Japan's Approach to Commercialization of Fuel Cell / Hydrogen Technology

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Overview of Presentation

- Koizumi's Initiative and Current Topics
- Targets and Policies
- METI's Budget and its Priorities

P.M. Koizumi's Initiative

- **Test Drive by Prime Minister (December, 2001)**

- **Basic Policy Speech by Prime Minister to the Diet (February, 2002)**

> *…"The fuel cell is the key to opening the doors to a hydrogen economy. We will aim to achieve its practical use as a power source for vehicles and households within three years."…*

- **Introduction of First Commercially Released FCVs by the Government (December, 2002)**

PM's new Residence introduced the world's first commercially released FC Systems this spring.

Panasonic

Ebara-Ballard

FC technology showcase at EXPO 2005

4 Types are being Demonstrated

(1) Demonstration of FC Buses / Hydrogen Station

Fuel Cell Buses (PEFC)

Hydrogen Station (Natural Gas reforming + By-product from steel mills)

(2) Demonstration in National Government Pavilion

Electric Power supply for the pavilion

- PAFC 800kW
- MCFC 720kW
- SOFC 50kW

National Government Pavilion

Expected Targets and Policies

FCV	
2010	50,000
2020	5M
2030	15M

Stationary PEFC	
2010	2.1GW
2020	10 GW
2030	12.5 GW

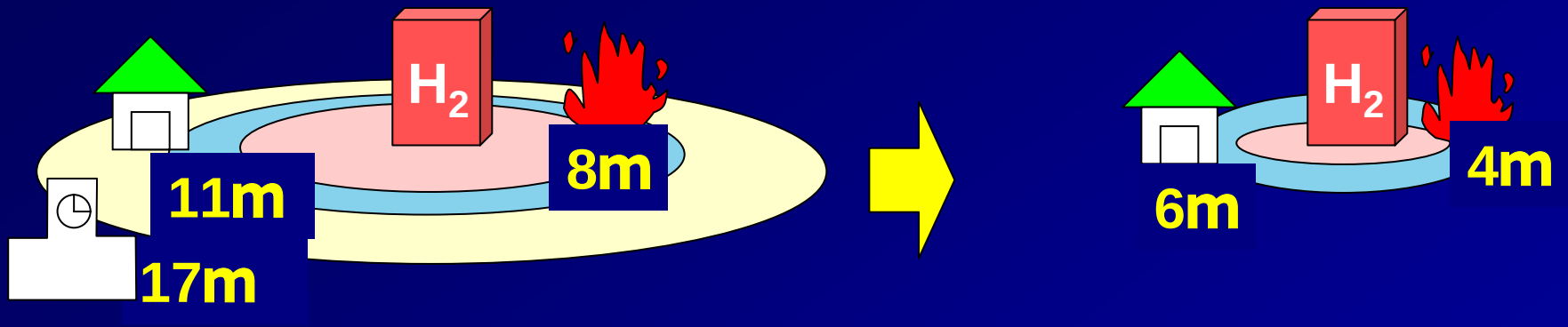
	2002 -	2005-	2010-
	R&D Stage	Introduction Stage	Diffusion Stage
Infra	Demonstration Project	Stepwise Construction	Grow Naturally
Codes	Review of Regulations		
R&D	R&D on FC and H_2	Further R&D	

Review of Regulations **(1)**

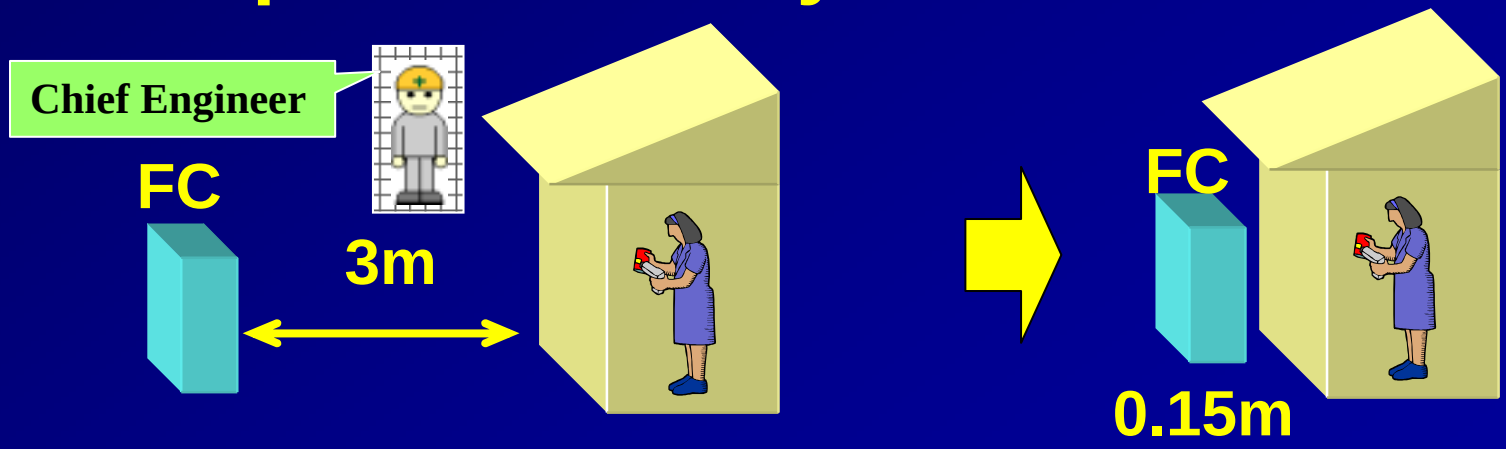
- 28 items of 6 laws
- Completed by FY2004 (Mar. 2005)
- To remove barriers to introduction of FCVs, H_2 stations and stationary fuel cells

Review of Regulations (2)

Example: Hydrogen Station



Example: Stationary Fuel Cell

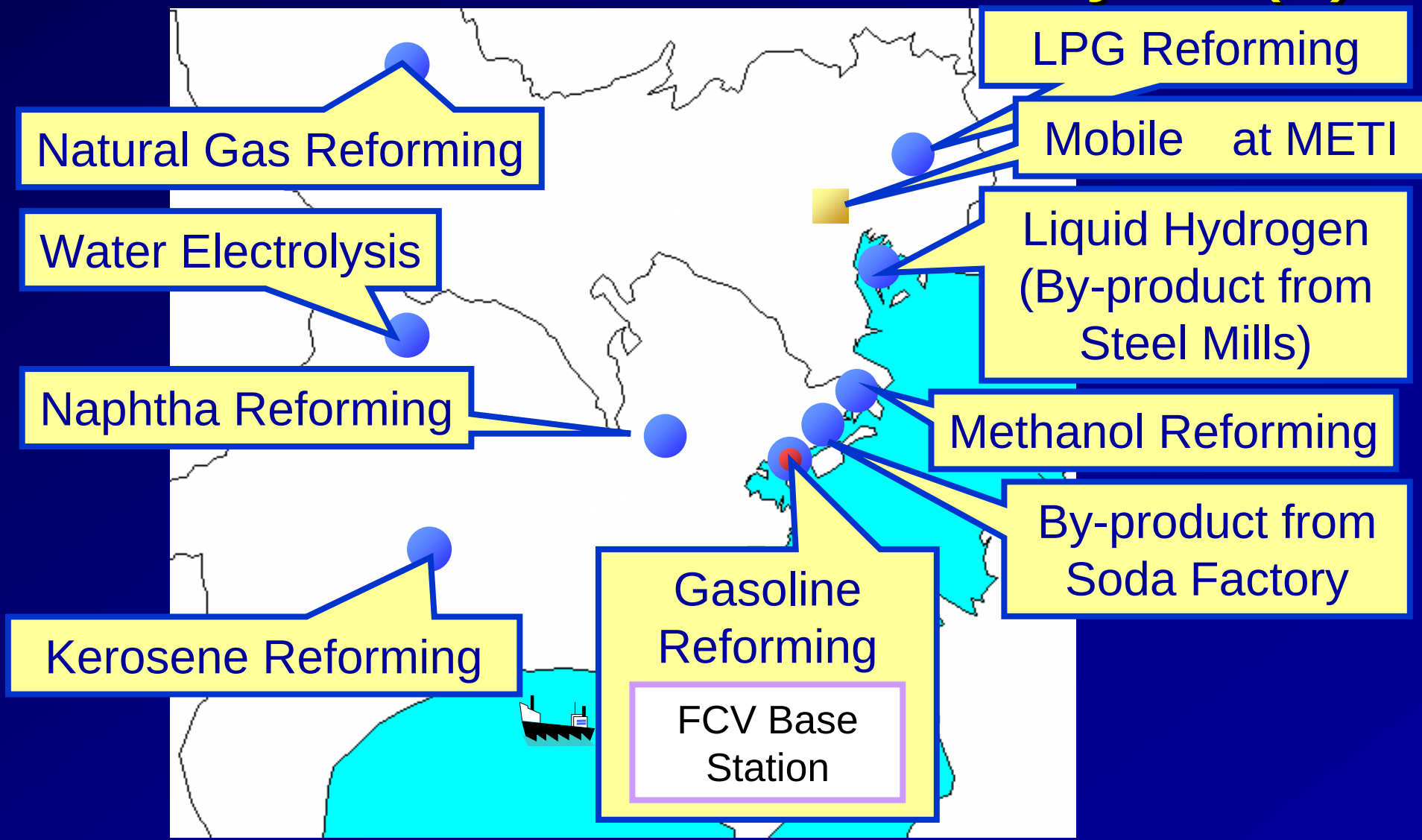


JHFC Demonstration Project (1)

Overview

- 59 FCVs (at May. 2005) from both domestic and overseas auto manufacturers
- 10 hydrogen stations with different H_2 sources
- Study on energy efficiency

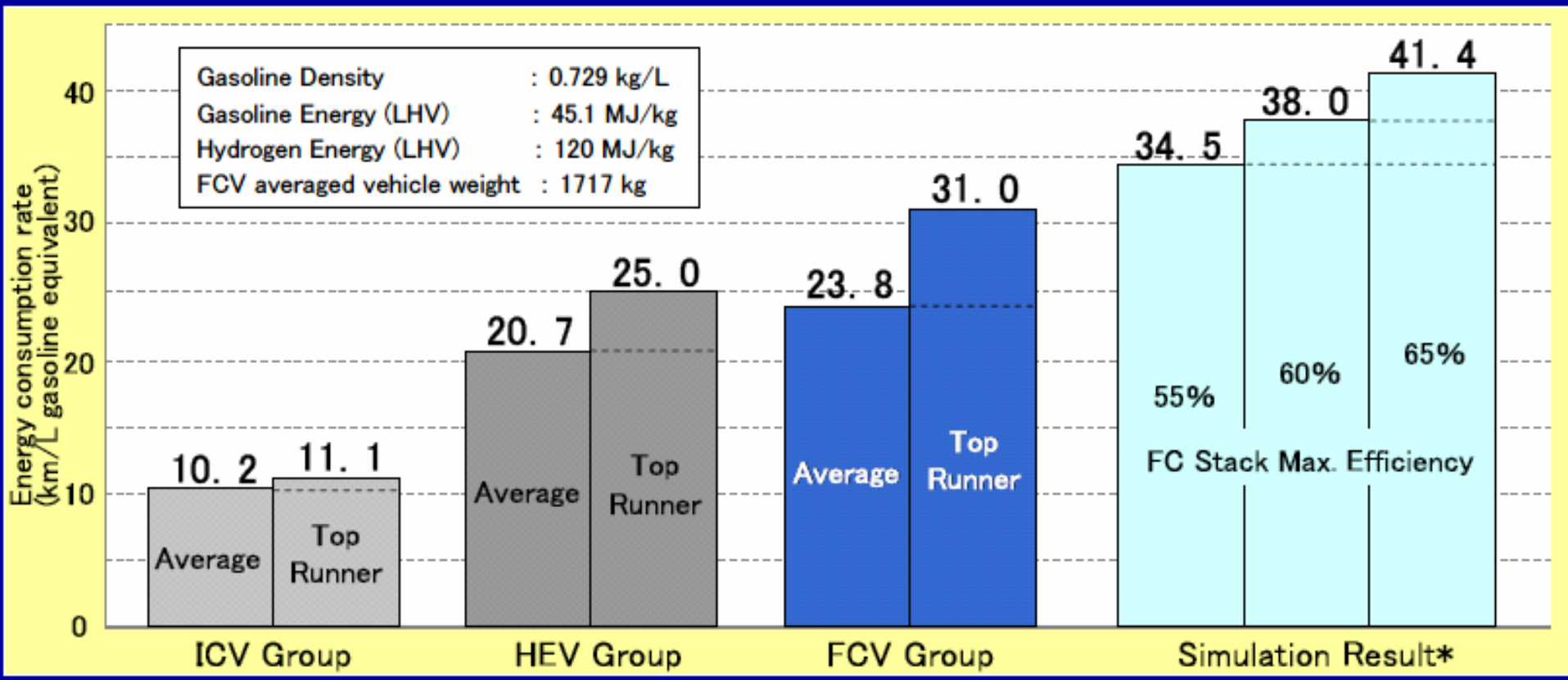
JHFC Demonstration Project (2)



JHFC Demonstration Project (3)

10-15 Mode Measurement Result

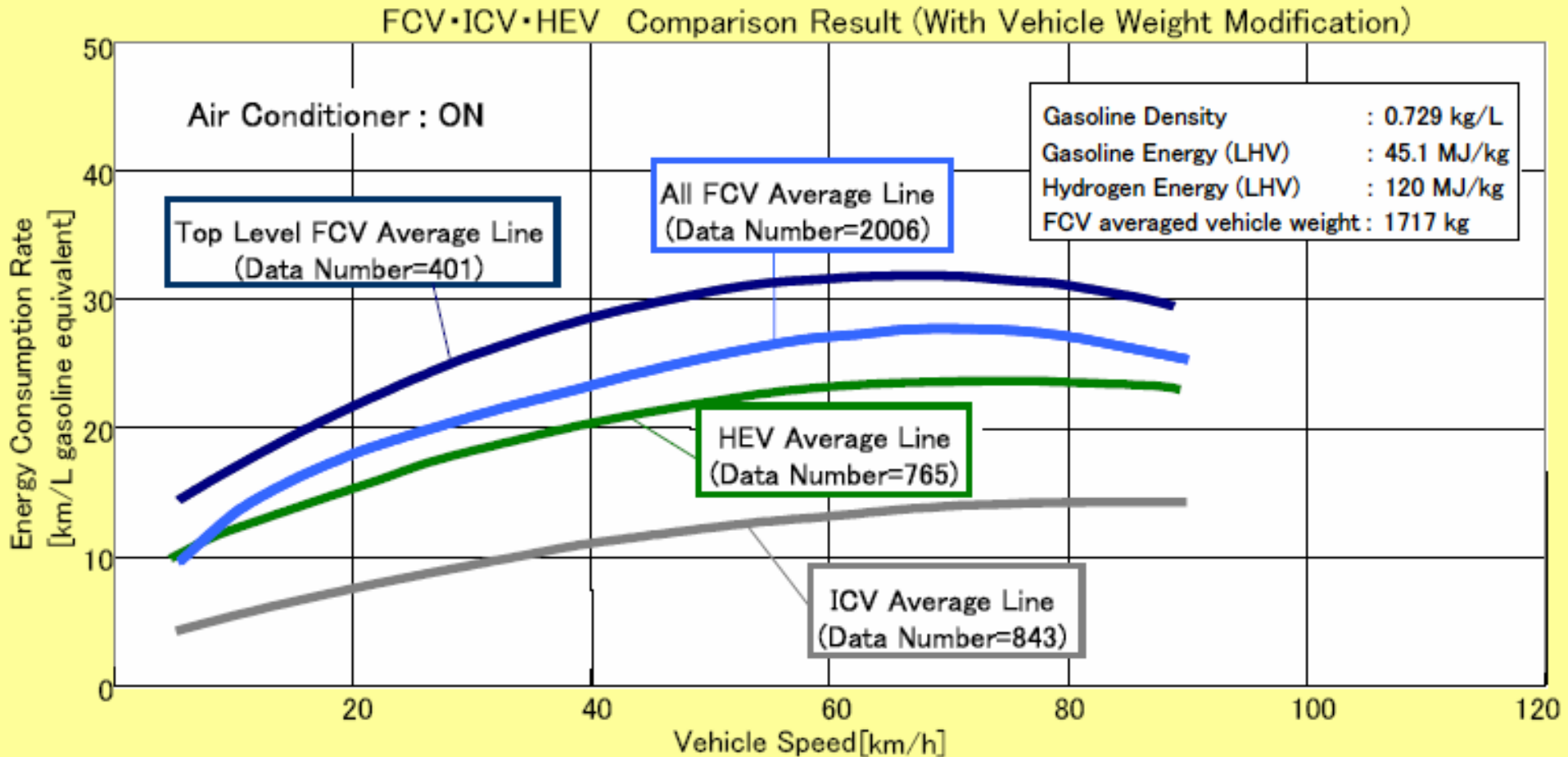
FCV indicated superior energy consumption rate per vehicle weight



JHFC Demonstration Project (4)

Analysis Result

Compared with ICV and HEV, FCV showed better energy consumption rate per vehicle weight. Top level in demonstration FCVs indicated higher performance.

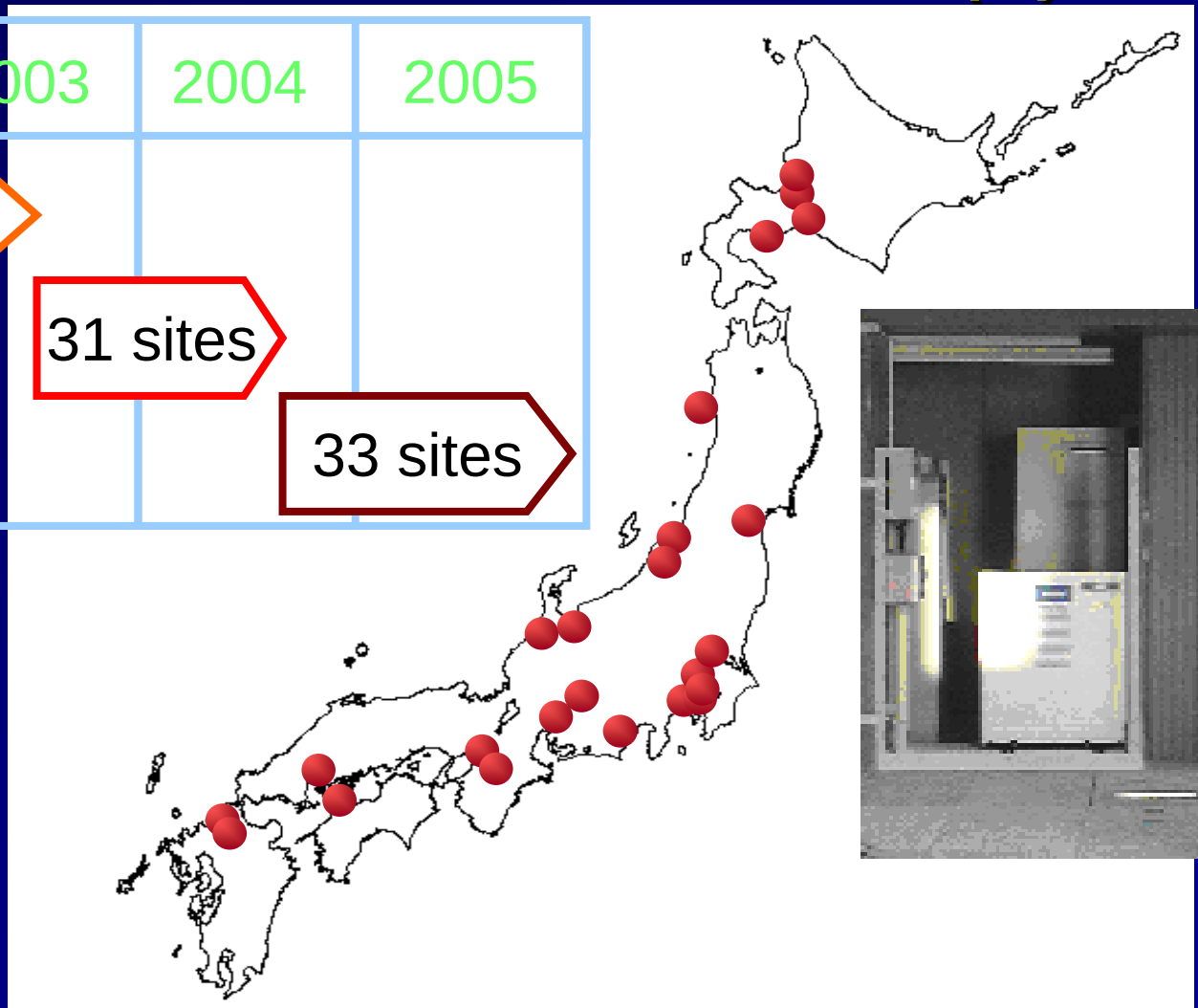


Stationary Fuel Cell Demonstration (1)

- 33 stationary PEFCs from 11 manufacturers
- Various conditions
- Various fuels (Natural Gas, LPG, Kerosene)

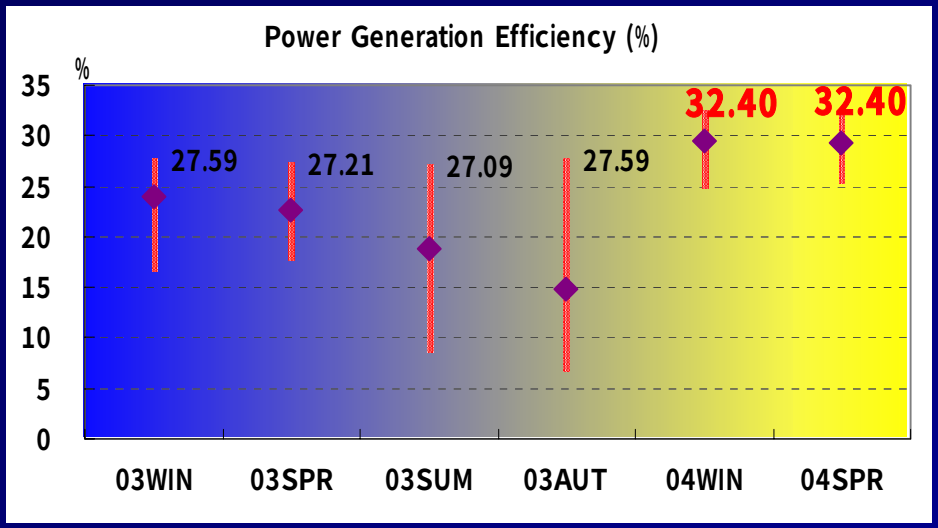
Stationary Fuel Cell Demonstration (2)

2002	2003	2004	2005
12 sites			
	31 sites		
		33 sites	

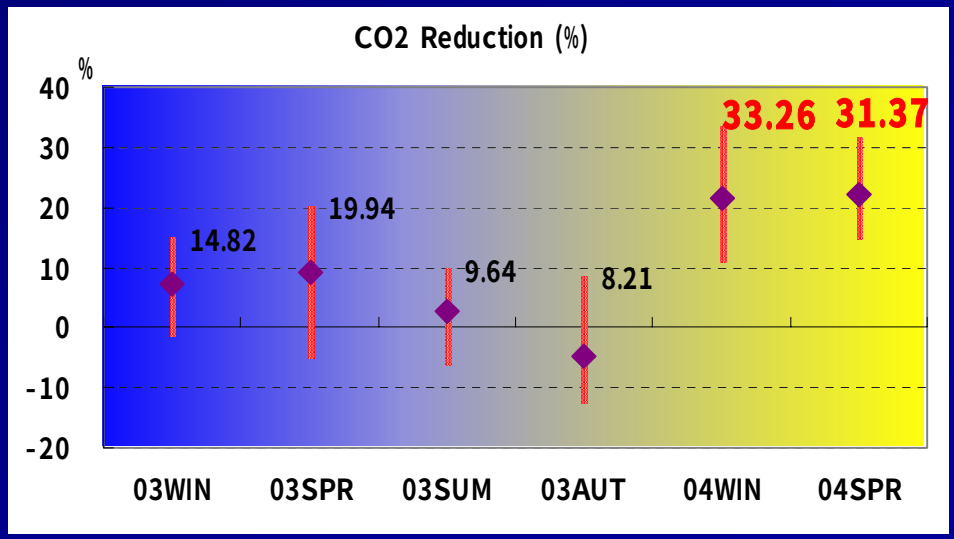


Stationary Fuel Cell Demonstration (3)

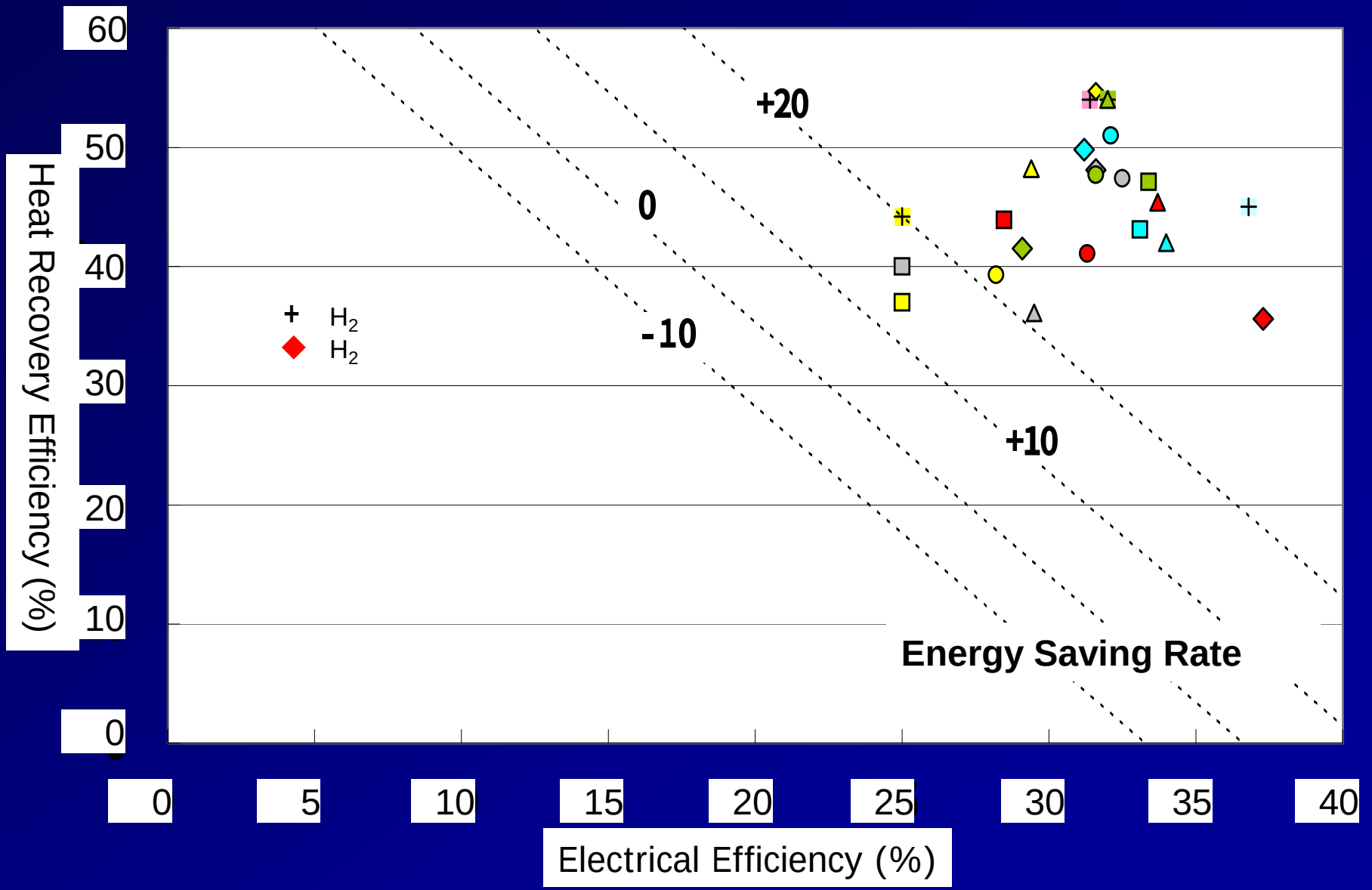
More than 32% efficiency under real conditions



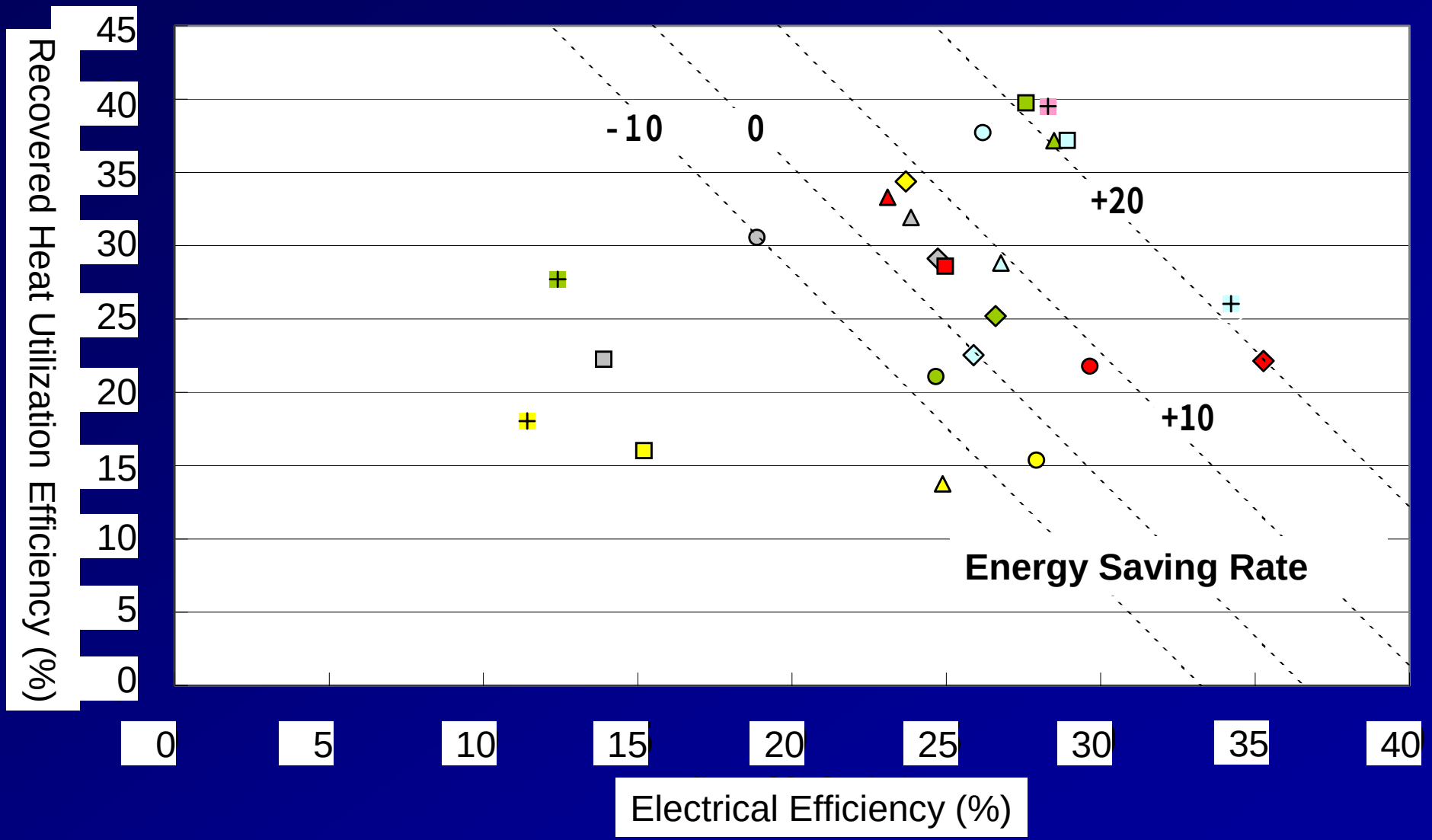
More than 30% CO2 reduction under real conditions



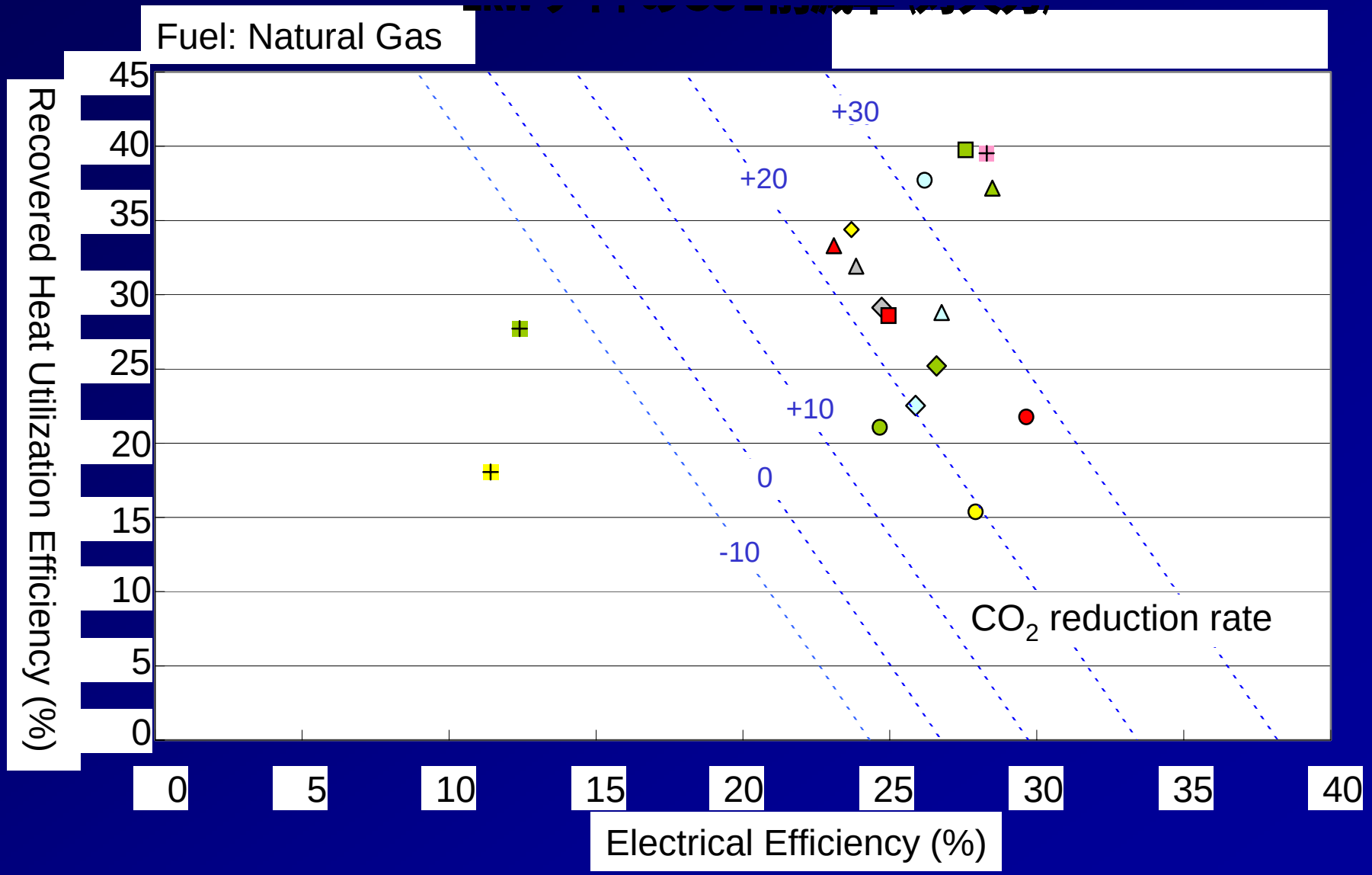
Performance of SFCs at Rated Point (1kW)



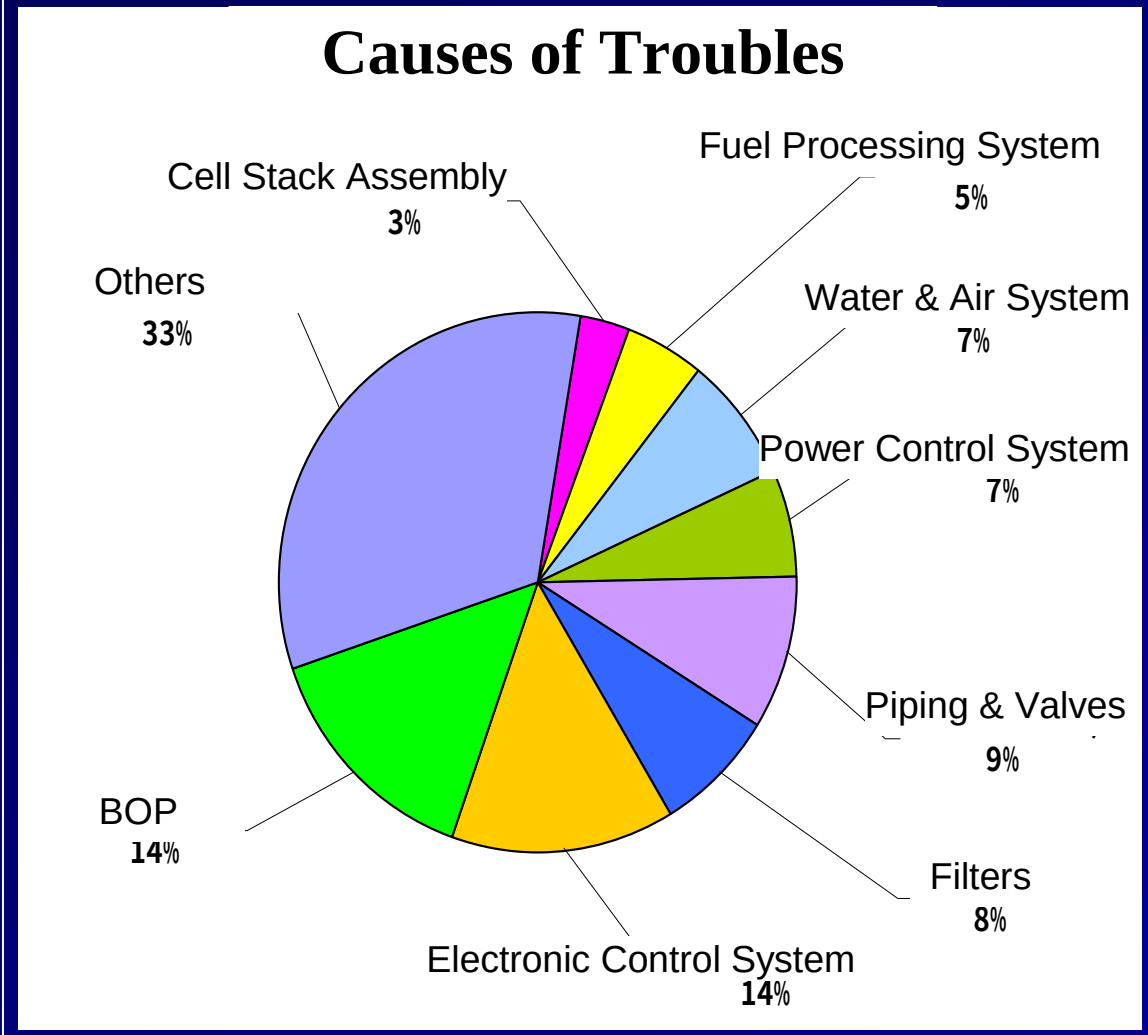
Performance of SFCs at Study Sites



CO_2 Reduction at Study sites



Encountering Troubles



Number of Troubles /site・year

	1st Stage	2nd Stage
Cell Stack Assembly	2.6	0.5
Reformer	3.4	0.8
Air & Water System	3.0	1.2

Number of Troubles encountered in the main parts has decreased.

METI Budget for Fuel Cells (1)

2001FY: 11.7

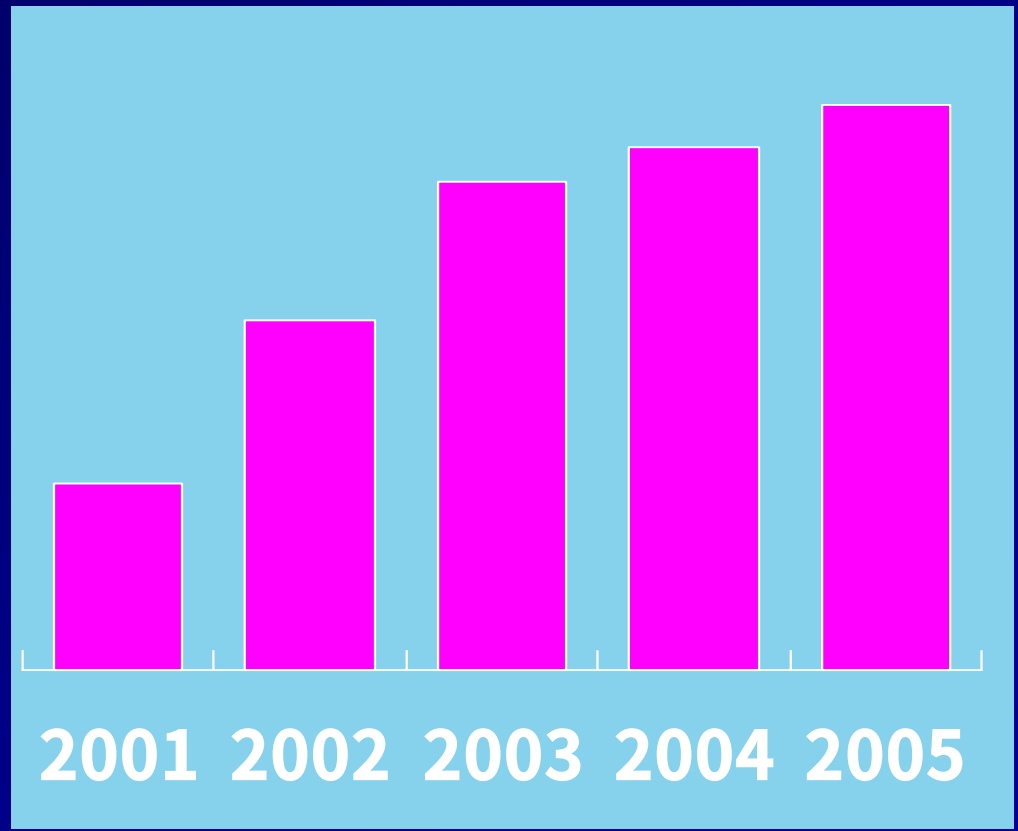
2002FY: 22.0

2003FY: 30.7

2004FY: 32.9

2005FY: 35.4

(Billion JPY)



METI Budget for Fuel Cells (2)

	2005FY
R&D on PEFC	5.5B
- Strategic R&D alliance - New	*2.0B*
"FC-cubic" New national lab. - New	*1.0B*
R&D on Hydrogen Safety	4.1B
Codes and Standards	3.6B
R&D on SOFC	3.3B
Large-scale demonstration for stationary application - New	*2.5B*
Strategic publicity - New	*0.3B*

(JPY)

International R&D Cooperation

- METI/NEDO started a **new international joint R&D grant program** up to 300,000 USD per each team.
- 11 joint research activities were adopted last year.
- Diverse foreign partners from 8 counties: Université du Québec, National Research Council Canada (Canada), Chinese Academy of Science (China), Université Bordeaux 1 (France) , National University of Singapore (Singapore) , University of Fribourg (Switzerland) , Institute for Energy Technology (Norway) , Boreskov Institute of Catalysis - Russian Academy of Sciences (Russia) , Applied Nanotech, Inc., Battelle Memorial Institute, Naval Research Laboratory, SRI International (US)

A New National Lab. for basic FC R&D

Polymer Electrolyte Fuel Cell Cutting-Edge Research Center

(FC^3 = FC-cubic)

METI

AIST Depts.

1 Billion Yen

(FY 2005)

FC3 was established on April 1 2005.

Close collaboration

Industries, Public, Academia

Basic Scientific Knowledge

↓

Open Innovation

Creation of real market for stationary FC

Target system cost is c. 500,000 yen (=5,000USD)/1kW.
Mass production drastically reduces the cost.
Joint R&D and other measures help us to reach the target.
To achieve the goal in three years, Japan:

①Started large-scale demonstration program (c. 400units) in order to urge "kaizen" (improvement) and assure a learning curve to design a mass-production system.

②Started a joint R&D team consisting of "top runners" in order to research and resolve degradation factors.

③Started research to find ways to secure harmonized specifications or compatibilities of modules in order to achieve further cost reduction and self-inducting "evolution" of modules .

Thank you very much for your attention!

More Information….

- METI:http://www.meti.go.jp/english/index.html
- FCCJ: http://fccj.jp/index_e.html
- JHFC: http://www.jhfc.jp/e/index.html
- NEDO: http://www.nedo.go.jp/english/index.html
- ENAA: http://www.enaa.or.jp/EN/index.html