

Energy situation in Japan ~ challenges and future plans~



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March 24, 2015

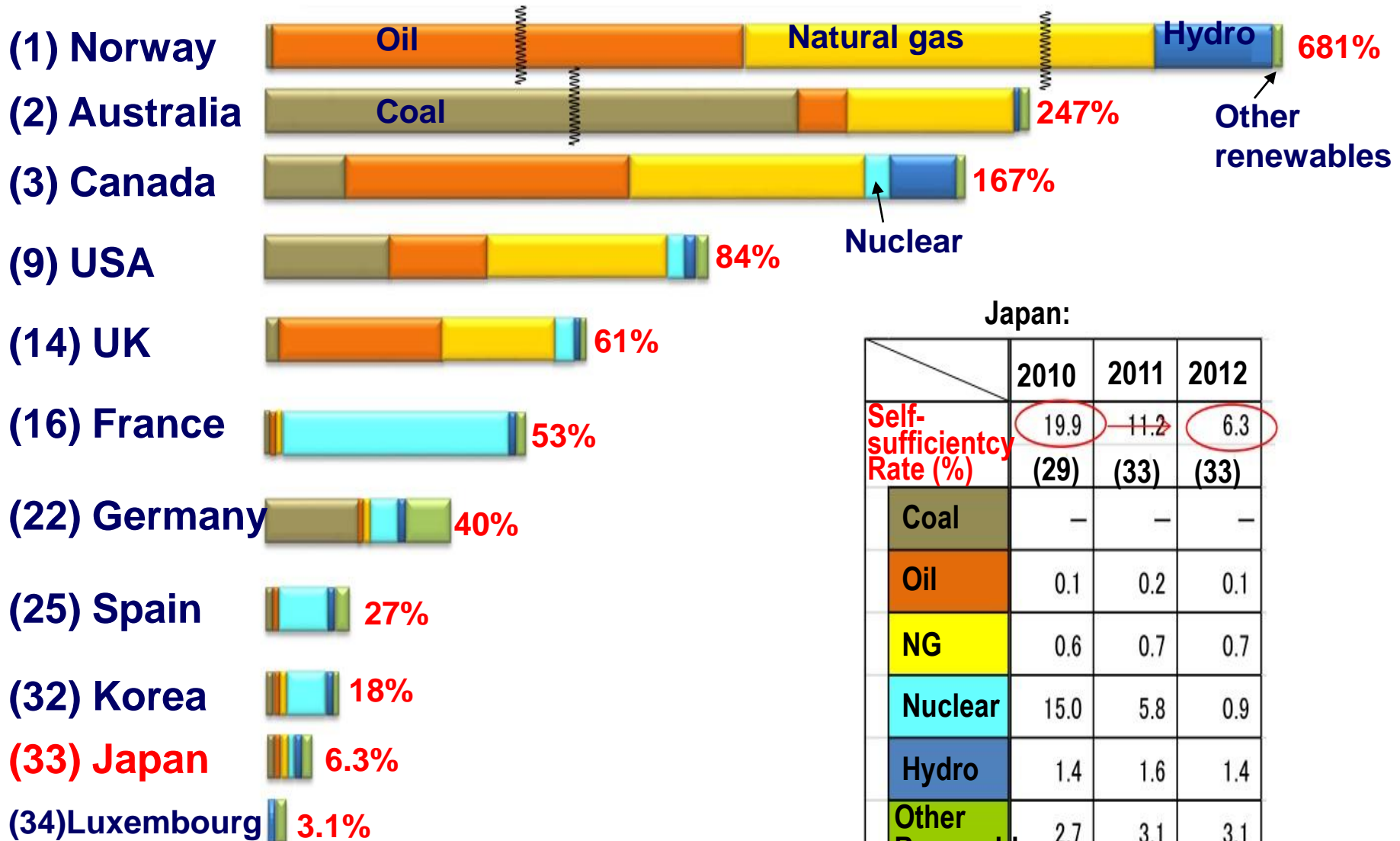
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Japan's Energy Situation

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Energy: self-sufficiency rate among OECD (2012)



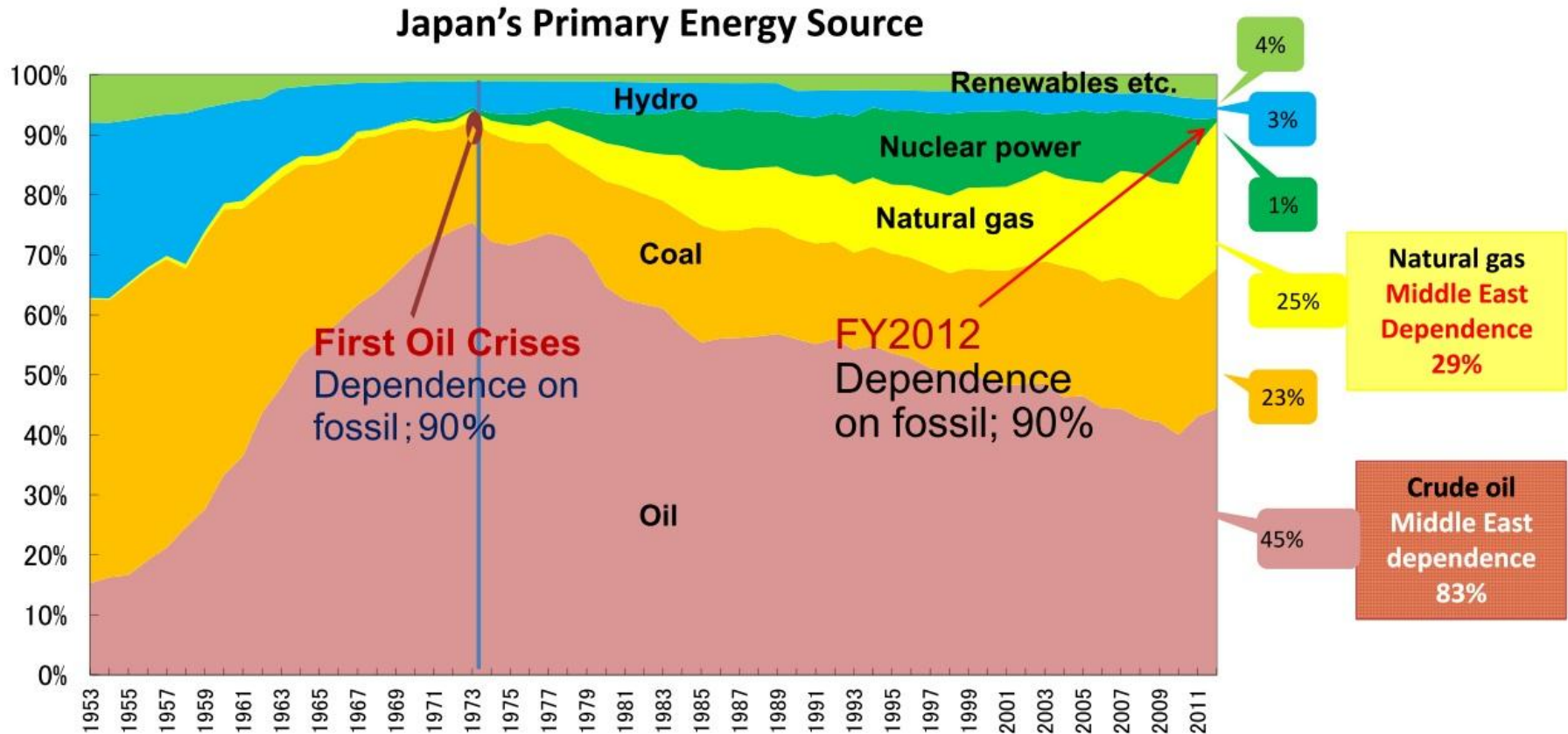
Japan:

	2010	2011	2012
Self-sufficiency Rate (%)	19.9 (29)	11.2 (33)	6.3 (33)
Coal	-	-	-
Oil	0.1	0.2	0.1
NG	0.6	0.7	0.7
Nuclear	15.0	5.8	0.9
Hydro	1.4	1.6	1.4
Other Renewable	2.7	3.1	3.1

Source: METI

Primary Energy Mix in Japan

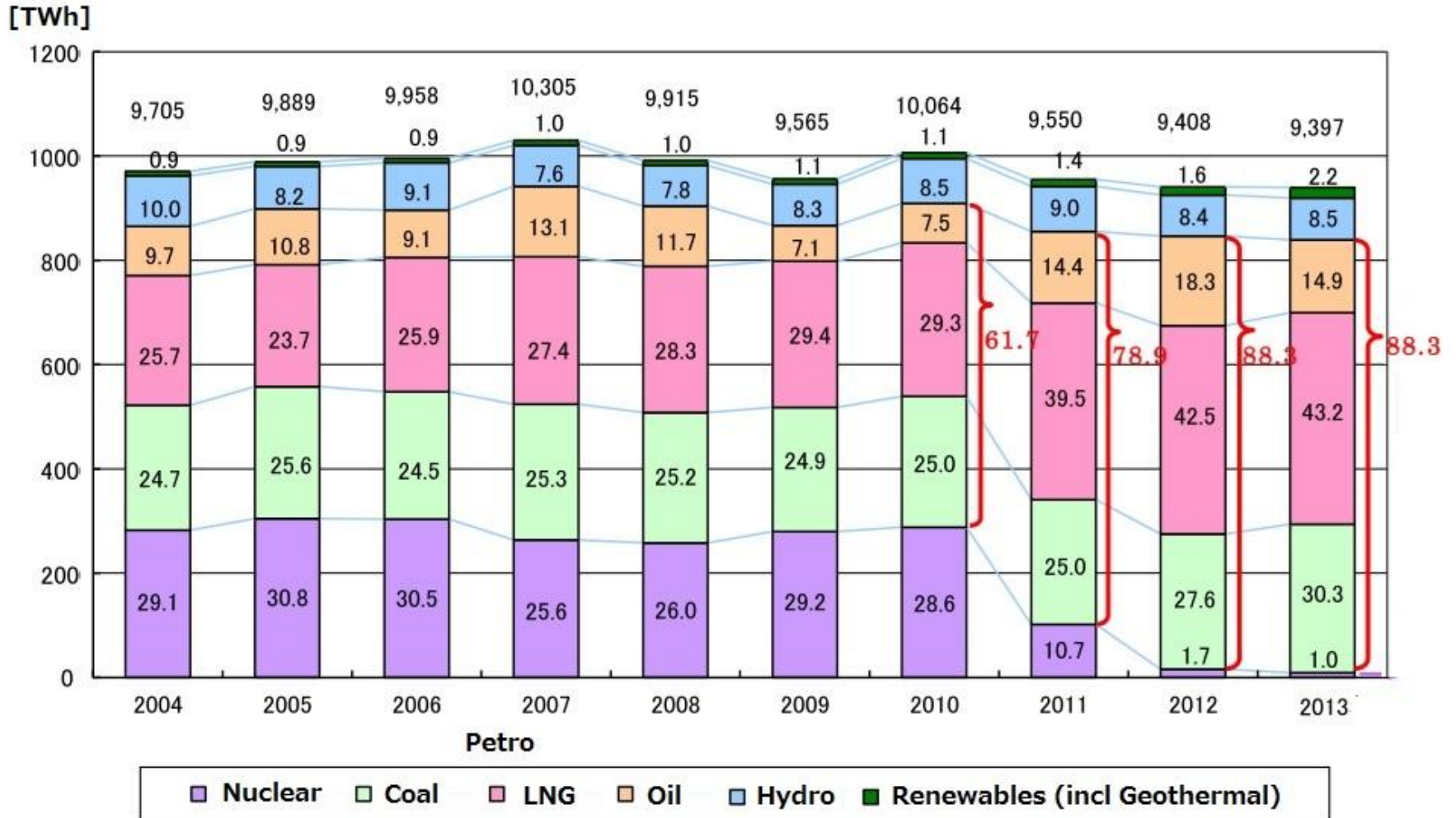
- 90% of primary energy comes from fossil energy!!!



Source: METI

Electricity Mix in Japan

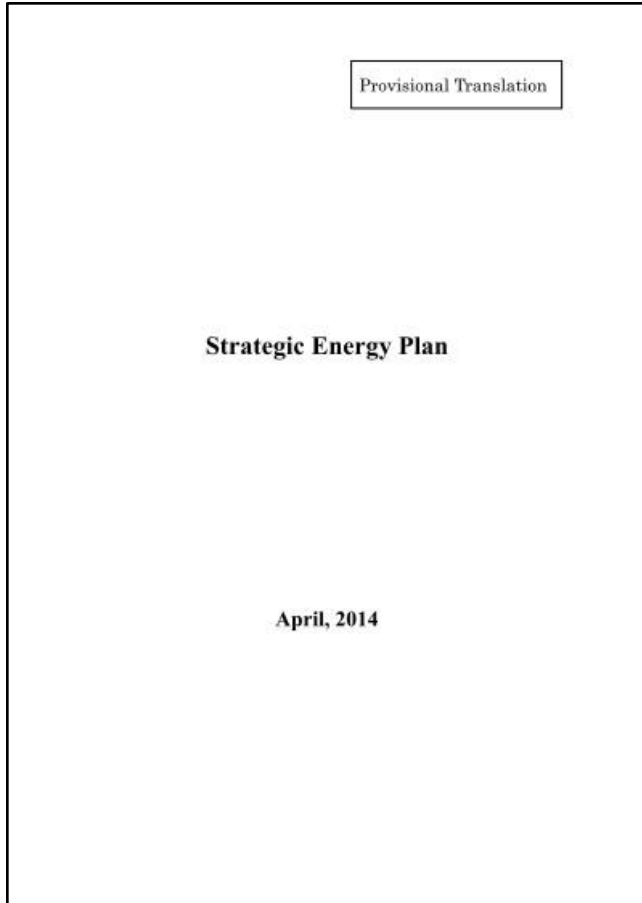
▣ 90% of electricity comes from fossil energy!!!



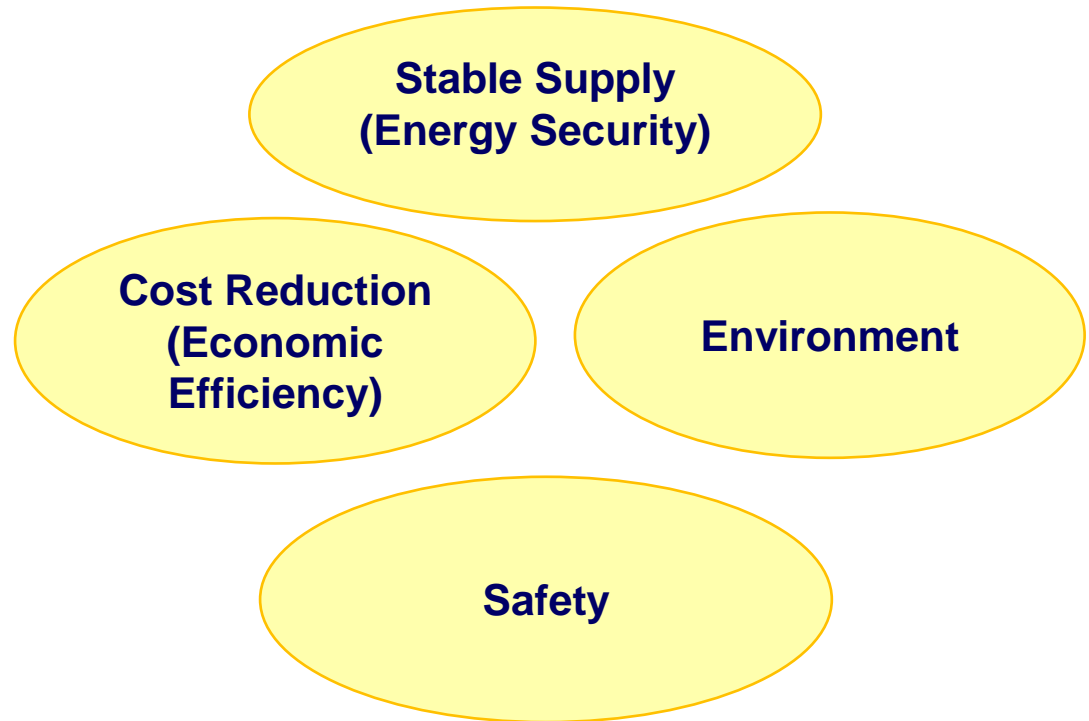
Source: METI

Strategic Energy Plan (Updated in April 2015)

Japan's Cabinet adapted the update of Strategic Energy Plan in April, 2014



Basic viewpoint of energy policies (3E + S)



Strategic Energy Plan (Updated in April 2015)

□ Renewables

- Promising, important
- Low-carbon and domestic energy sources.
- Accelerating introduction

□ Nuclear Power

- Important base-load power source
- Low carbon and quasi-domestic energy source, contributing to stability of energy supply
- Dependency on nuclear power generation will be lowered by energy saving, by introduction of renewables, and by improvement of the efficiency of thermal power generations

Source: METI

Strategic Energy Plan (Updated in April 2015)

□ Hydrogen

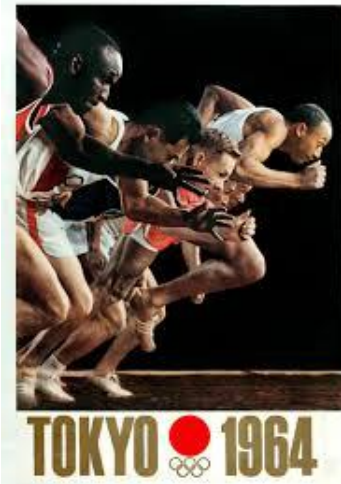
Acceleration of steps toward realization of a "hydrogen society"

- (1) Spread and expansion of the introduction of Stationery Fuel Cells (Ene-Farm etc.)
- (2) Creating an environment for acceleration of introduction of fuel-cell vehicles
e.g. 2020 Tokyo Olympic and Paralympic Games
- (3) Realizing new technologies such as hydrogen power generation for full-scale usage of hydrogen
- (4) Promoting development of production and storage/transportation technology for stable supply of hydrogen
- (5) Formulating a road map toward realization of a "hydrogen society"

Source: METI

Tokyo Olympic Games - Legacy

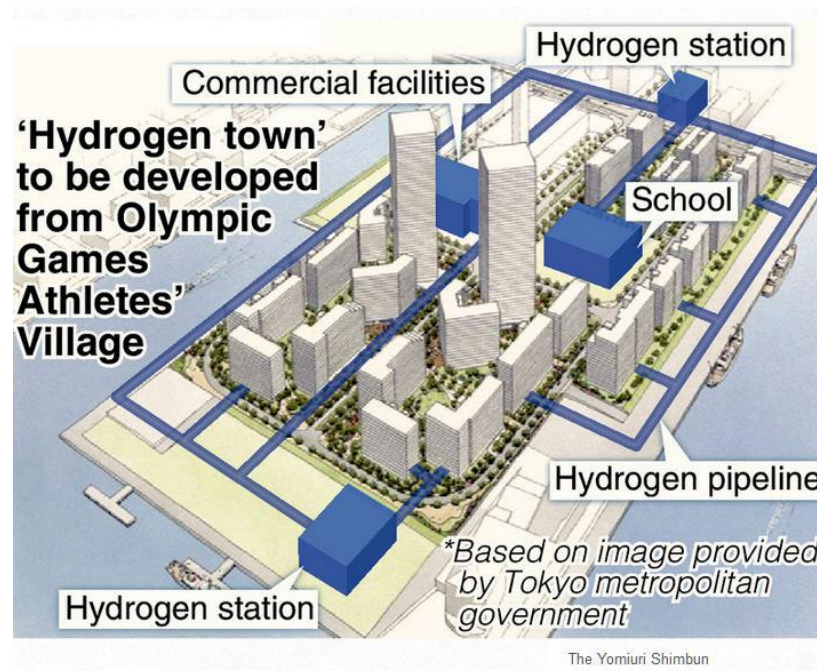
□ 1964



Shinkansen Train
(Tokyo - Osaka)

Source: Wikipedia

□ 2020



Hydrogen Town

Source: Yomiuri Shimbun

The Yomiuri Shimbun

Then, MIRAI comes

- ❑ On Nov 18, 2014, Toyota announced the official sales of MIRAI.



Source: Toyota

- ❑ First MIRAI was delivered to Prime Minister's Office on Jan 15, 2015.

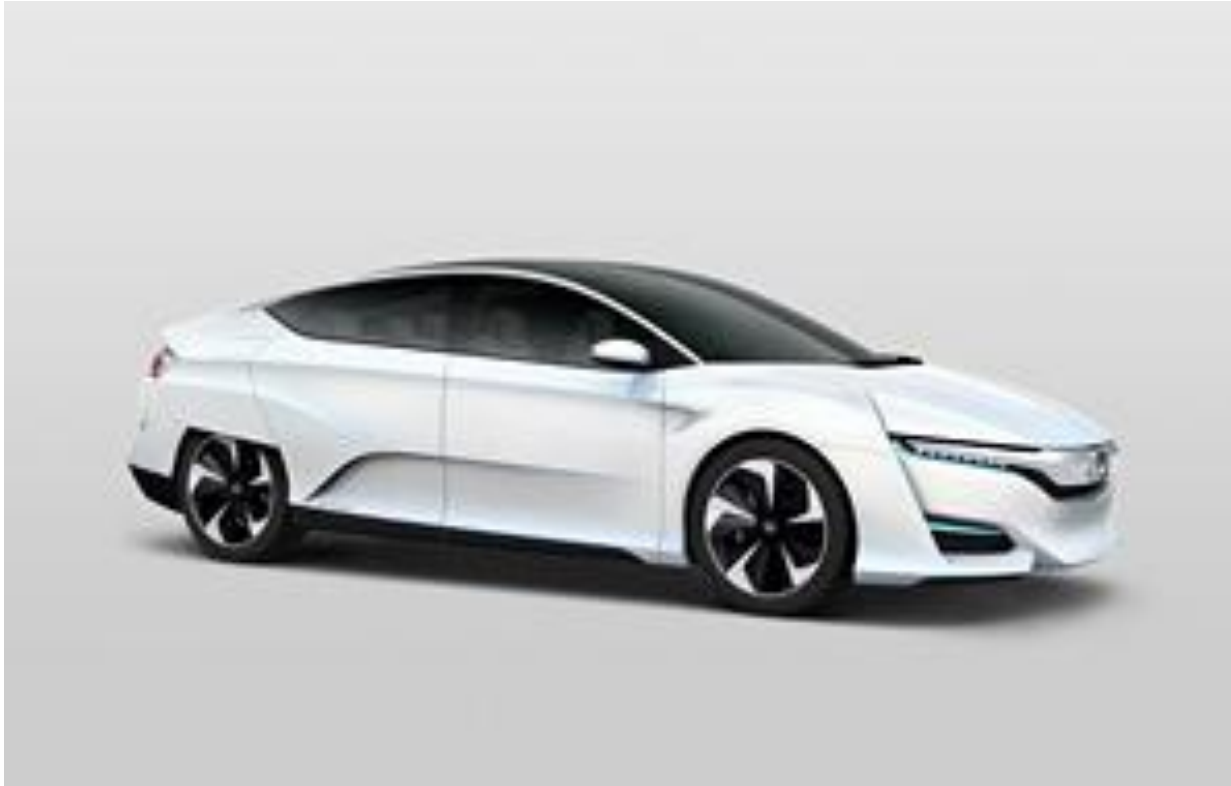


Source: Prime Minister's Office

- ❑ Back order: 1,500
- ❑ Production capacity (annual):
700 (now) → 2,000 (2016) → 3,000 (2017)

HONDA follows

- ❑ On Nov 17, 2014, Honda revealed “Honda FCV CONCEPT”, which will be on the road by the end of FY 2015 (March 2016).



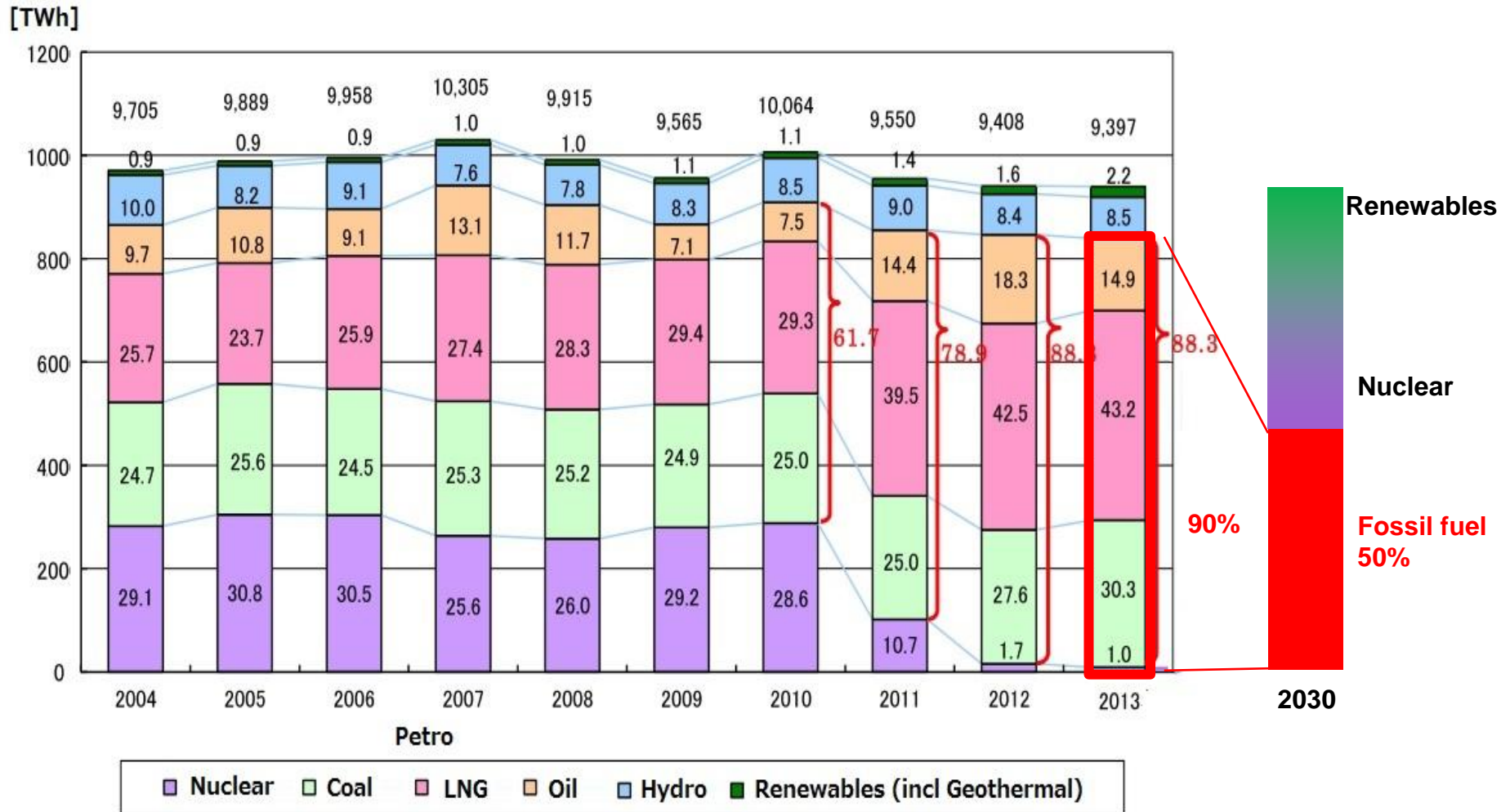
Source: Honda

How Hydrogen Helps Japan

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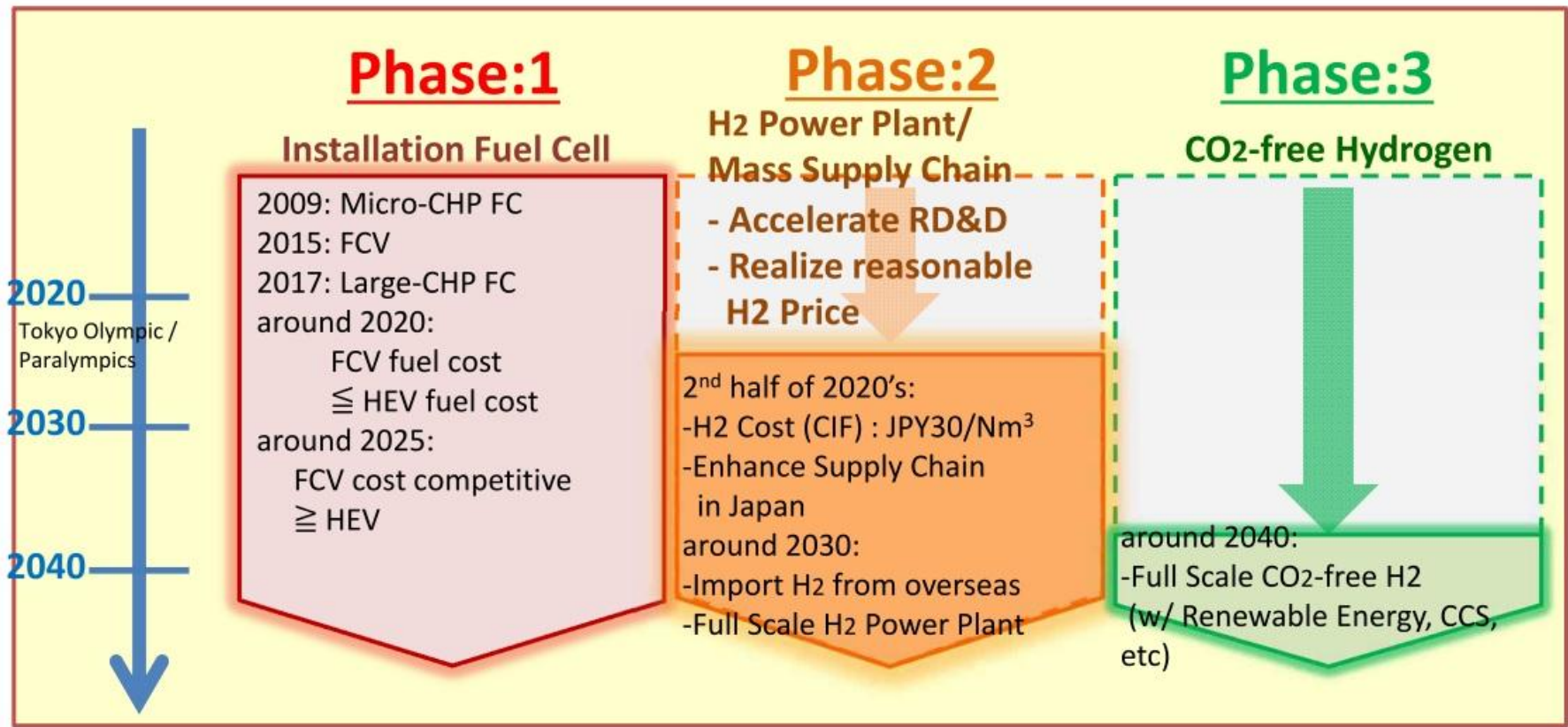
New target for 2030

- Currently, we are setting the target for 2030.....



Strategic Roadmap for Hydrogen and Fuel Cells

- METI announced hydrogen roadmap in June, 2014.
By 2040, Japan introduces **large-scale hydrogen (CO₂-free hydrogen)**.



Source: METI

Hydrogen stations

FY	2002 – 2005	2006 - 2010	2011	2012	2013	2014	2015	
Demonstration	JHFC1	JHFC2	JHFC3 (by HySUT)					
		17	16	16	17	9		
Target (by 2015): 100 in four metropolitan area			★ <u>Jan. 2011</u> Joint Announcement by 13 Japanese companies			★ <u>April. 2014</u> Adapted in “Strategic Energy Plan		
Commercial stations					★ 1 st call	★ 2 nd call	★ 3 rd call	

Subsidy	1 st Call	2 nd Call	3 rd Call
Budget	4.6 bil yen (35 mil Euro)	7.2 bil yen (55 mil Euro)	9.6 bil yen (73 mil Euro)
Adapted	18 stations	23 stations	Now open
Total	41 stations (45 locations)		Nearly 100

Subsidy for Hydrogen stations: METI

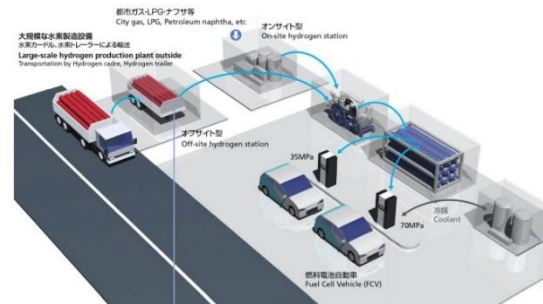
Capacity [Nm ³ /hr]	Type	Subsidy ratio	Upper limit (Mil yen)
>300	On-site (packaged)	Fixed	290
	On-site (non-packaged)	50%	290
	Off-site(packaged)	Fixed	250
	Off-site (non-packaged)	50%	250
	Movable	Fixed	250
100-300	On-site (packaged)	Fixed	220
	On-site (non-packaged)	50%	220
	Off-site(packaged)	Fixed	180
	Off-site (non-packaged)	50%	180
	Movable	Fixed	180

Packaged



Source: Iwatani

Non-packaged



Source: HySUT



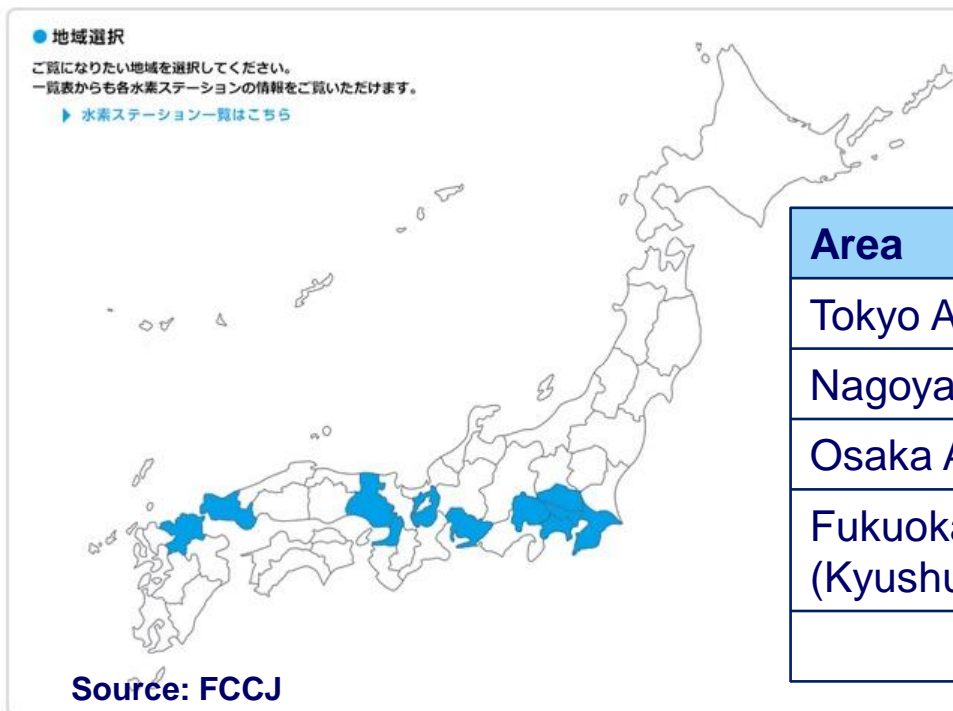
Source: JX Energy

Among 41 stations, 13 are open now

Station Suppliers

- JX Energy (oil company) 19 stations (40?)
- Iwatani Corporation / Linde 11 stations (20)
- Toyota Tsusho / Mitsusi 5 stations
- Toyota Tsusho / Air Liquide 2 stations
- Tokyo Gas 2 stations
- Osaka Gas 1 stations
- Toho Gas 1 stations

Total : 41 Stations



Area	Now	By Mid 2015
Tokyo Area	9	14
Nagoya Area	2	7
Osaka Area	1	4
Fukuoka Area (Kyushu)	1	3
Total	13	28

Subsidy for Hydrogen stations: Local Gov

Action by Tokyo Metropolitan Government

- Conveying to the world the information on the technologies of hydrogen by taking advantage of the 2020 Summer Olympic Games in Tokyo.

(1) HRS Installation

35 stations in 2020, 80 stations in 2025

(2) Promote of FCV, FC Bus

FCV: 6,000 in 2020, 100,000 in 2025

FC Bus: over 50 by 2020

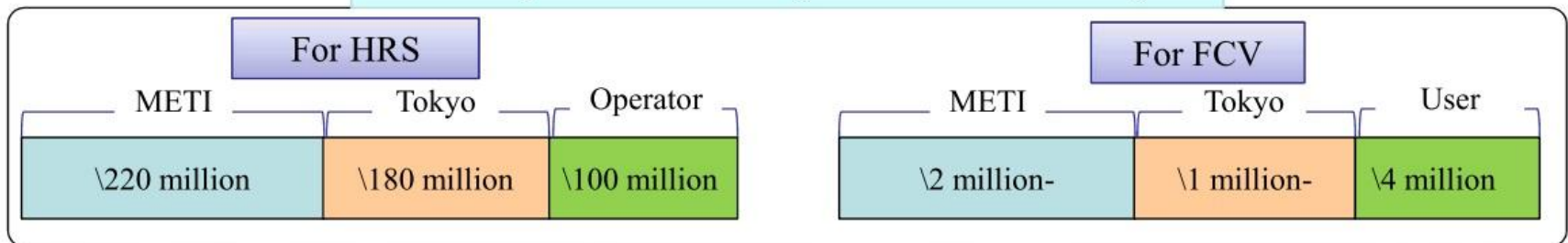
(3) Promote of micro-CHP and large-CHP

micro-CHP: 0.15 million units in 2020, 1 million units in 2030

large-CHP: market introduction in 2017

(4) Stable Hydrogen Supply / Improve of Social Acceptance

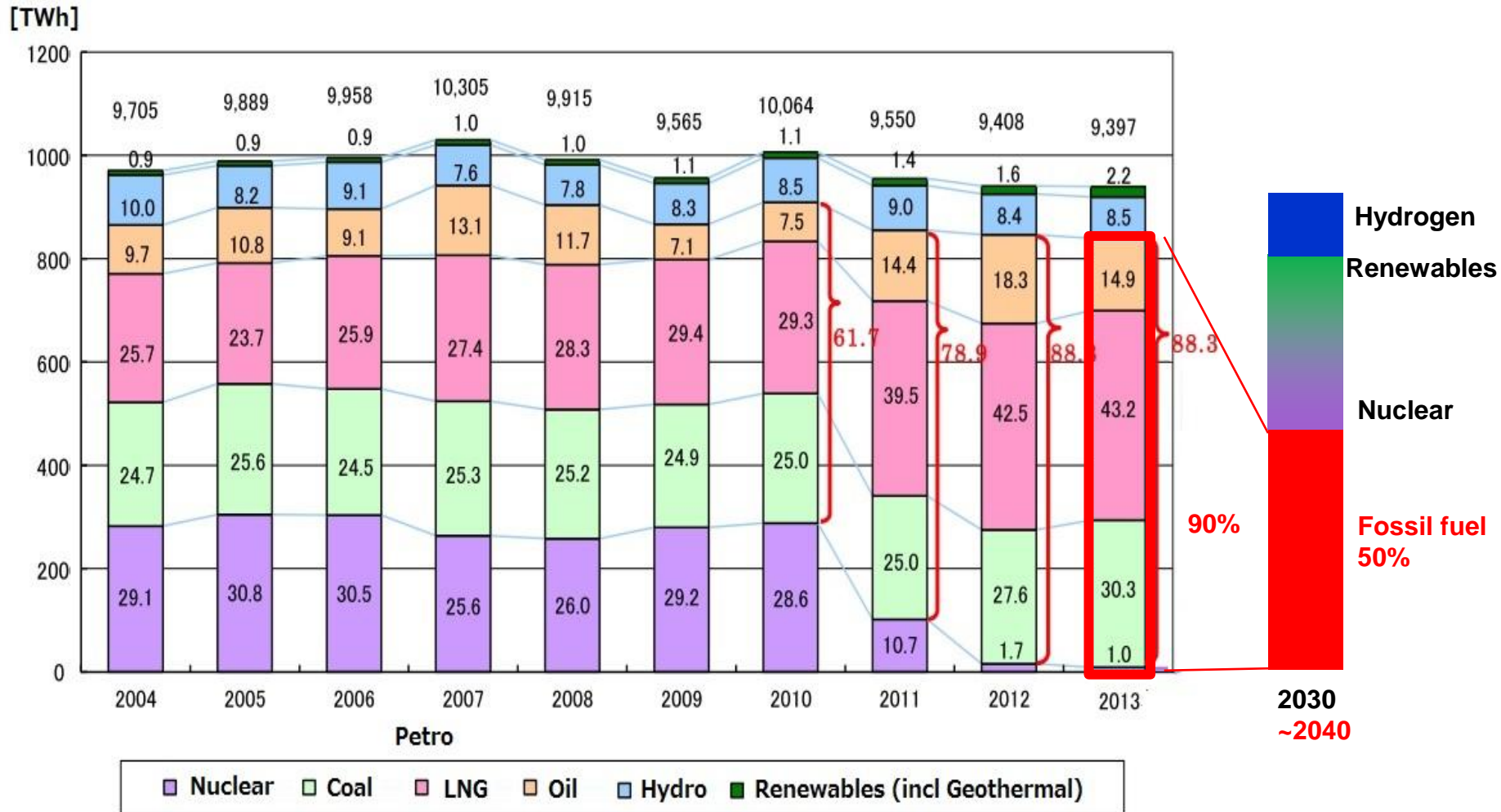
Example of Subsidies (standard model case)



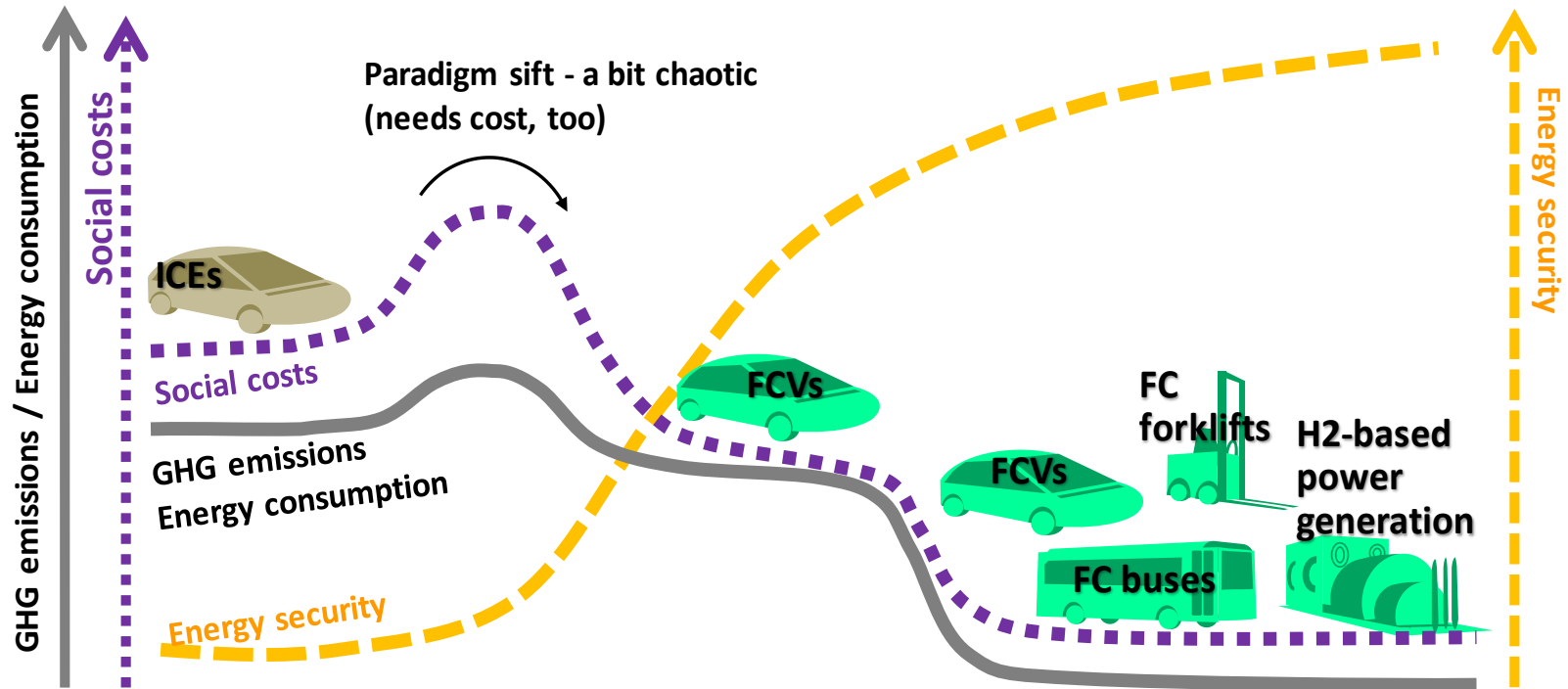
Source: METI (IPHE SC Country Update)

New target for 2030 (Hydrogen helps!)

- Hydrogen can be part of energy mix!



My vision (showing the blight future)



Today (2015)
Society, somehow optimized by oil and gas

2020-2030
Transition

2030-2040
Society, optimized by hydrogen

Hydrogen supply using existing energy infrastructure (SMR)

Introduction of CO2-free hydrogen (renewable hydrogen)

Source: Akiteru Maruta, Technova

Conclusion

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Conclusion

- ❑ Japan's energy situation:
6% of self-sufficiency rate / 90 % of fossil energy
- ❑ Currently, METI is setting the energy mix target for 2030.
- ❑ Toyota's MIRAI comes, Honda follows.
- ❑ Hydrogen stations: 100 station needed by 2015.
(now 41 are awarded)
- ❑ Hydrogen may help Japan's energy security and GHG reduction.
The introduction of CO₂-free (or renewable hydrogen) is the key.
- ❑ Show the bright future!