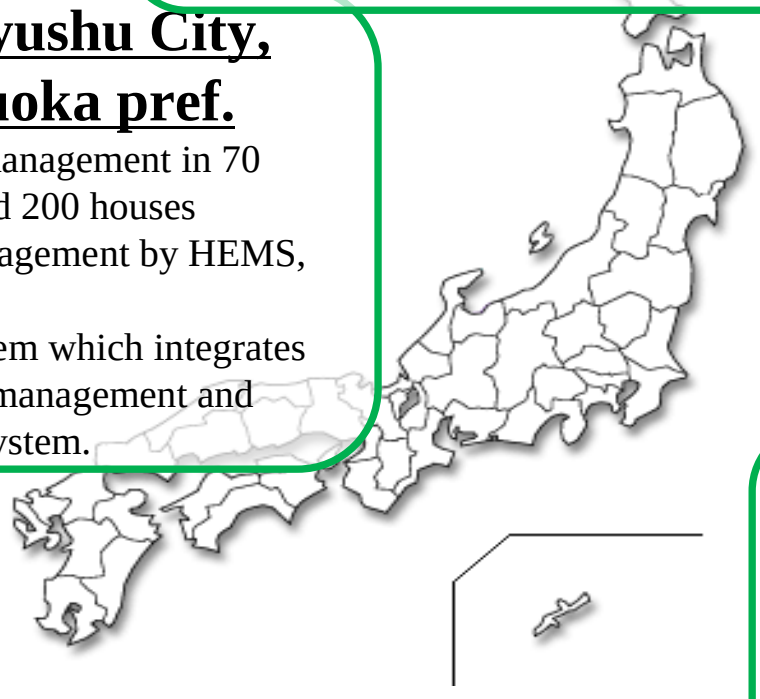
Examples of Smart Community projects in Japan

Kansai Science City, Kyoto pref.

- ‘Smart tap’ which visualizes energy consumption control home electronics energy usage.
- ‘Electric power virtual coloring’ technology actualizes total home energy management system.

Kitakyushu City, Fukuoka pref.

- Real-time management in 70 companies and 200 houses
- Energy management by HEMS, BEMS
- Energy system which integrates demand-side management and high energy system.



Yokohama City, Kanagawa pref.

- Energy management system which integrates HEMS,BEMS,EV
- Large-scale PV system(27000 kW), 4000 Smart houses, 2000 Evs
- Use of heat and unused energy

Toyota City, Aichi pref.

- Use of heat and unused energy as well as electricity
- Demand response with more than 70 home, 3100EVs, Vehicle to Home(V to H), Vehicle to Grid(V to G)

FCV

The Japan Hydrogen & Fuel Cell Demonstration Project

JHFC：The Japan Hydrogen & Fuel Cell Demonstration Project consists of the "Fuel Cell Vehicle (FCV) etc. Demonstration Study" and the "Hydrogen Infrastructures Demonstration Study". Both studies are part of the "Fuel Cell System Demonstration Study" subsidized by the Ministry of Economy, Trade and Industry.(NEDO from FY 2009).

JHFC1 : FY 2002 - 2005

1.Clarified the high energy efficiency of FCV as a vehicle.
2.Clarified "Well to Wheel" efficiency (overall energy efficiency that takes consumption of all energies concerned: from the mining of the primary energy, production, transportation and filling to vehicle and to driving of vehicles) with demonstration data of FCVs and hydrogen stations.

JHFC2 : FY 2006 – 2010

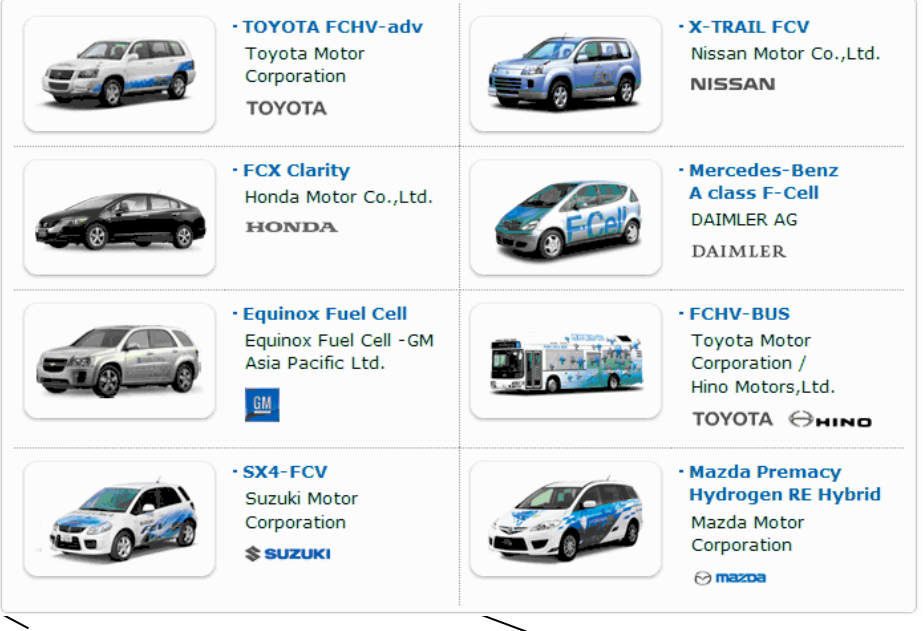
1.To clarify the remaining issues under the actual use conditions
2.To collect data to develop regulations, codes, and standards
3.To formulate and implement public relations and education strategies for dissemination and promotion
4.To verify the energy saving (fuel economy) and environmental impact mitigation
5.To identify technology and policy trends
of FCVs, small fuel-cell powered vehicles and hydrogen engine vehicles as well as hydrogen infrastructures

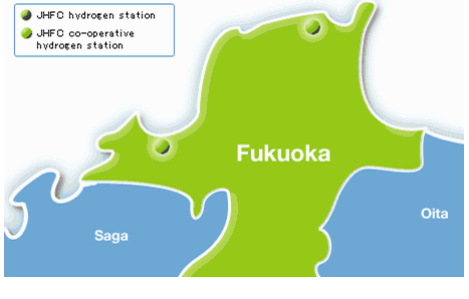
JHFC 水素・燃料電池実証プロジェクト
Japan Hydrogen & Fuel Cell Demonstration Project

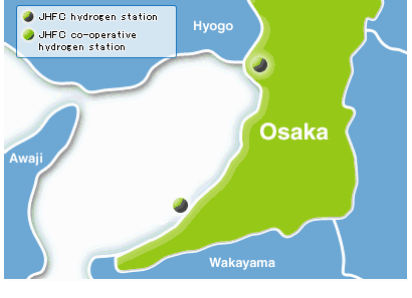
http://www.jhfc.jp/e/index.html

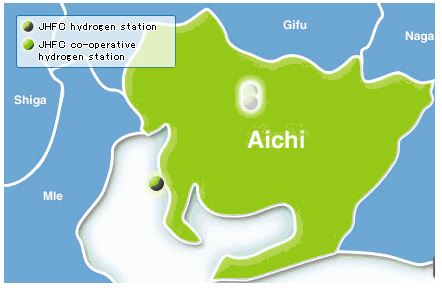
JHFC Hydrogen Stations

As a major activity of JHFC project, 14 hydrogen stations were constructed and have been operated in the Tokyo metropolitan area, Chubu, Kansai and Kyushu region. Hydrogen is produced by reforming a wide variety of fossil fuels such as desulfurized gasoline, naphtha, methanol and natural gas, or by water electrolysis or purification of COG. These hydrogen infrastructures have been evaluated in the real world through refueling of hydrogen to FCVs and ICVs.









Aiming Commercialization in 2015

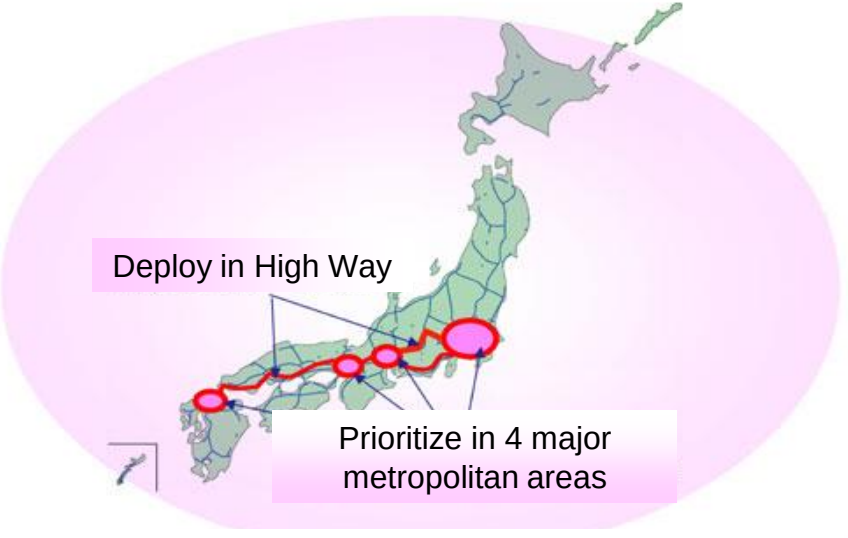
13 coumpanies announced their plan to starting develop FCV market in 2015 on 1/13/2011.

Automobile manufacurters : Toyota Motor, Nissan Motor, Honda Motor,

Refiners :JX Nippon Oil and Energy, Idemitsu Kosan, Showa Shell Sekiyu, Cosmo Oil

Gas Companies: Tokyo Gas, Osaka Gas, Toho Gas, Saibu Gas, Iwatani, Taiyo Nippon Sanso

1. Automobile manufacturers are developing commercial FCV with aiming to start selling in domestic market with a focus on four major metropolitan areas in 2015.
2. Hydrogen supply companies aim to place about 100 hydrogen stations before 2015 in order to develop early stage of FCV hydrogen infrastructure for commercial FCV.
3. Asking for government to establish deployment strategy including measures to improve social acceptance etc.



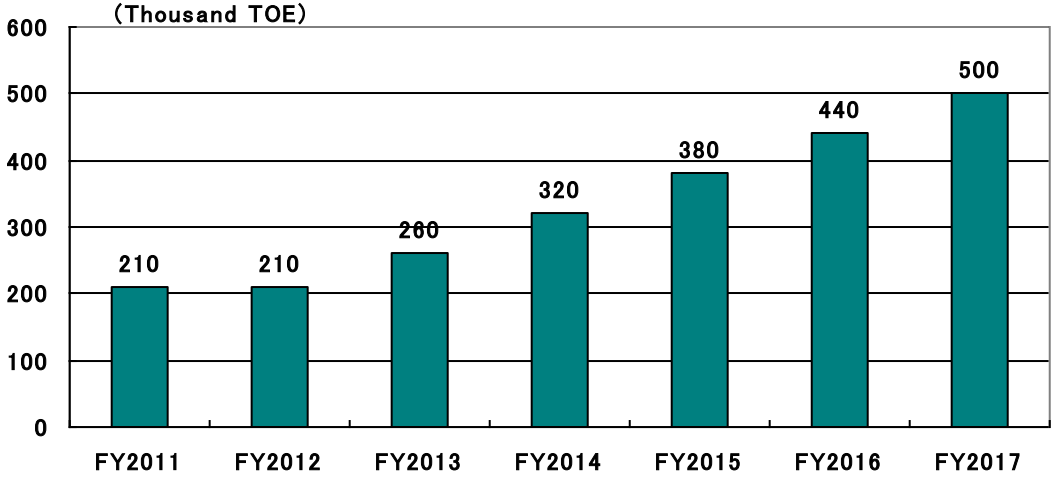
Biofuels

Law regarding Advanced Energy Supply Structures

- Law regarding promote the effective utilization of raw materials of fossil energy and use of non-fossil energy sources (Law regarding Advanced Energy Supply Structures) was passed in July 2009.
- Related ministerial order including ethanol introduction target was in effect in November 2010.
- Distributor : 0.6ml/year of gasoline sales

  Refiner :3 million kl/year of crude oil processing

  Minimum criteria to mandate ethanol (about 98% of the market)
- LCA of GHG emission of ethanol should be less than 50% of baseline gasoline
- Both of ETBE and direct blend are accepted.



✓Basic act on Energy Policy indicates 3% ethanol introduction in gasoline in 2020.
✓Domestic use of gasoline was about 58million KL in 2010.
✓No nationwide supply for biodiesel.
Only “local production, local use”

Thank you
for your attention!