

Feb.17, 2011
DOE Hydrogen and Fuel Cell Technical Advisory Committee
Arlington, VA

Development of fuel cell at JX

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The Future of Energy, Resources and Materials

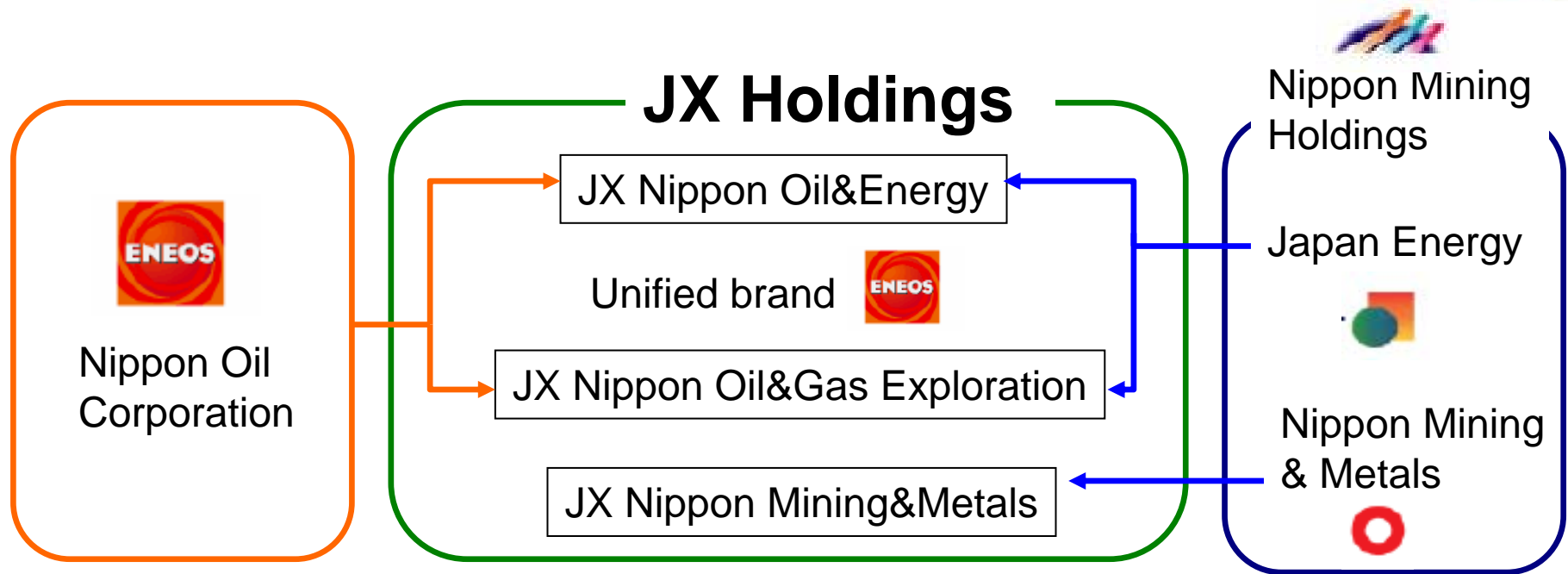
JX Nippon Oil & Energy Corporation

- 1. JX Holdings company briefing**
- 2. Why residential fuel cells developed**
- 3. Large scale demonstration project in Japan**
- 4. Commercialization of residential fuel cells in Japan**
- 5. Challenges in residential fuel cells**
- 6. Toward future Low Carbon Society**



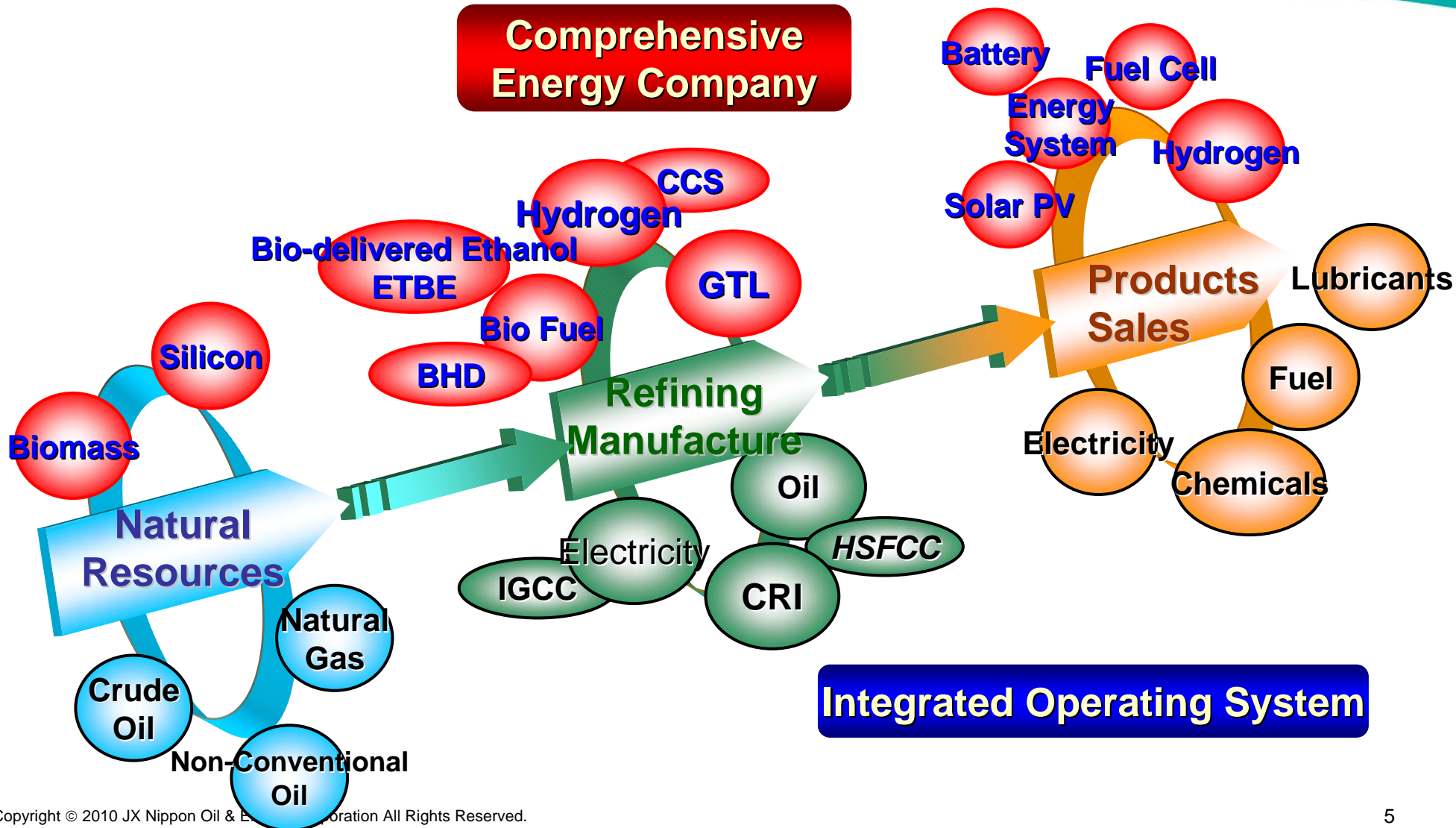
1. JX holdings company briefing

JX Group Establishment, April 2010



2010FY Financial Performance	Annual sales: \$97 Billion Profit: \$2 Billion
Employee	18,000

JX's Comprehensive Energy Strategy

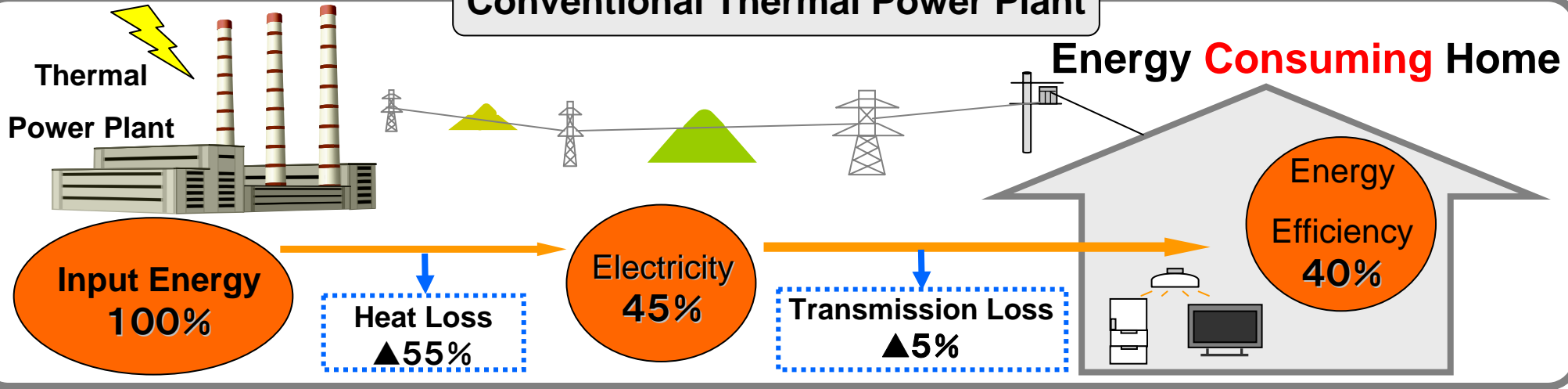


2. Why residential fuel cells developed ?

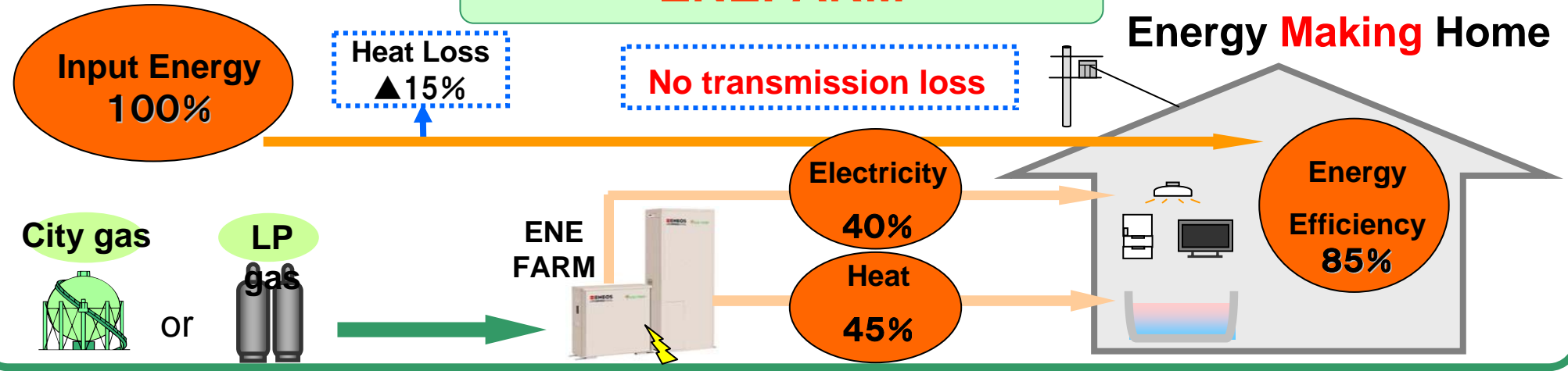
Higher Energy Efficiency of Fuel Cell



Conventional Thermal Power Plant



ENE FARM



CO₂ reduction by residential Fuel Cell in Japan



CO₂ reduction through various kinds of energy saving activities

(Source: The Energy Conservation Center, Japan)

-1200
kg/year

-58
kg/year



LED bulb

-40
kg/year



Idling stop

-35
kg/year



28°C set for
Air Conditioner

-30
kg/year



1min/day
reduction
for shower usage

-10
kg/year



1hr/day
reduction
for TV watching

Fuel cell
for home use

ENEFARM

3. Large Scale Demonstration project in Japan

Large Scale Demonstration Project(2005-8) & Hydrogen Town



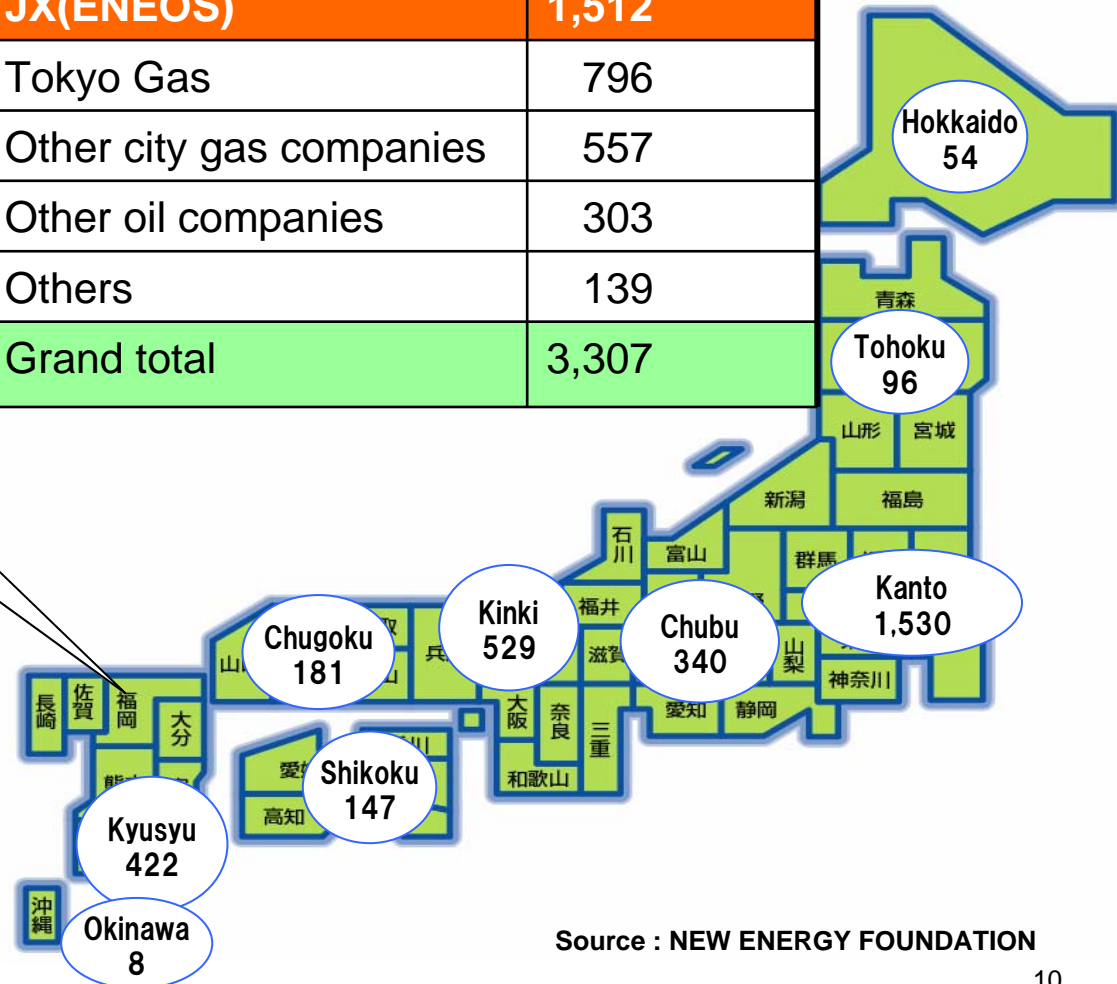
< Fukuoka Hydrogen Town > World's first model city for hydrogen energy



**Intensive installation of
150 ENE FARMs by JX**

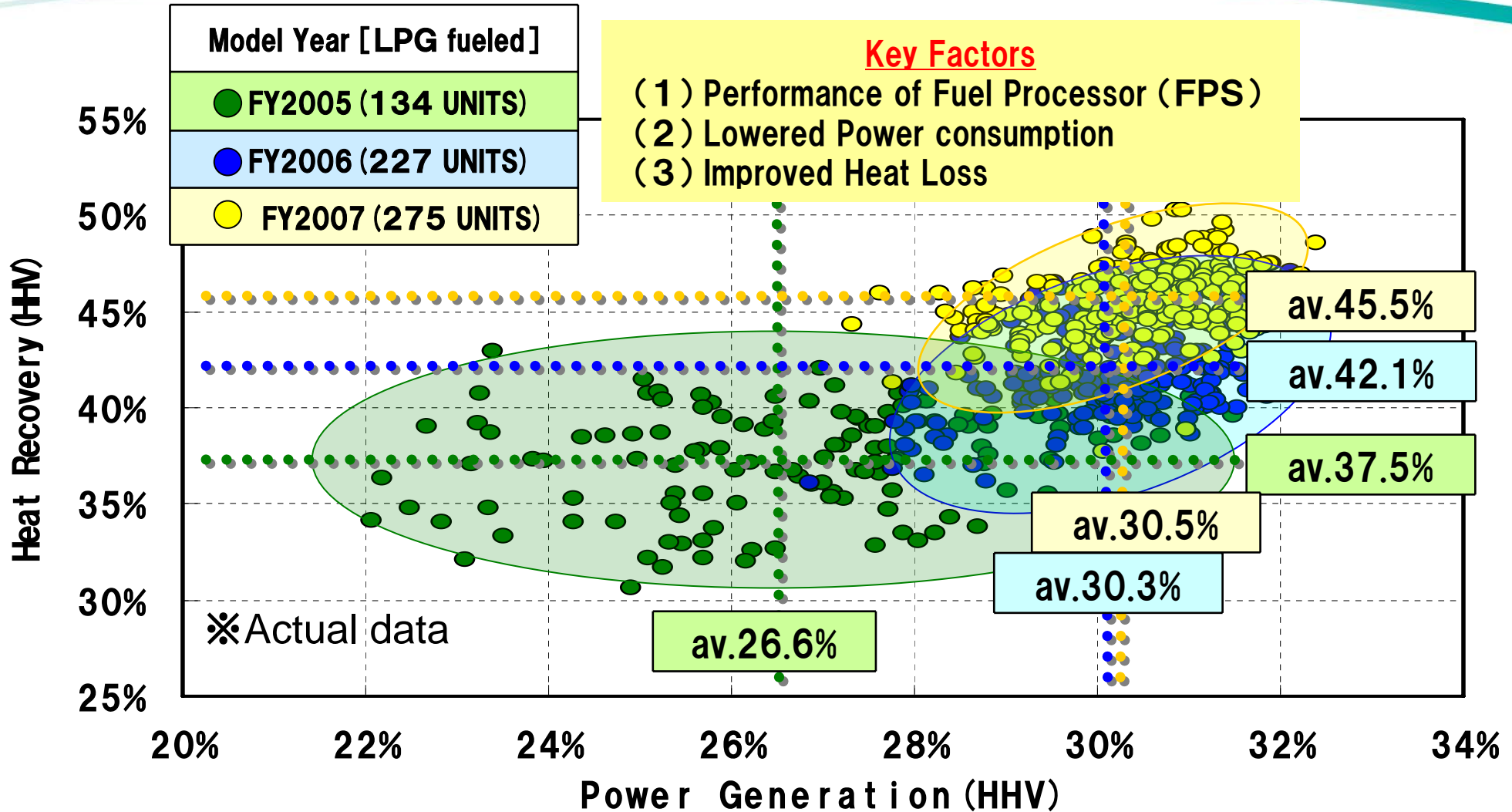
Installation number of Fuel Cell Systems

Energy Supplier	Total
JX(ENEOS)	1,512
Tokyo Gas	796
Other city gas companies	557
Other oil companies	303
Others	139
Grand total	3,307



Source : NEW ENERGY FOUNDATION

Improved performance at the Project



4. Commercialization of residential fuel cells in Japan

「ENE・FARM」 and its potential market



FY2009 Model

ENERGY + FARM

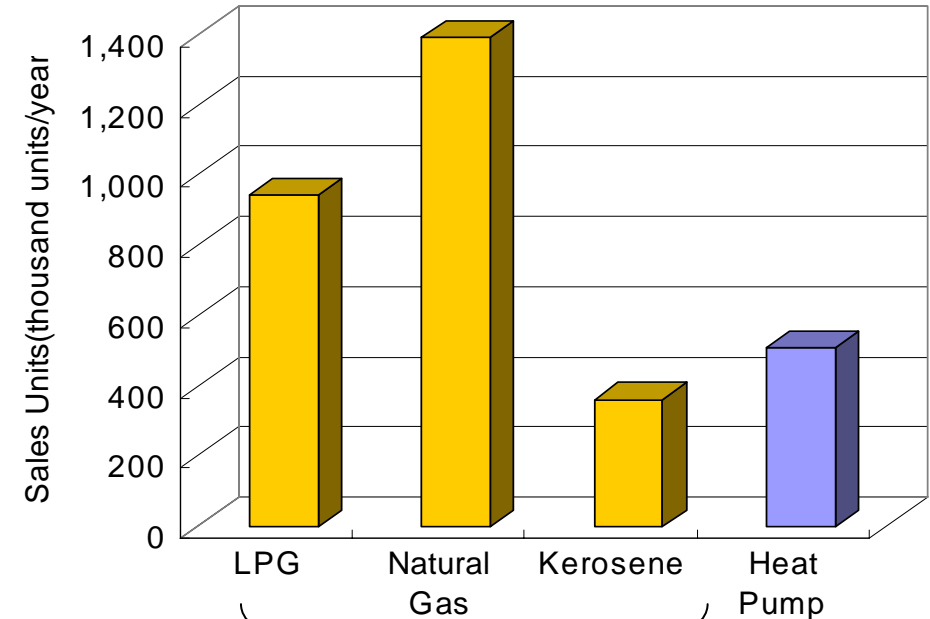


Energy farm at home

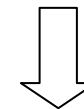


Basic Features	Rated Output	750W
	Power Generation	35%(LHV)
	Heat Recovery	50%(LHV)
Generation Unit	Size	280L
	Fuel	Natural Gas, LPG
Hot Water Unit	Tank Capacity	200L

Domestic boiler sales in 2009 in Japan

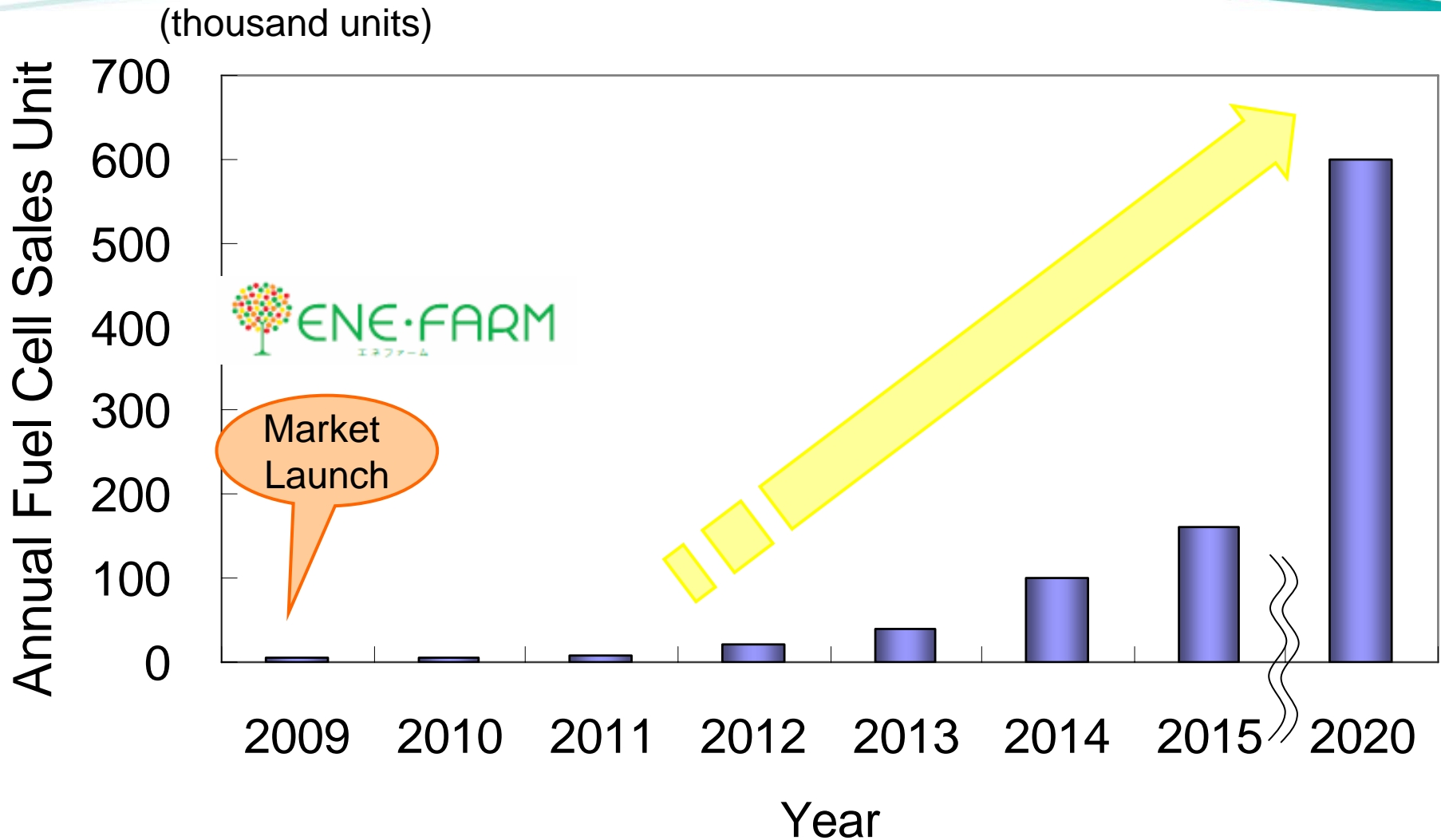


Potential market



**\$5,000/unit × 2.7million
=\$13.5billion**

Market prediction for ENEFARM in Japan



(Source: JX's estimates)

5. Challenges in residential fuel cells

Technical Challenges at ENEFARM



Novel Material

System Flow

Low Temp. Catalyst

Current Status

- 1. Price : ca. \$30,000
- 2. Duration : 40,000 hr
- 3. Reliability : Failure rate <10%/yr
- 4. Power Generation : 35%(LHV)
- Total Efficiency : 85%(LHV)

Improvement
In
Performance

Required Spec. (FY2015)

- 1. Price : < \$5,000
- 2. Duration : >10 year
- 3. Reliability : Failure rate <1%/yr
- 4. Power Generation : 35%(LHV)
- Total Efficiency : 85%(LHV)

Improvement of reliability

Quality Control

Simplification of System

Cost
reduction

Mass production

Less parts

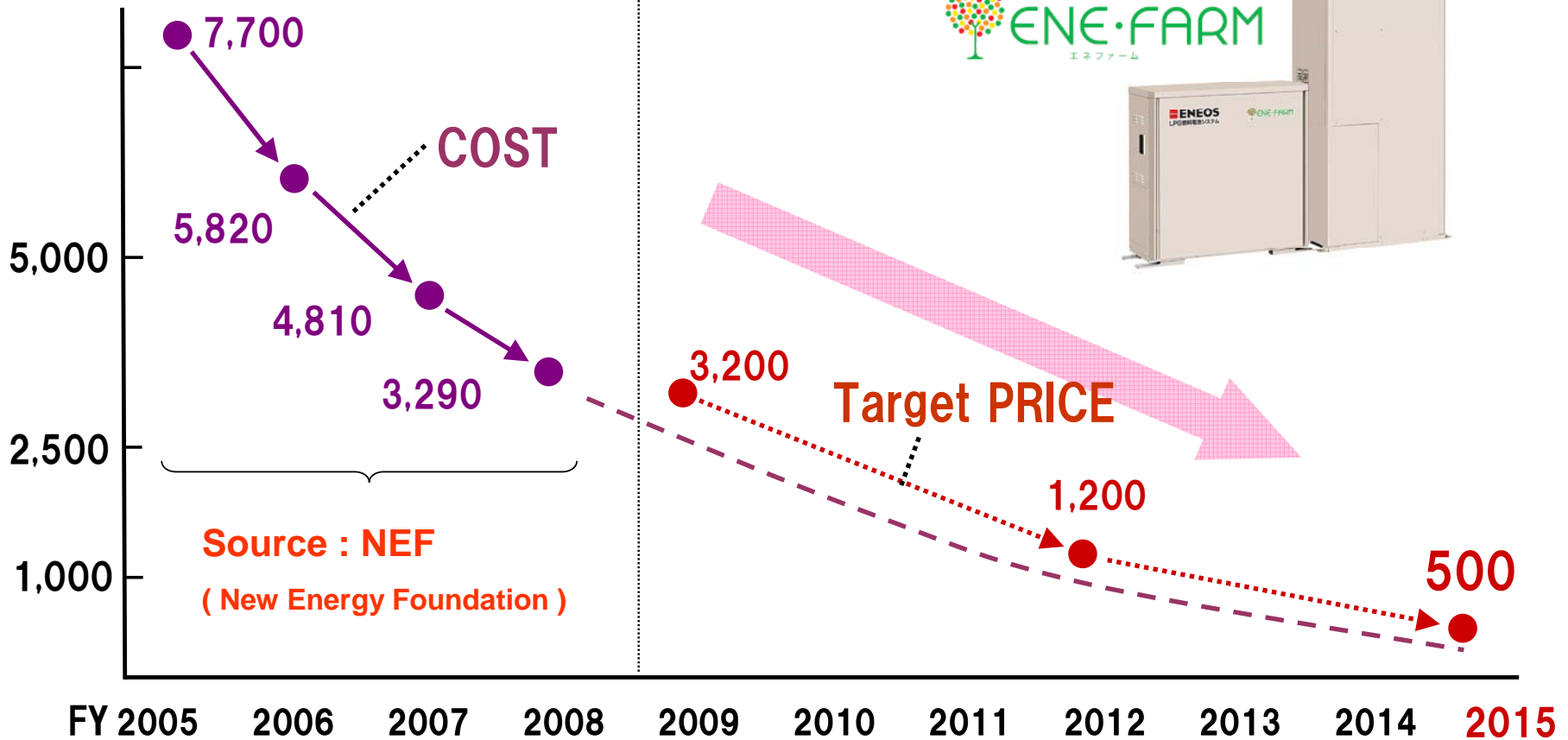
Cost Reduction Target of ENE-FARM



Large Scale Demonstration

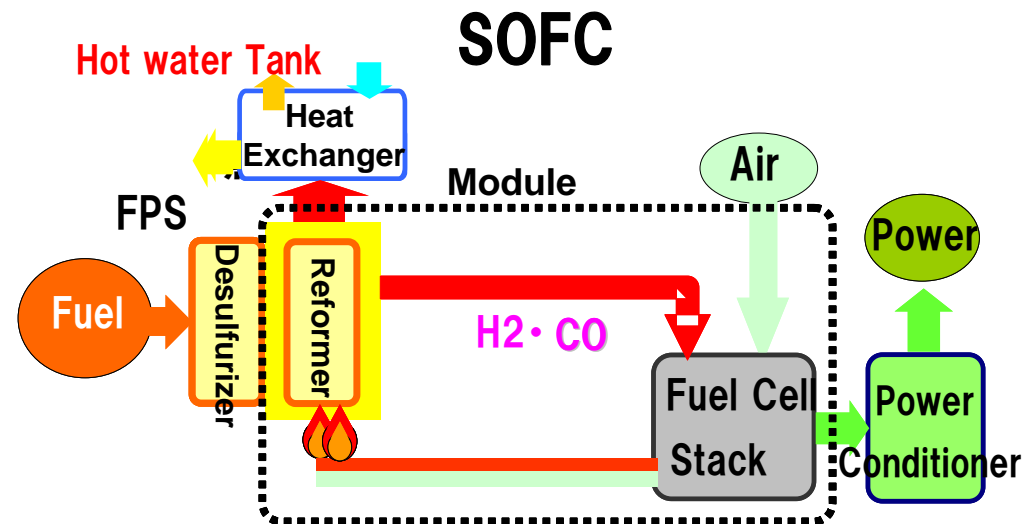
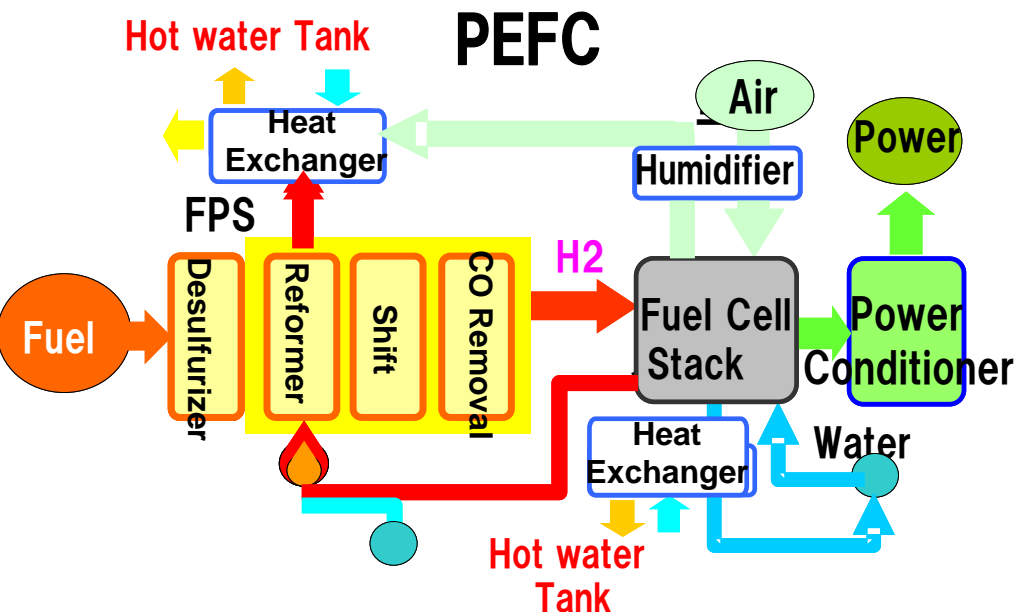
Commercialization

(× 1,000 JPY/Unit)



Characteristics of Solid Oxide Fuel Cell (SOFC)

	PEFC	SOFC
Operating Temp.	About 80°C	About 750°C
Power generation efficiency (LHV)	36%	45%
Fuel	H ₂	H ₂ , CO
Operation	Daily Start up&Shut down	Continuous
Size(1kW Class)	280L(09FY Model)	150L(09FY Model)





6. Toward future Low Carbon Society

Energy network of Low carbon society

