



# **Current Status of Stationary Fuel Cell Demonstration Study in Japan**

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**NEW ENERGY FOUNDATION  
JAPAN**

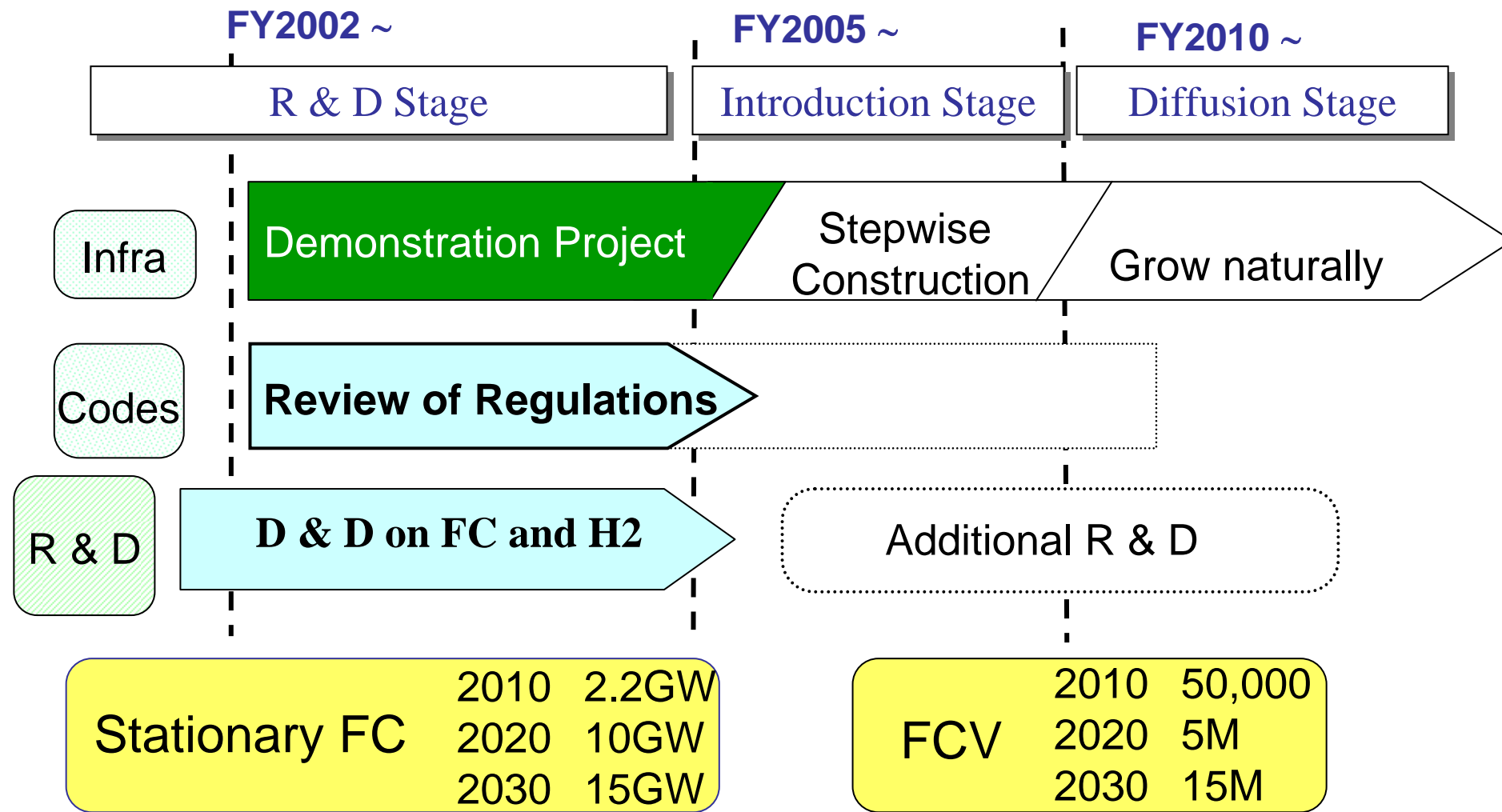


# Significance of Introducing Fuel Cells

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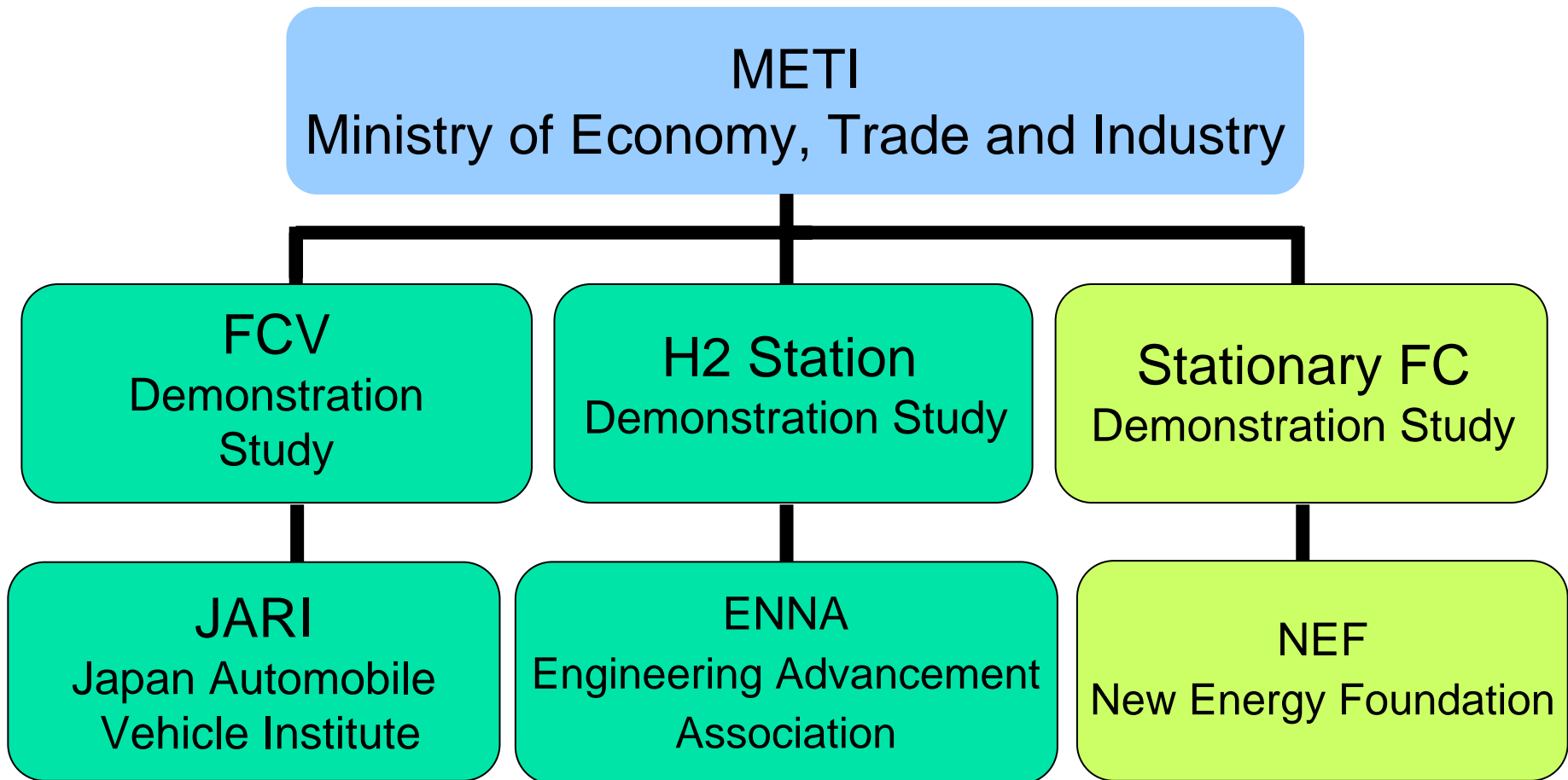
1. Energy Conservation Effect
2. Reducing Impact on Environment
3. Diversification of Energy Supply
4. Distributed Energy Resources
5. Creation of New Industry and Jobs & Enhancement of Industrial Competitiveness

# Policies and Target





# FC Demonstration Scheme



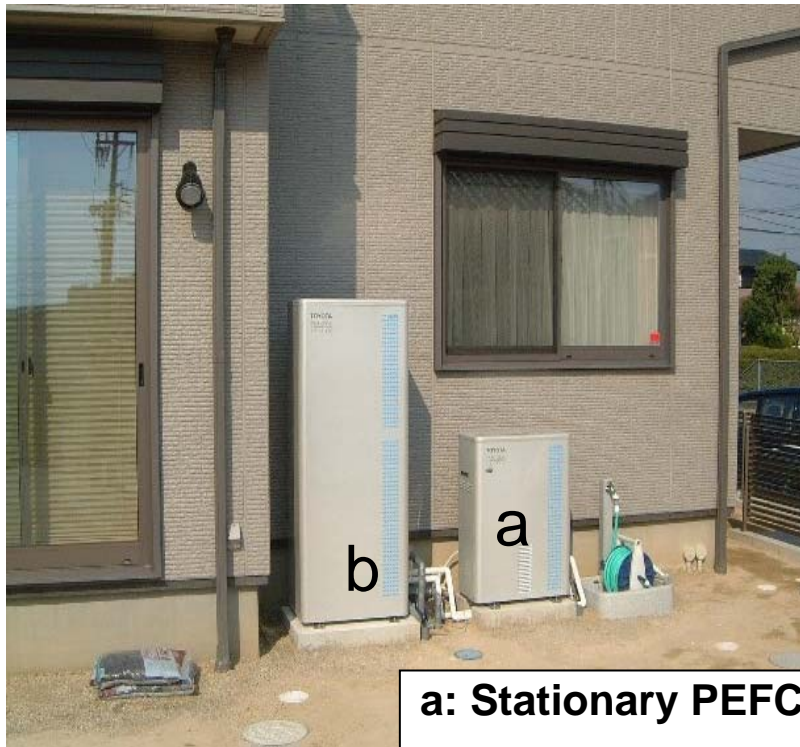


# Purposes of Stationary FC Demonstration Study

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1. To verify the performance of stationary FCs under a variety of actual usage conditions
2. To verify the effect of the grid connection of SFCs on the utility grid

# Stationary FC Specifications



**a: Stationary PEFC**  
**b: Hot Well Tank**

View of A Demonstration Study Site

## Requirements

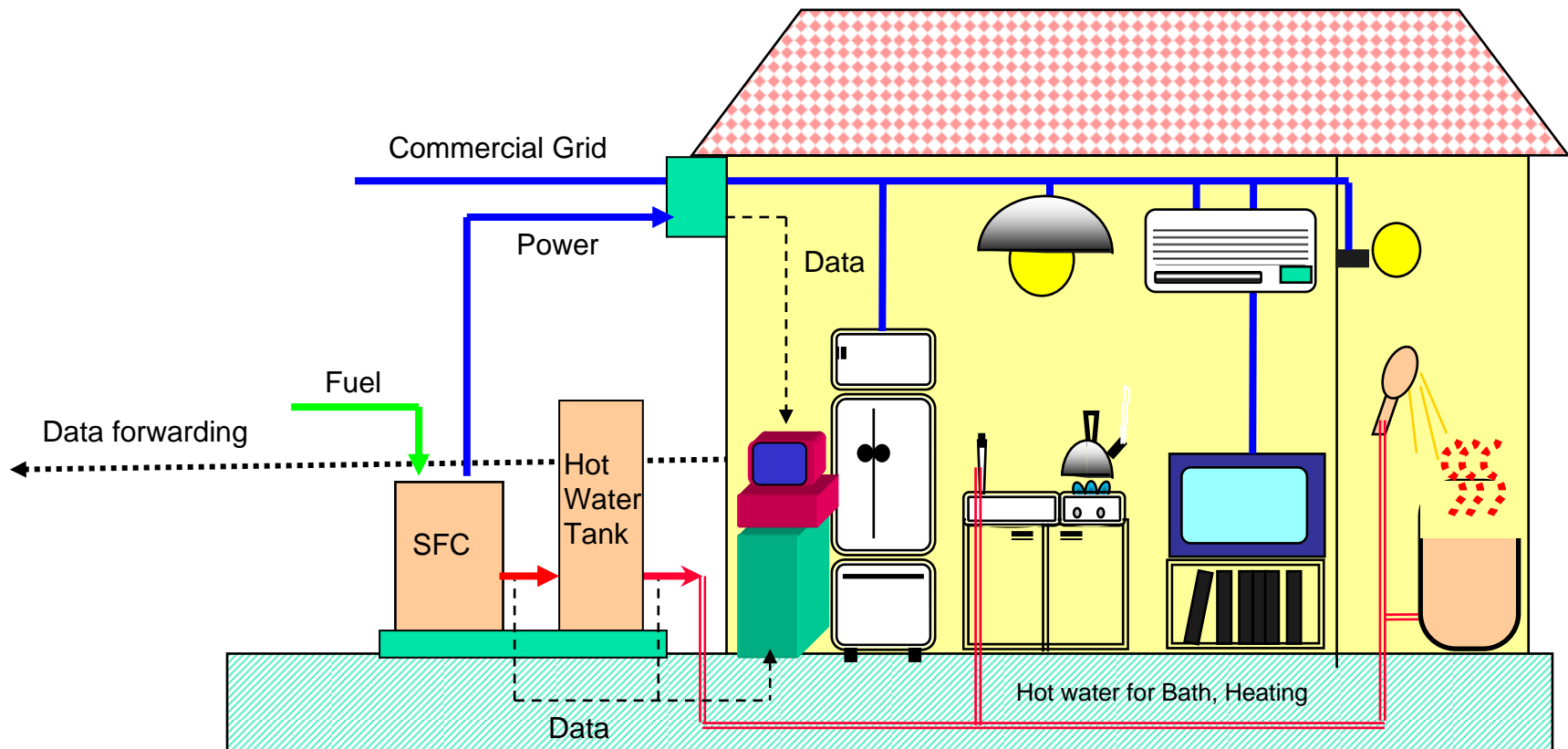
1. Cogeneration system with various fuels and outputs
2. Grid connection capability
3. Back-up hot water supply
4. Easy operability same as air conditioning unit

## Specifications

- Elec. Efficiency > 25% HHV
- Total Efficiency > 60% HHV
- Heat recovery > 55°C

# Stationary Fuel Cell Demonstration Study

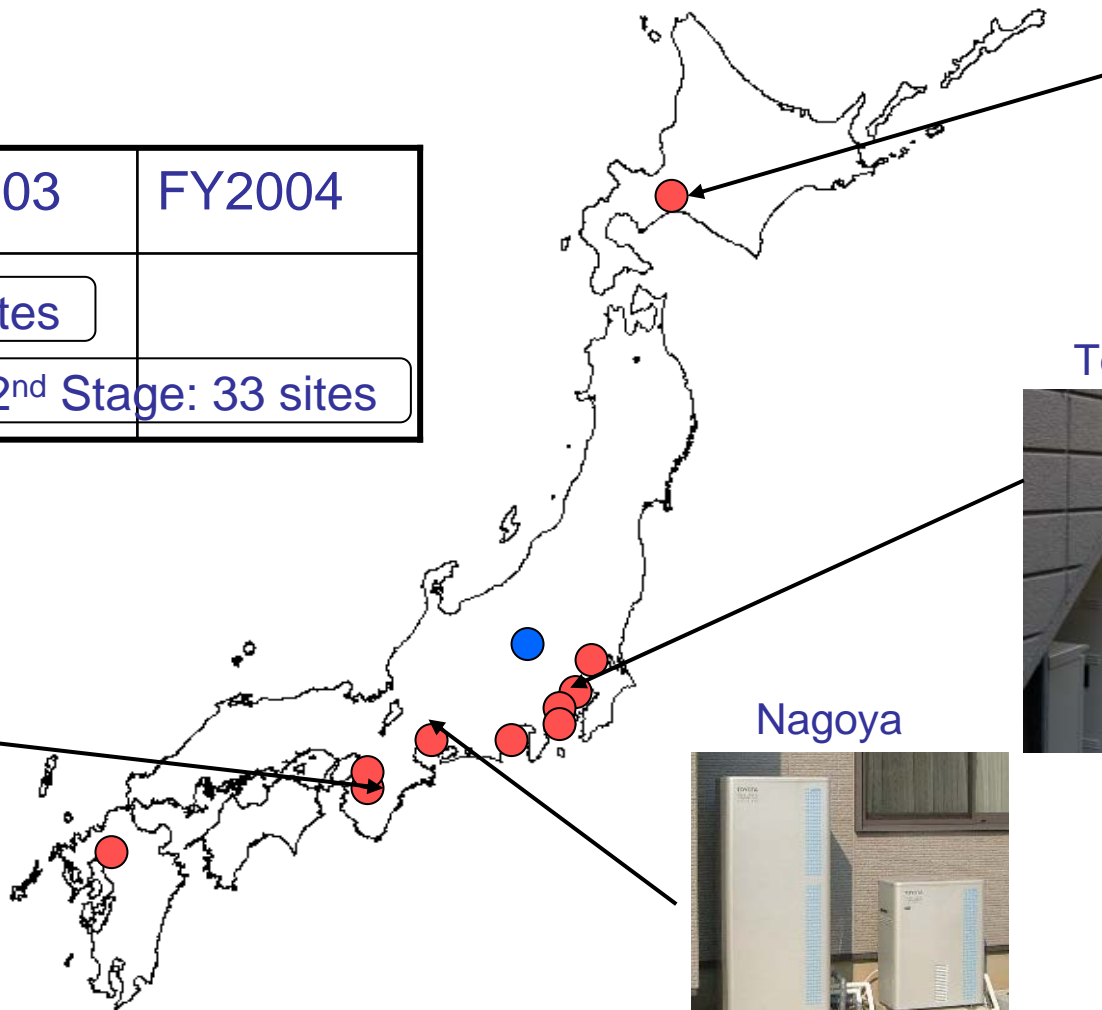
## Demonstration study Site





# The 1<sup>st</sup> Stage Stationary FC Demonstration Study

FY2002	FY2003	FY2004
1 <sup>st</sup> Stage: 12 sites		
	2 <sup>nd</sup> Stage: 33 sites	



Sapporo



Tokyo



Osaka

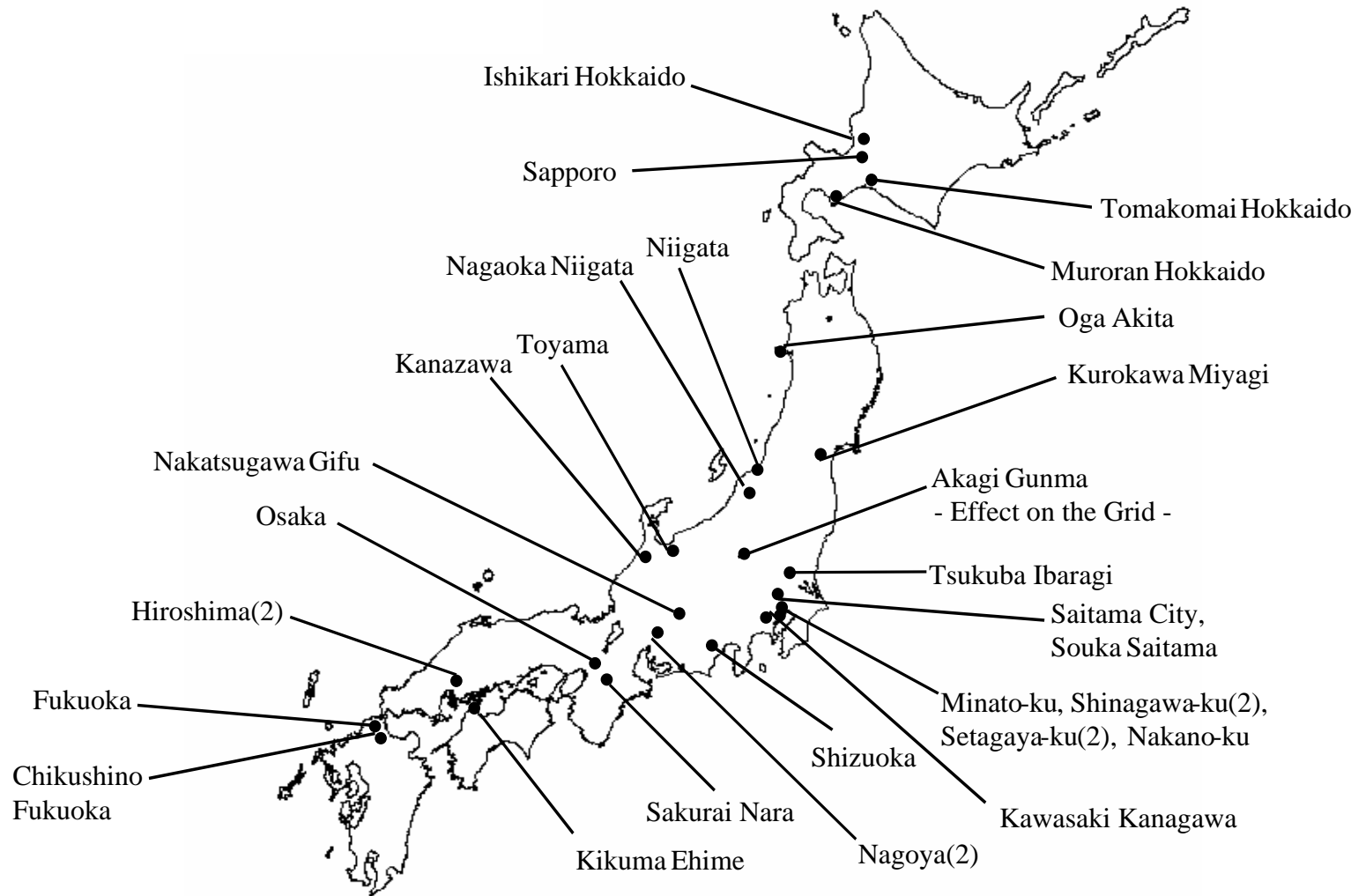


Nagoya





# The 2<sup>nd</sup> Stage Stationary FC Demonstration Study



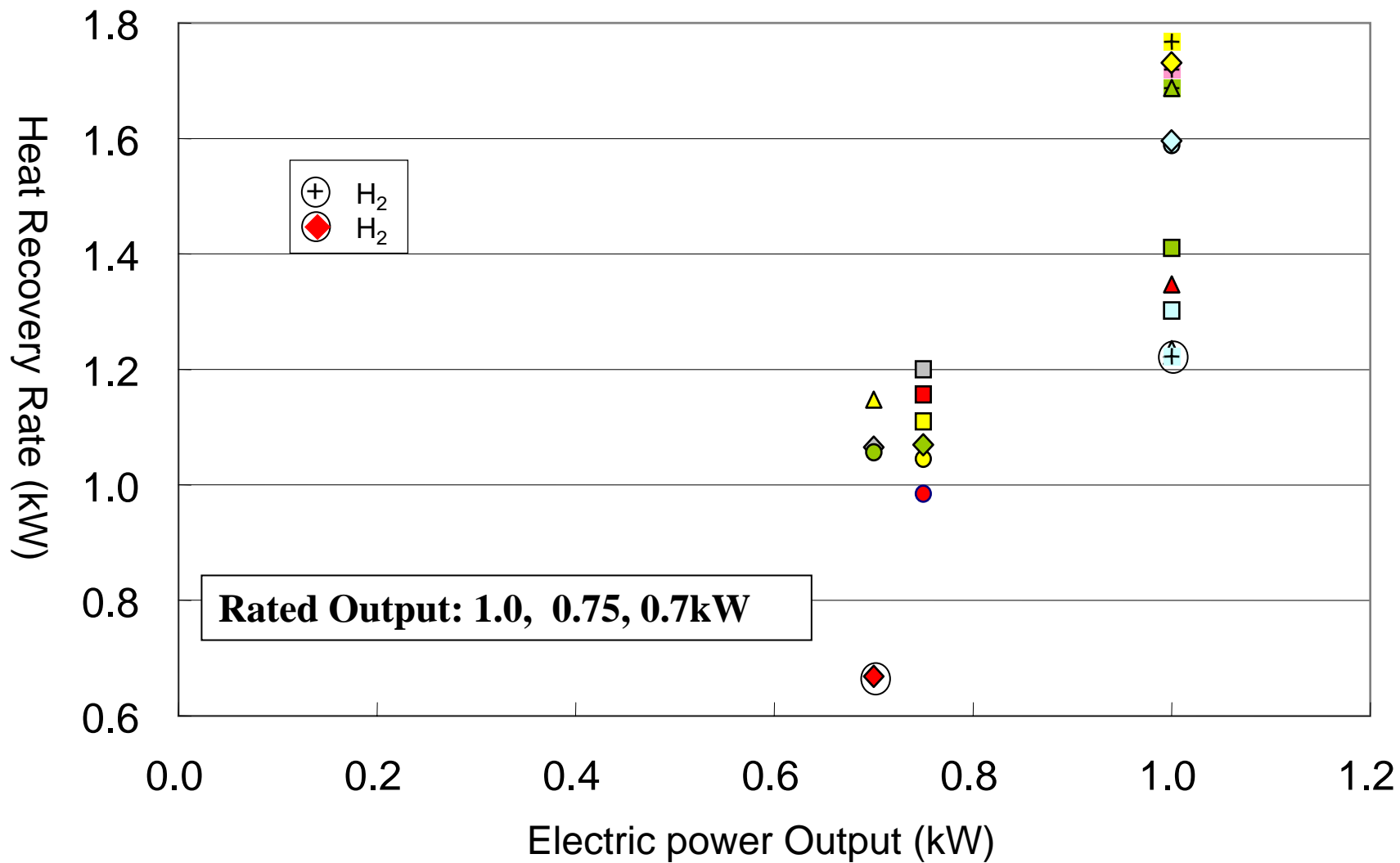


# The 2<sup>nd</sup> Stage Stationary FC Demonstration Study

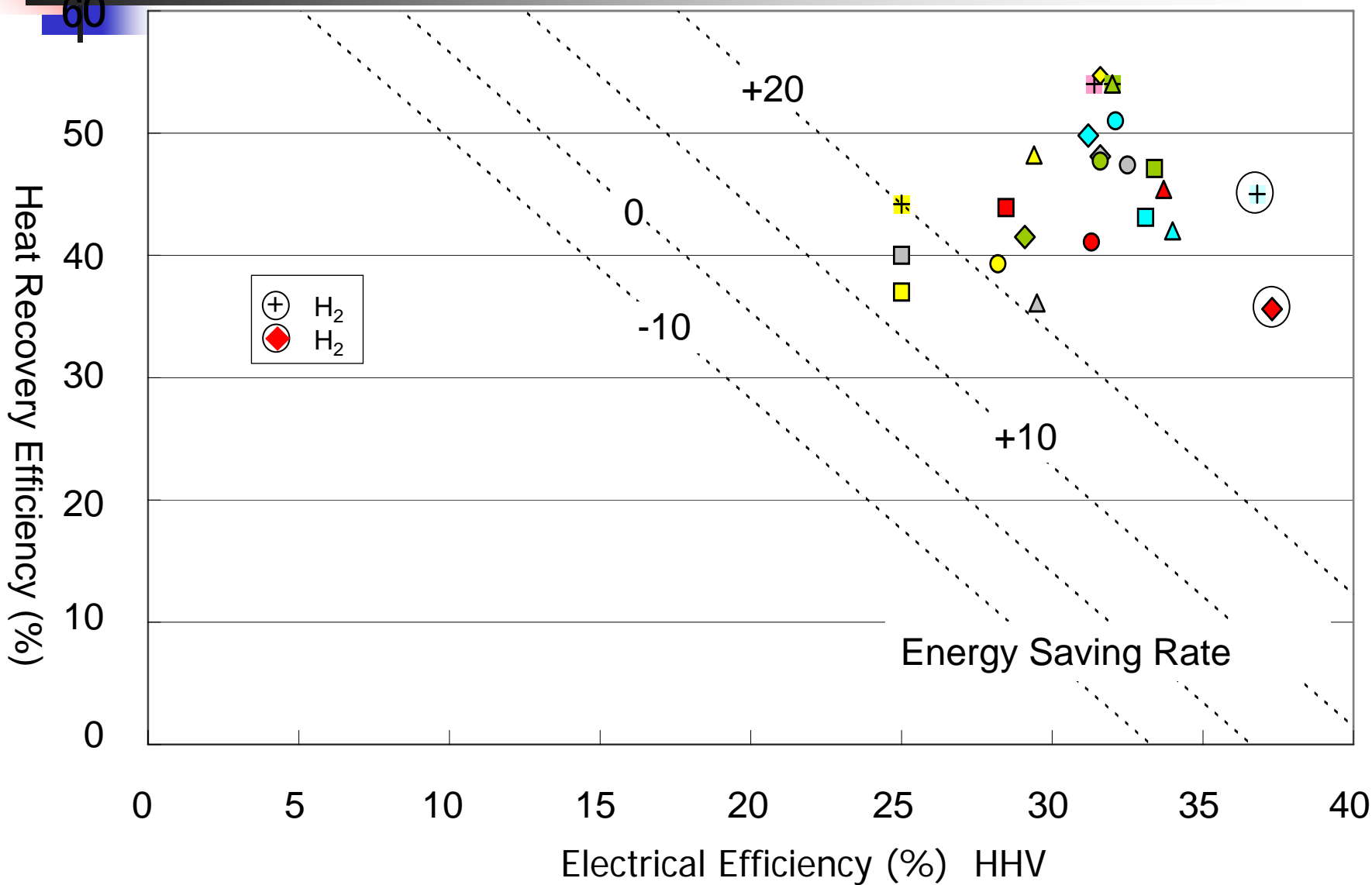
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1. Power output: 1kW, 5kW
2. Fuel: Natural gas, LPG, Kerosine, H<sub>2</sub>
3. Installation site: 1kW - Independent houses , Flats  
5kW - Dormitories, Training institute etc.
4. System provider: IHI, Ebara, Kurita, Sanyo, Mitsubishi Heavy Industries  
Nippon Oil, Toshiba, Toyota, Hitachi H&LS,  
Marubeni, Panasonic (11)
5. Test operator: Japan Gas Association, Tokyo Gas, Tokyo Electric Power  
Hokkaido Electric Power, Hokuriku Electric Power  
Kansai Electric Power, Chugoku Electric Power  
Kyushu Electric Power, Kandenko, Yurtec  
Idemitsu, Japan Energy, Taiyo Oil, Kyushu Oil  
Shinanen, Sekisui Chemical, Ebara, NTT Data  
Tokiwa, Matsumura, Niigata Prefecture, Gifu Prefecture  
Muroran Techno Center (24)

# Rated Power and Heat Output of SFCs (1kW)

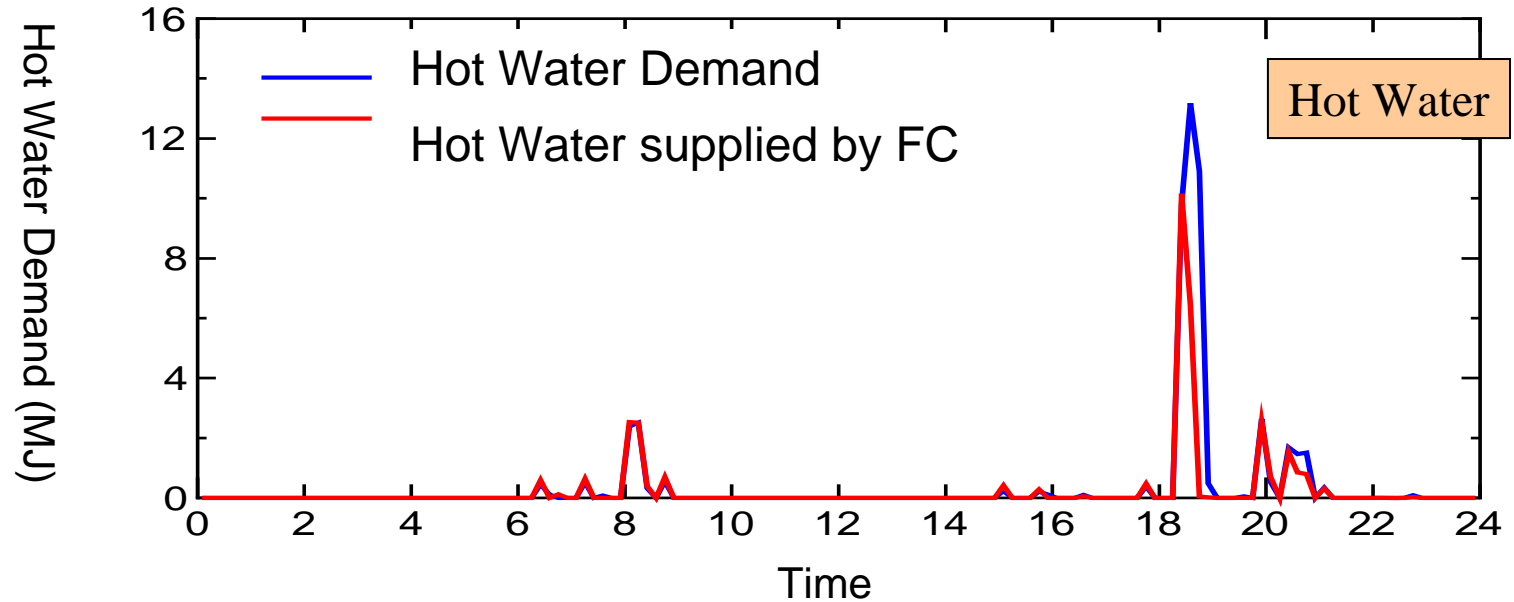
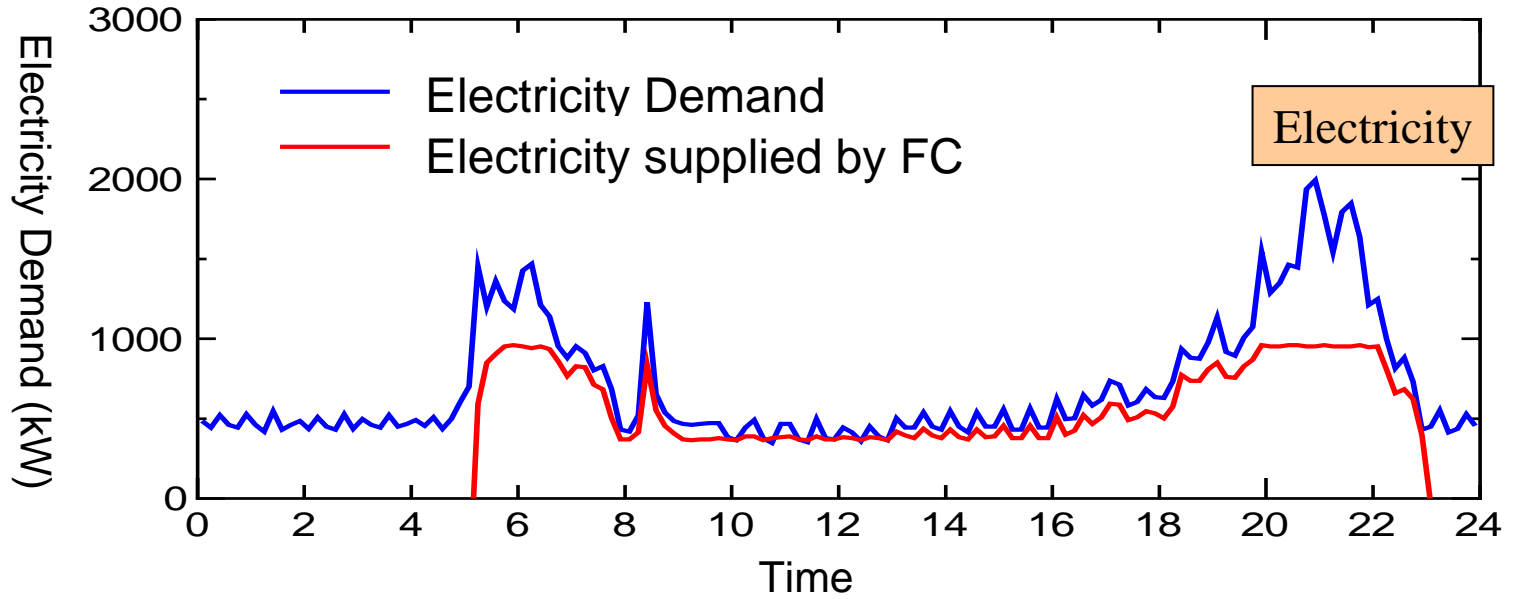


# Performance of SFCs at Rated Point (1kW)

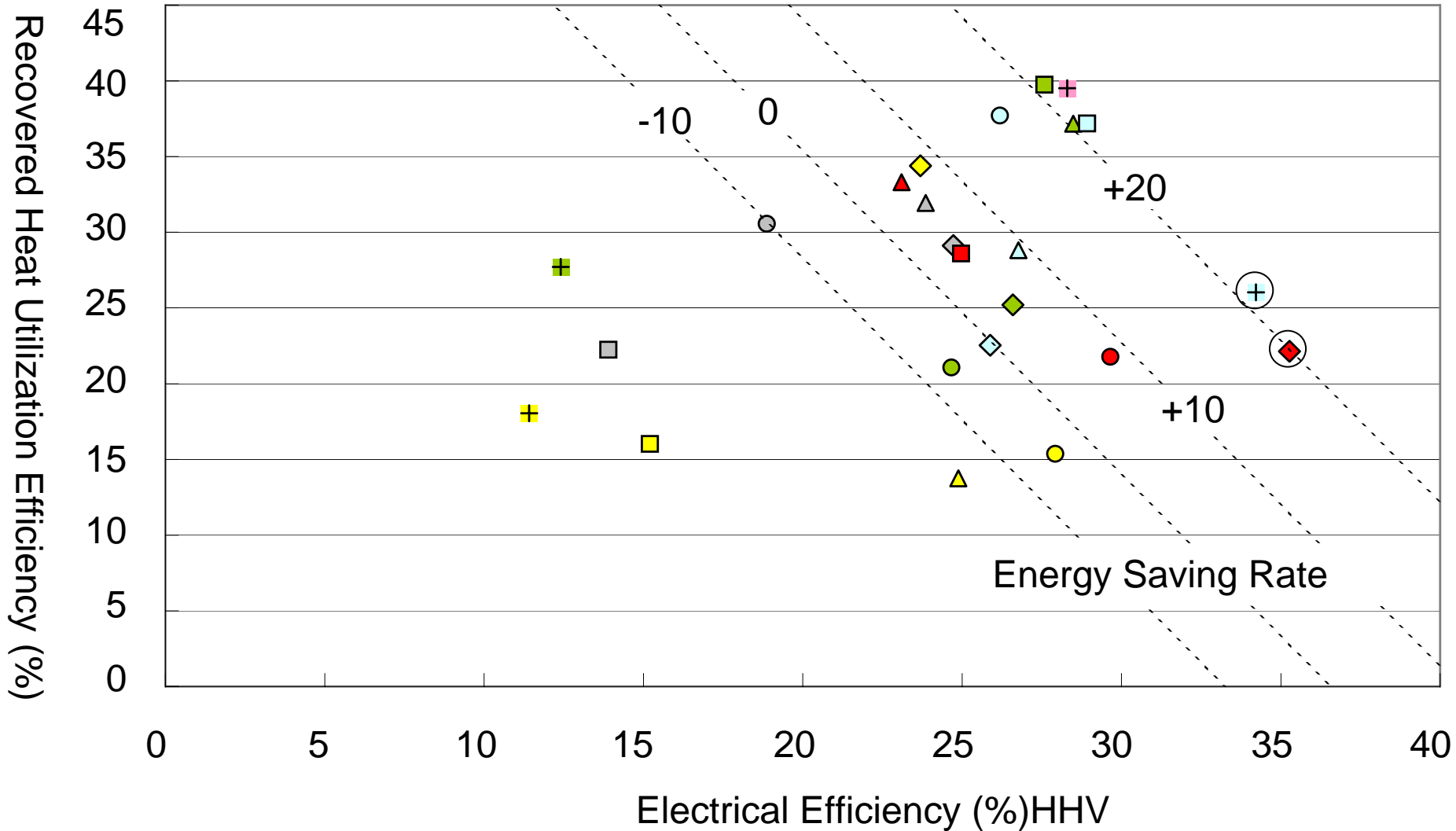


# Operation Example of SFC in One day

April 4, 2004

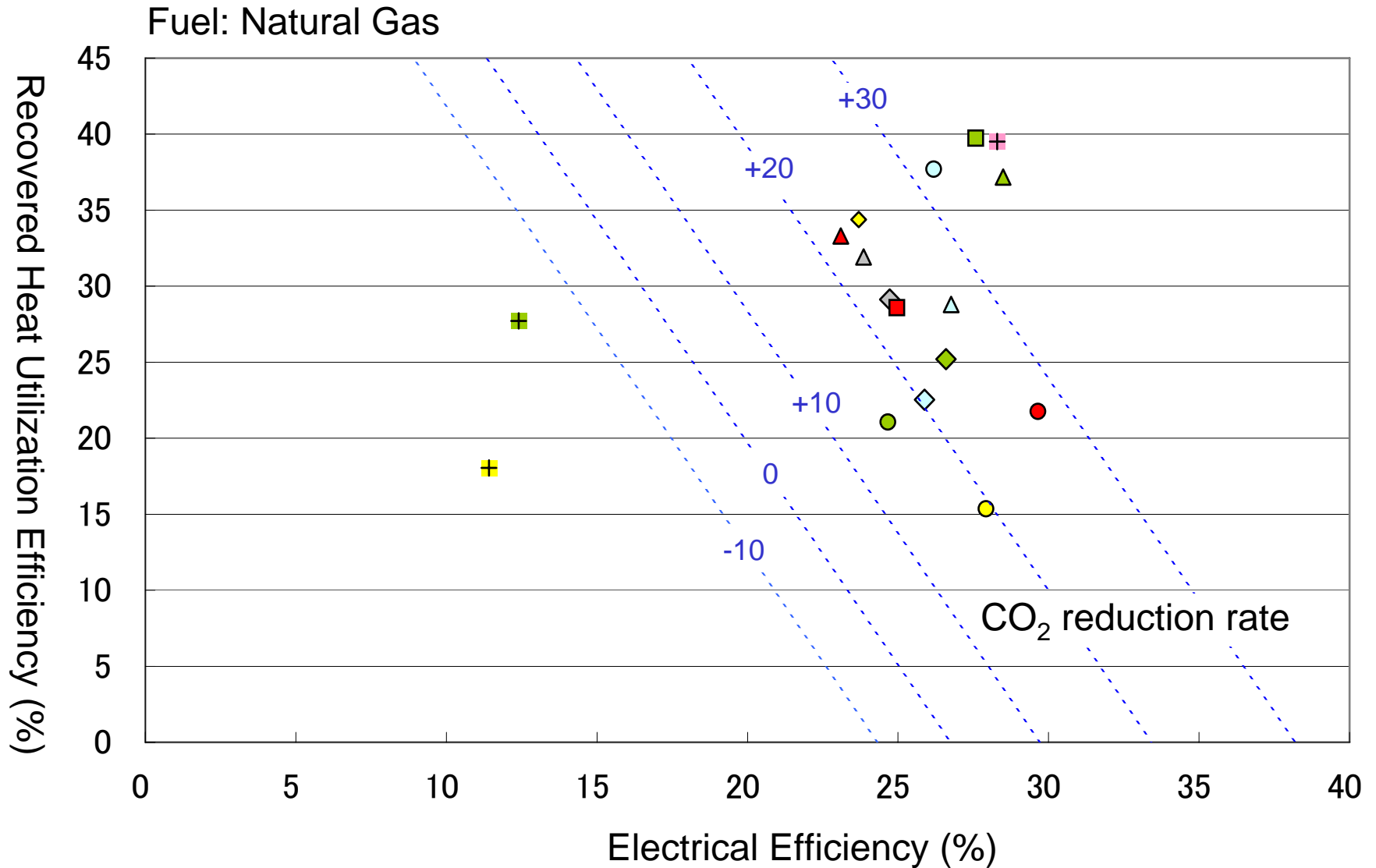


# Performance of SFCs at Study Sites

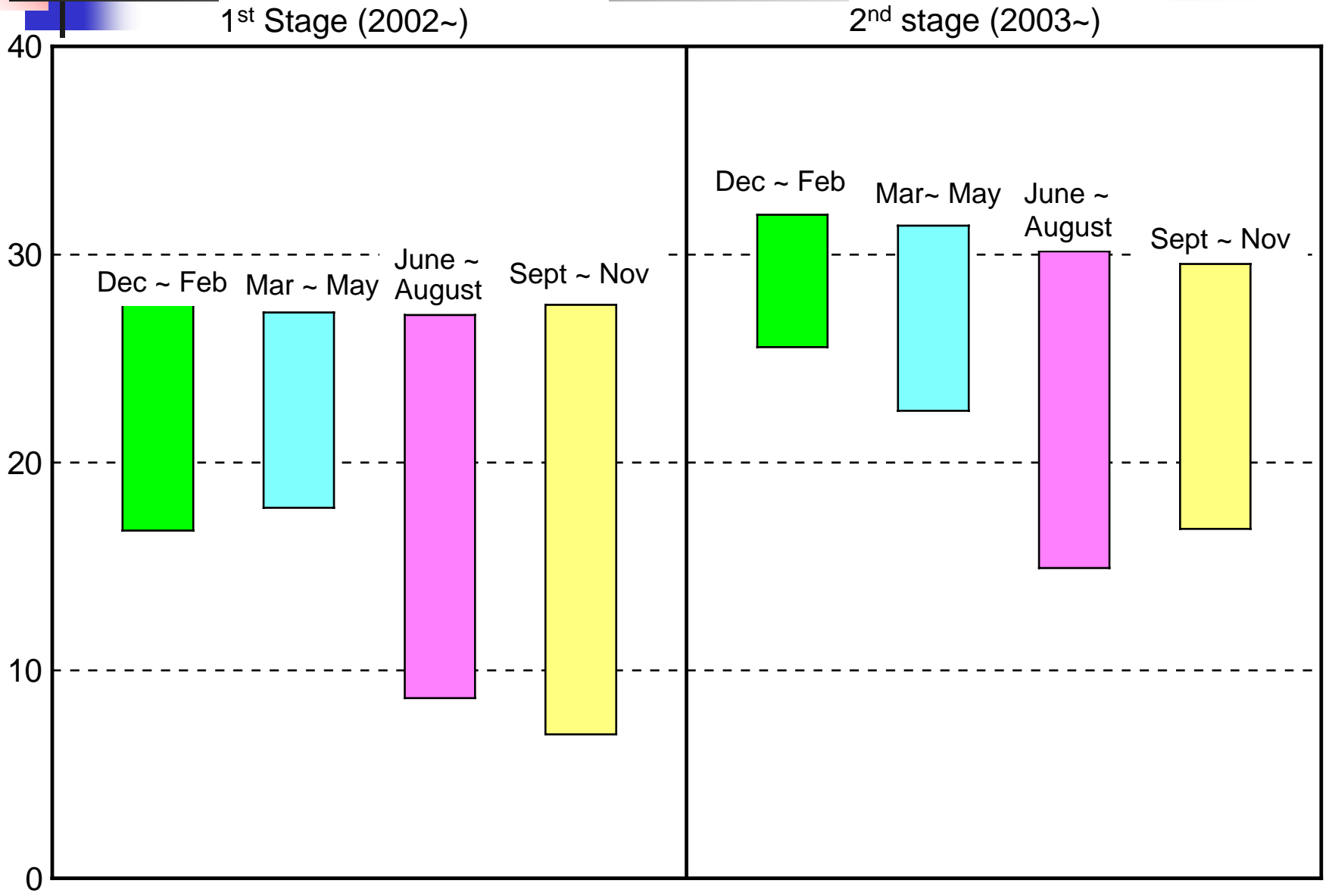




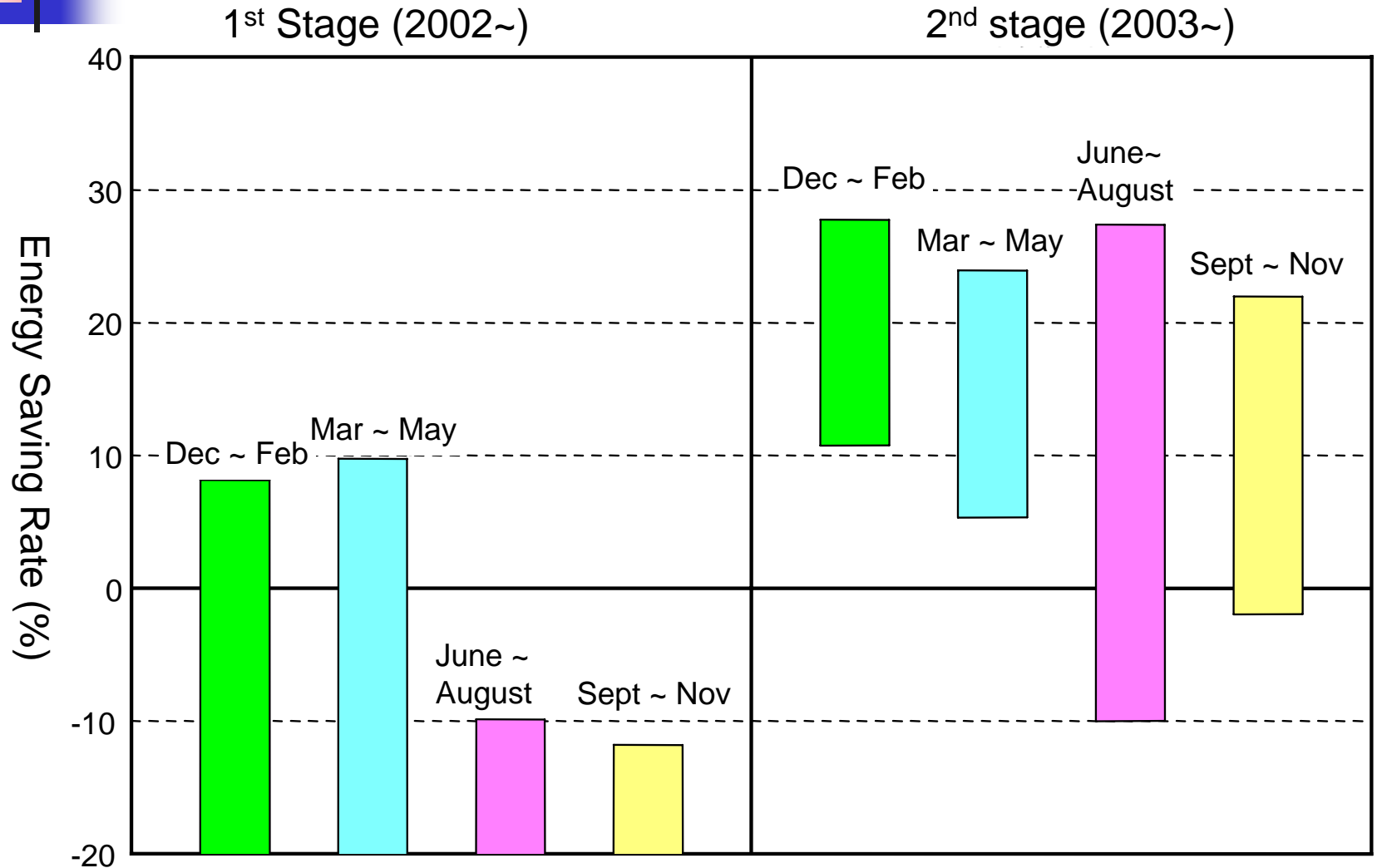
# CO<sub>2</sub> Reduction at Study sites



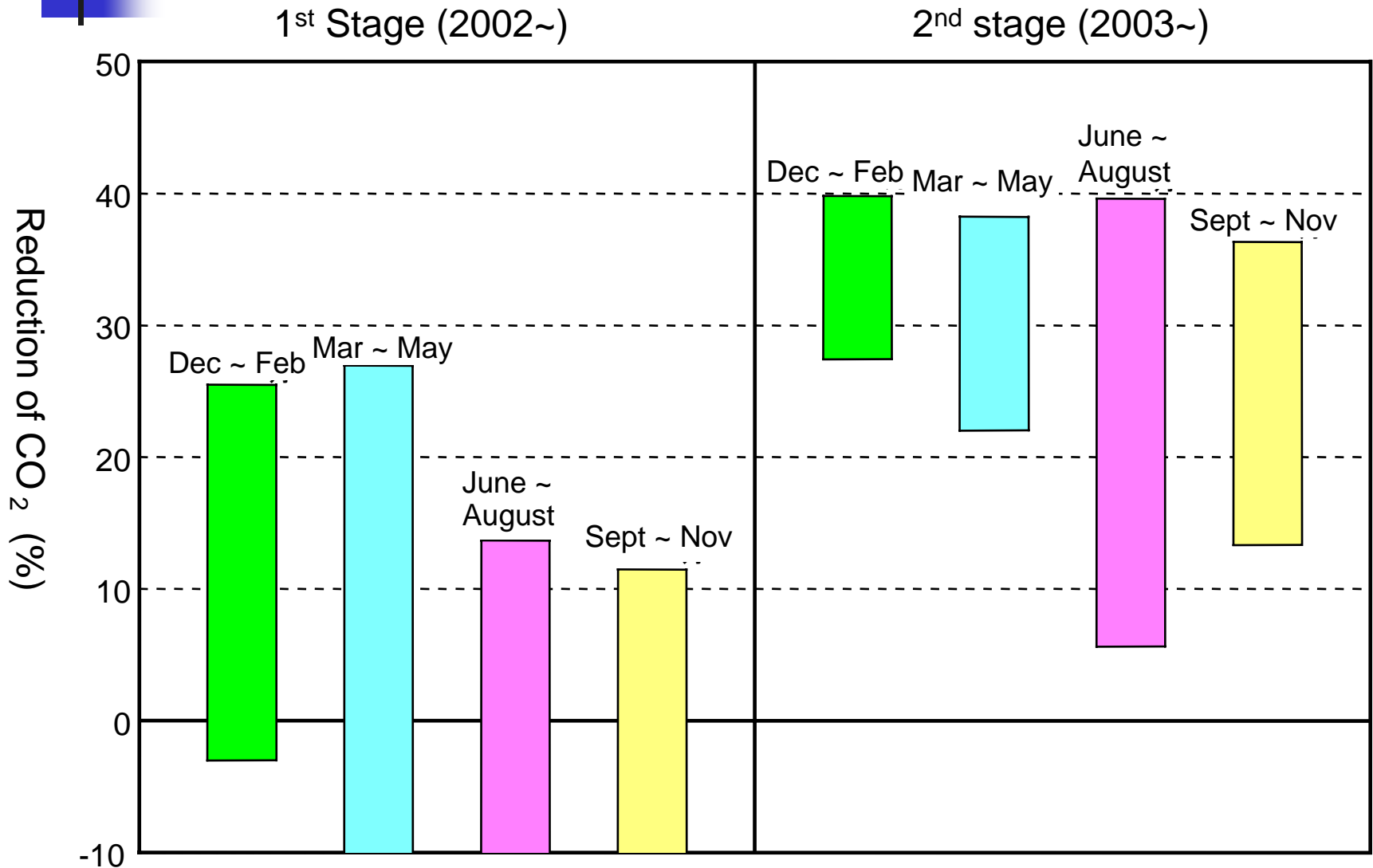
# Progress of Electrical Efficiency



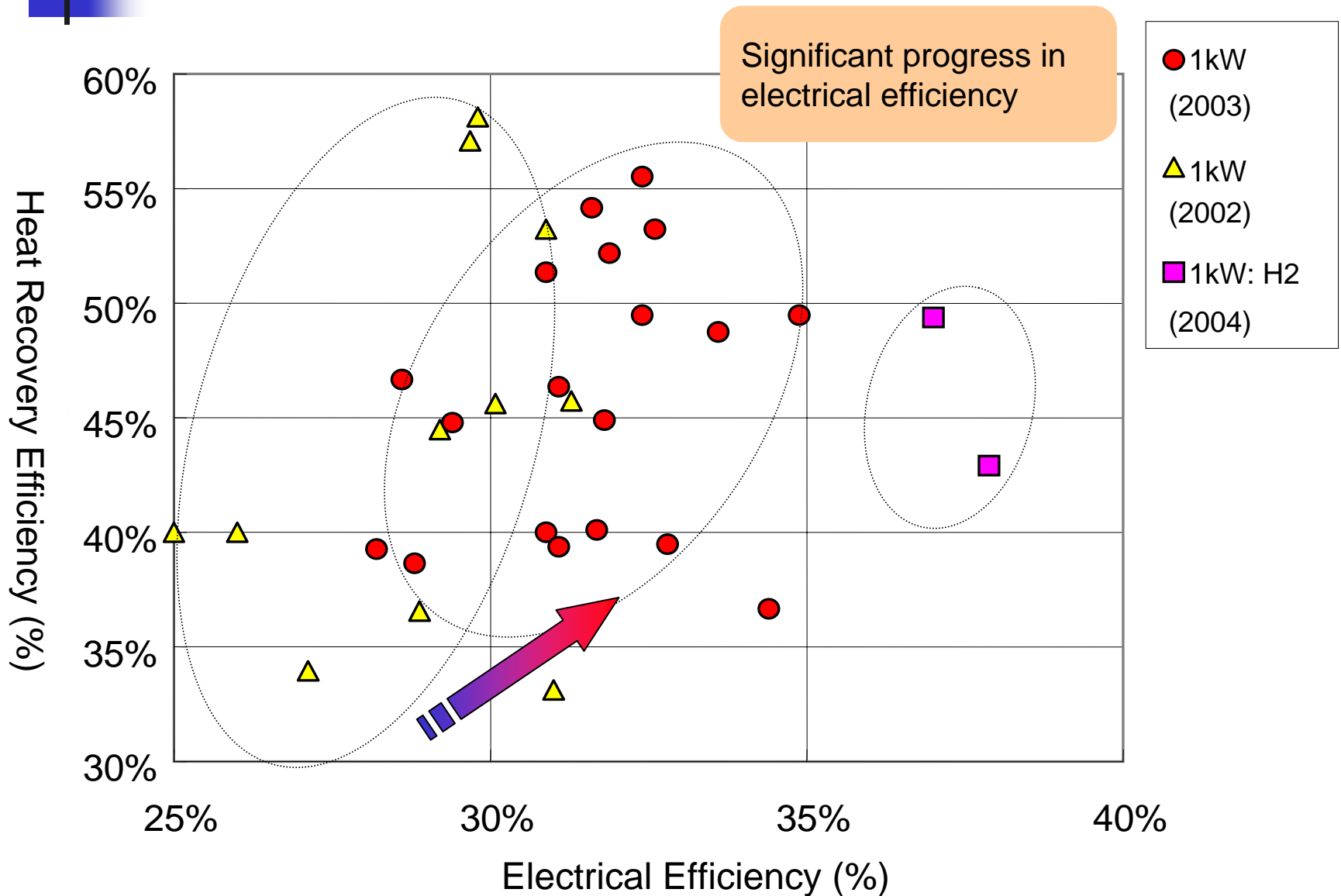
# Progress of Energy Saving Rate



# Reduction of CO<sub>2</sub> Emissions



# Performance Progress of SFCs





# Compatibility with Environment

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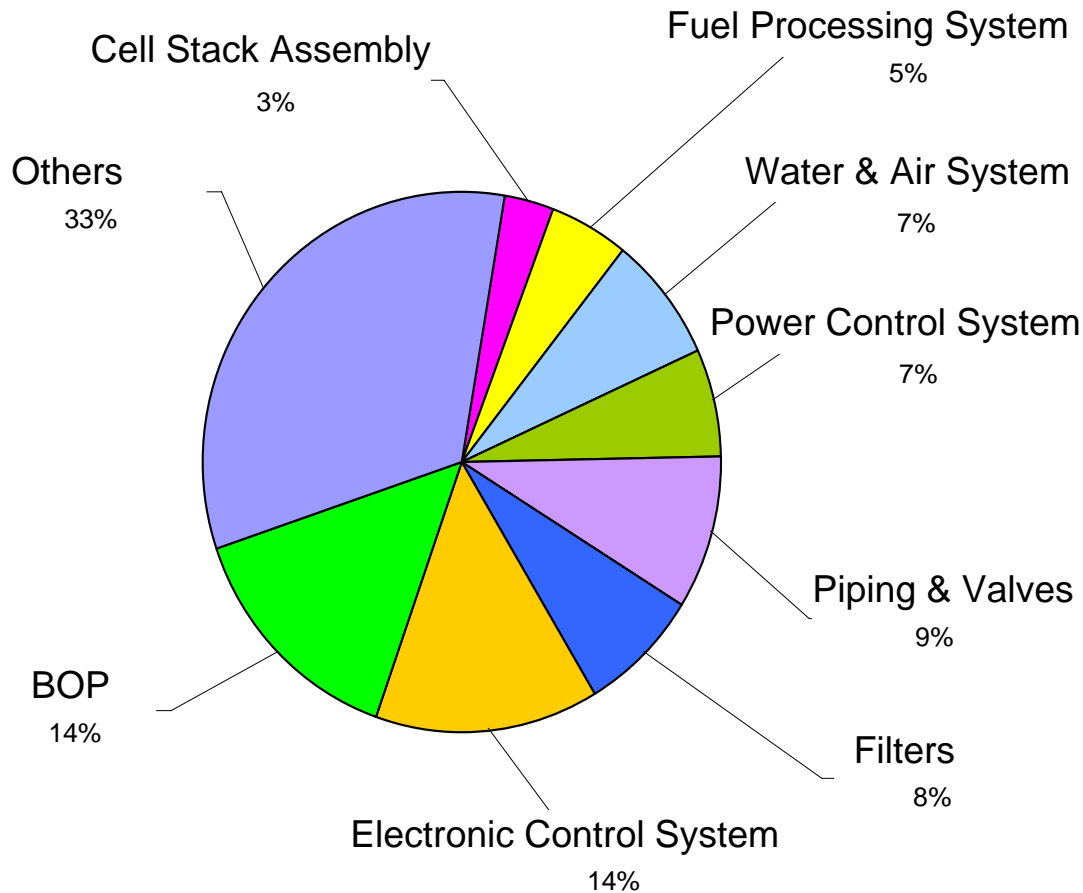
Exhaust Gas : NO<sub>x</sub> 10 ppm  
                  SO<sub>x</sub> 5 ppm  
                  CO 10 ppm  
Noise Level : 43dB ~



# Encountering Troubles

Number of Troubles /site·year

## Causes of Troubles



	1 <sup>st</sup> Stage	2 <sup>nd</sup> Stage
<b>Cell Stack Assembly</b>	<b>2.6</b>	<b>0.5</b>
<b>Reformer</b>	<b>3.4</b>	<b>0.8</b>
<b>Air &amp; Water System</b>	<b>3.0</b>	<b>1.2</b>

Number of Troubles encountered in the main parts has decreased.



# Conclusions

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1. Great Progress in the Performance of SFCs
2. Electrical efficiency at rated point: 30~35% (HHV)
3. Energy saving rate at rated point: 20%~
4. Electrical efficiency at sites: 25~30%
5. Energy saving rate at sites: 5~20%
6. CO<sub>2</sub> Reduction rate at sites: 20%~
7. Verified Environmental friendly features
8. Progress in the core parts such as cell stacks and reformers



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Thank you very much  
for your attention

