

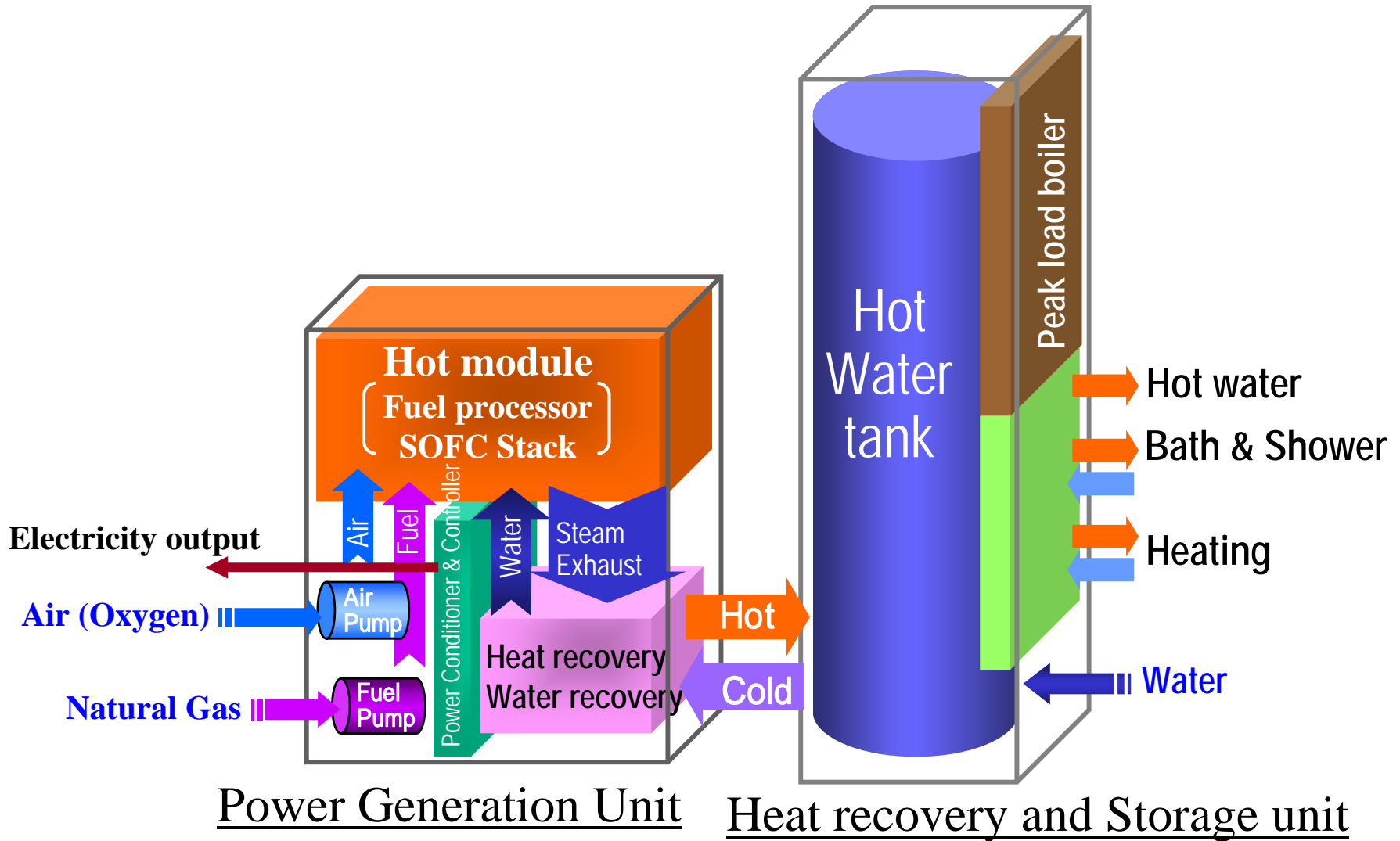
Challenge the commercialization of the residential SOFC CHP

March 1st, 2011



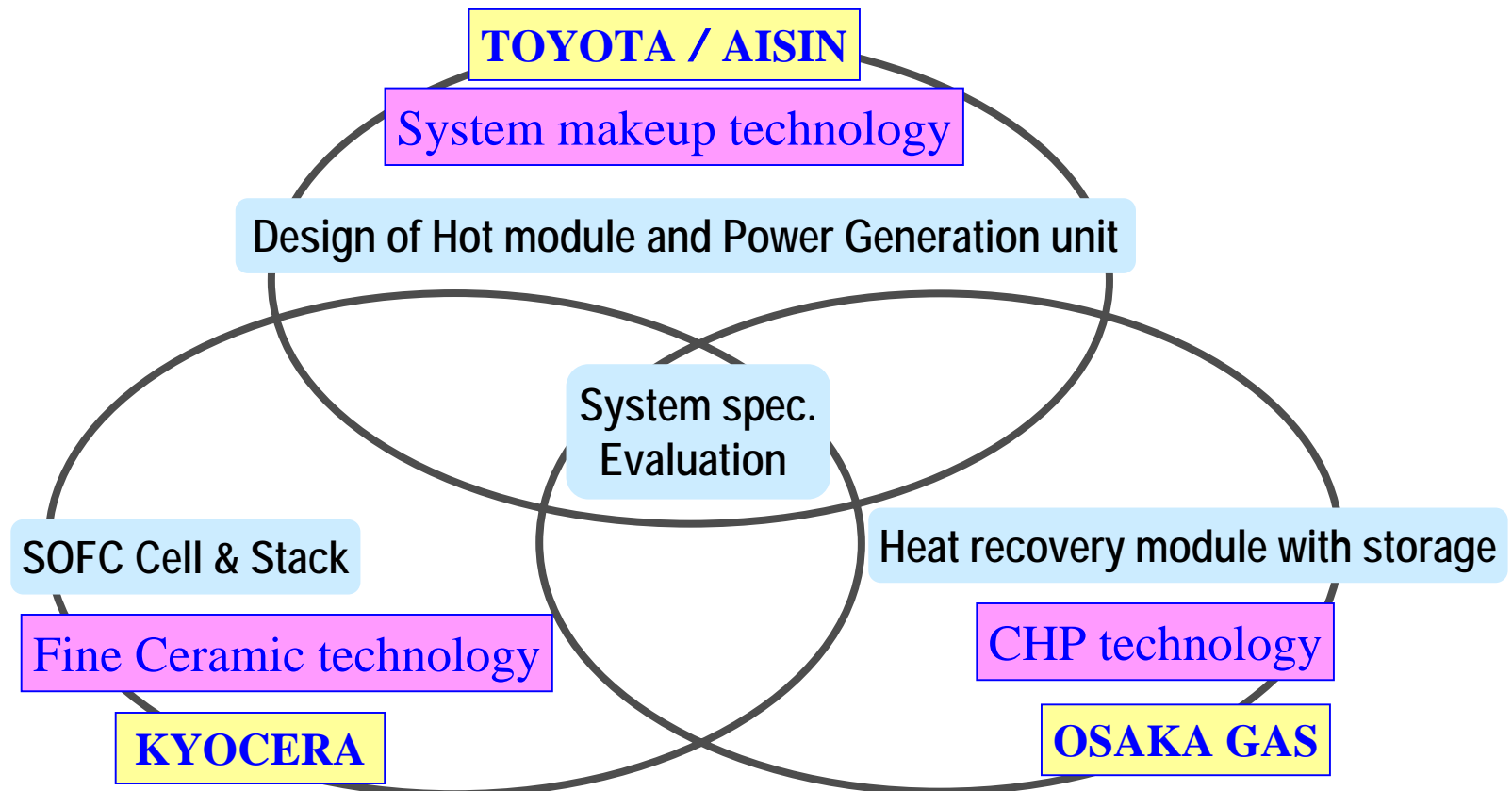
AISIN undertakes the Demonstrative Research on SOFC Project organized by New Energy and Industrial Technology Development Organization and New Energy Foundation. This includes the results of the project.

SOFC CHP System



Co-development from March 2009

Accelerating development through collaboration of technology and know-how of each company



FY2010 Model Development Specification

FY2010 Model

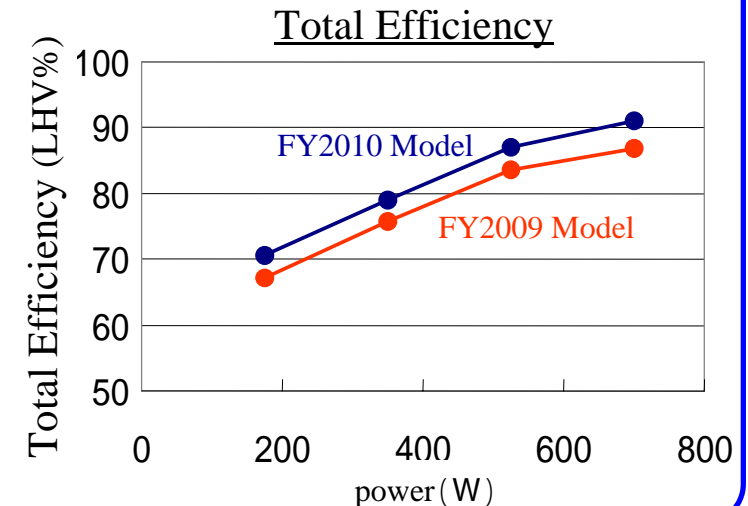
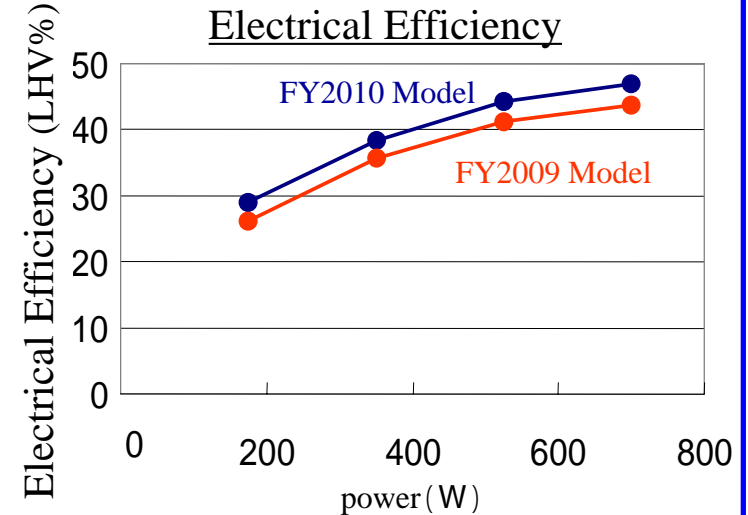


Electric Generating Unit

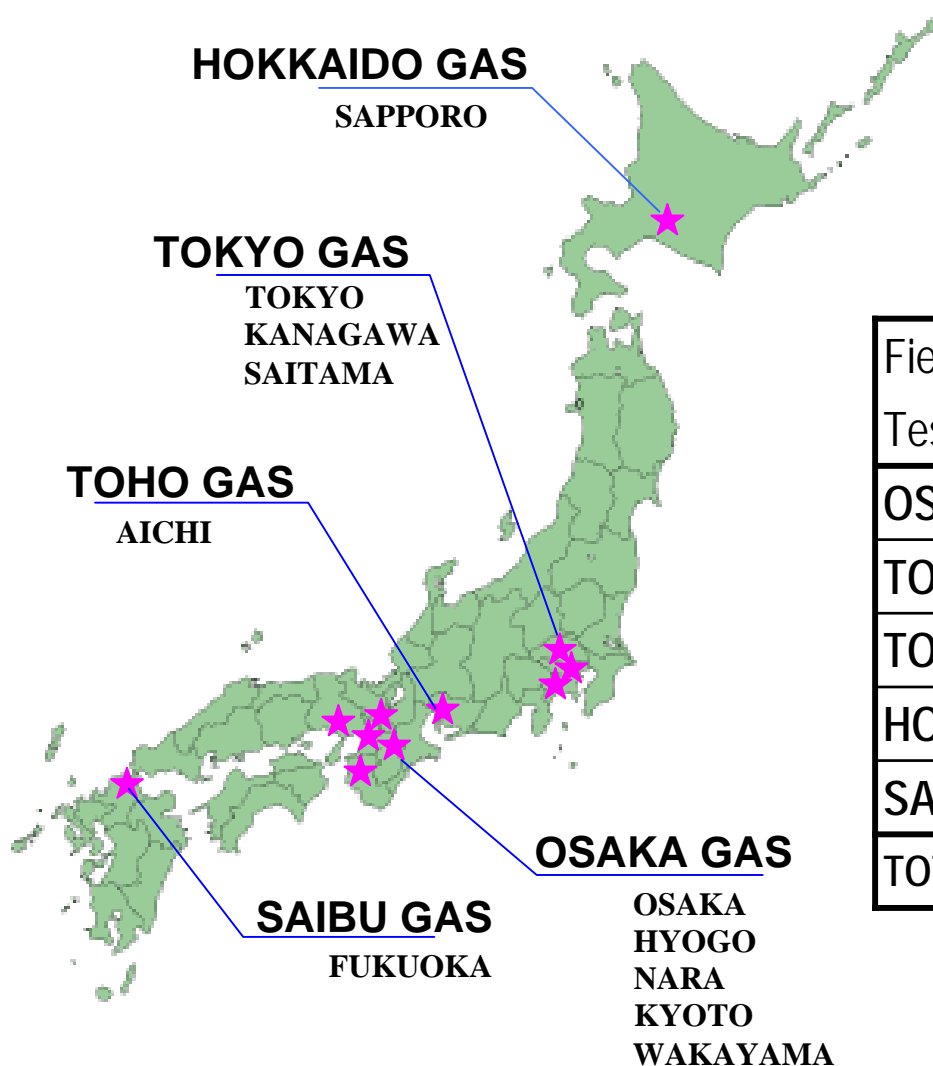
【TOYOTA MOTOR CORPORATION / AISIN SEIKI Co.,Ltd.】

Rated power	700W
Electrical efficiency	45% (LHV)
Total efficiency	85% (LHV)
Power range	100W ~ 700W
Size	H935×W600×D335
Heat Recovery Unit 【CHOFU SEISAKUSHO CO.,LTD.】	
Tank capacity	90 L
Hot water temp	70 degrees C

experimental data



Demonstrative research



Field Installation and Test operators	number	FY2009	FY2010
		OSAKA GAS	64
TOKYO GAS	15	4	11
TOHO GAS	3	1	2
HOKKAIDO GAS	3	1	2
SAIBU GAS	3	1	2
TOTAL	88	30	58

Example of Installation

standard



< OSAKA >

narrow



< TOKYO >

separated



< OSAKA >

corner



< OSAKA >

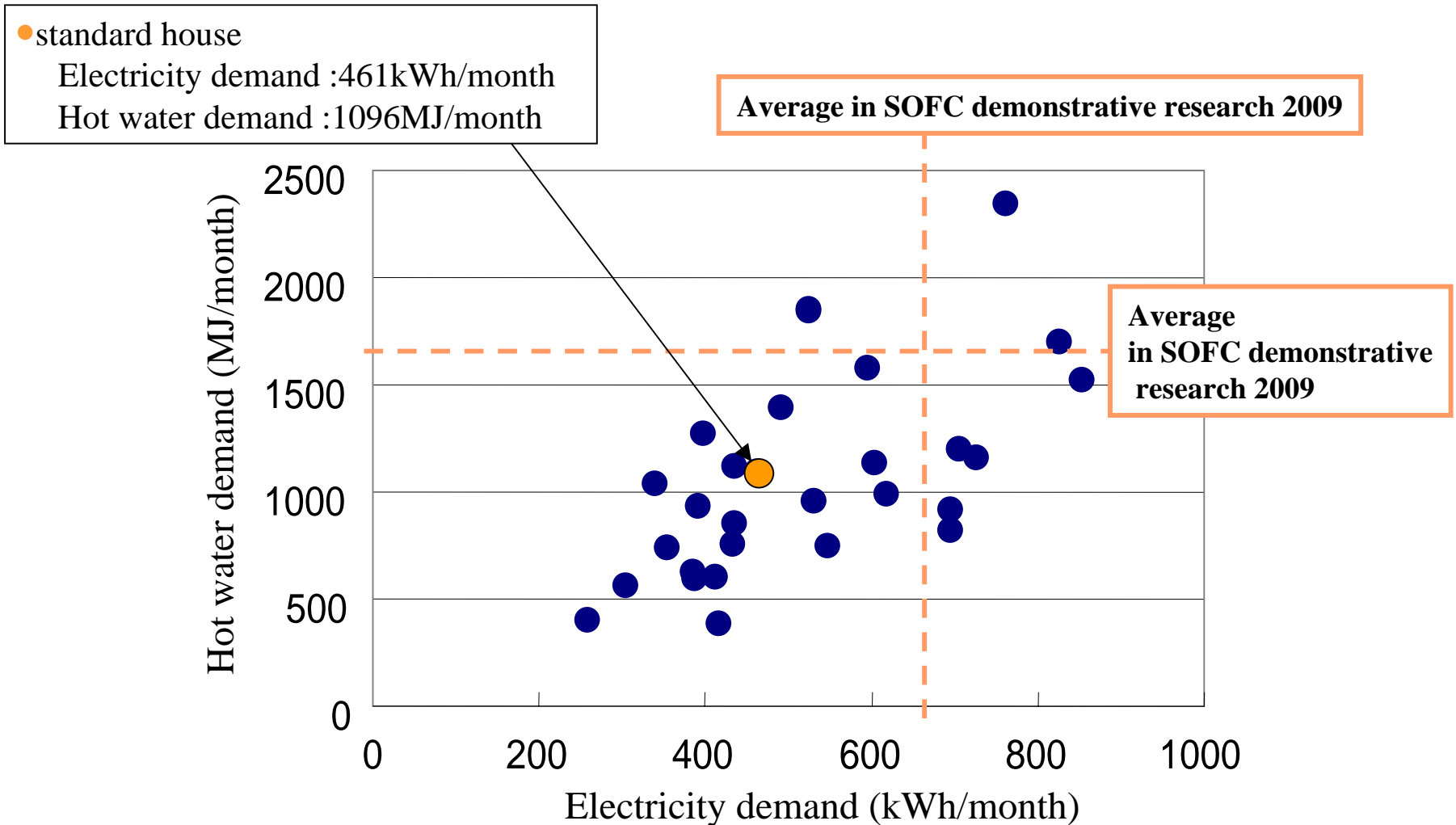
cold area



< HOKKAIDO >

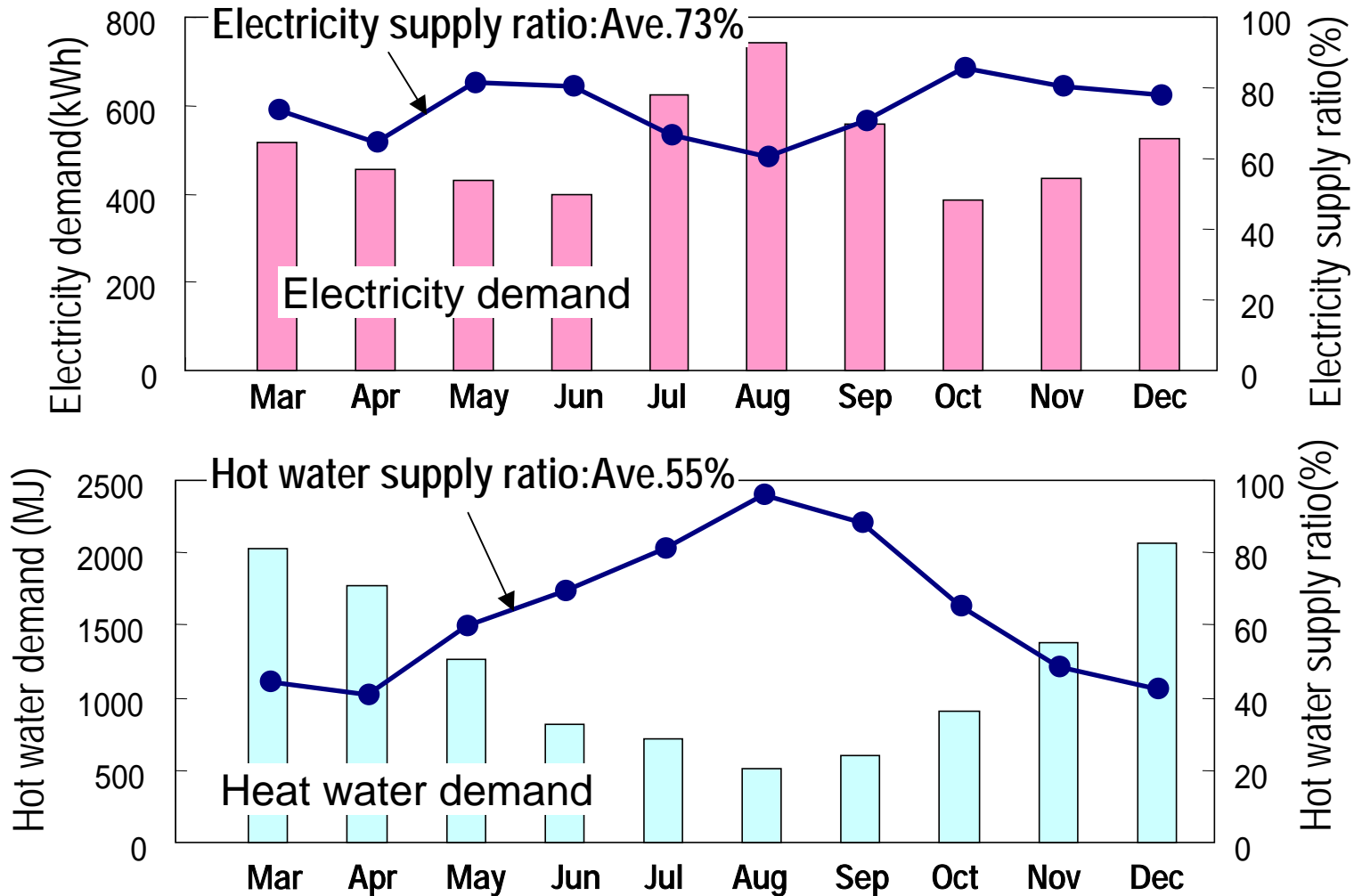
Demonstrative research 2009

Merit of SOFC CHP



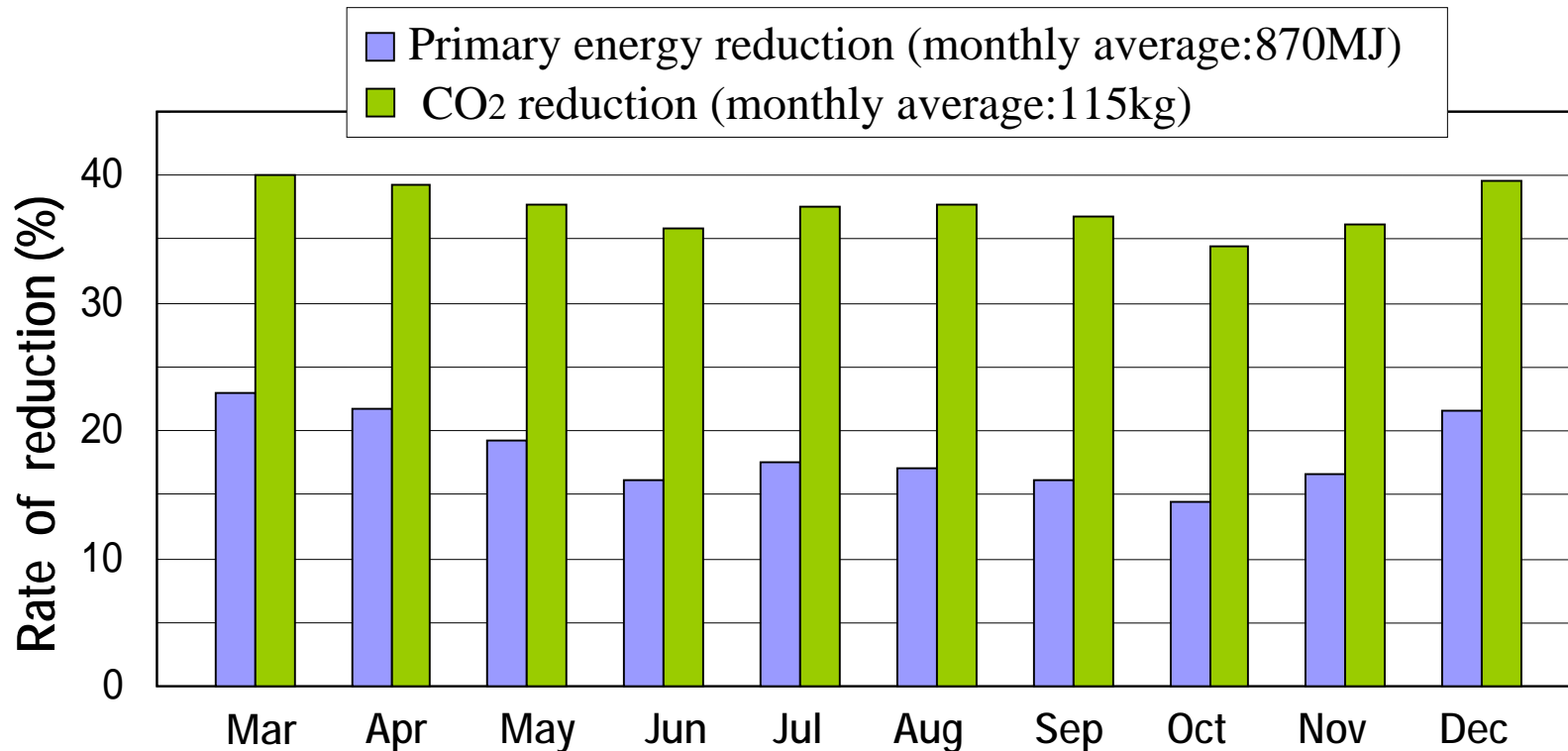
Demonstrative research 2009

Energy demand & Supply ratio by SOFC CHP in standard house



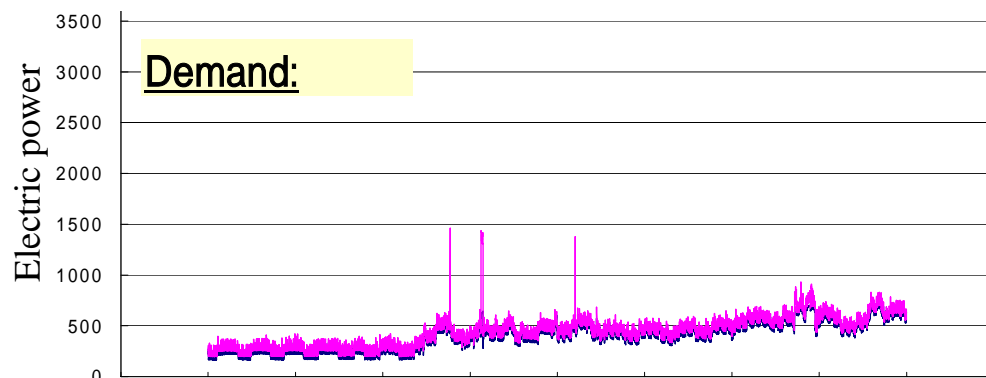
Demonstrative research 2009

Environmental merit by SOFC CHP in standard house

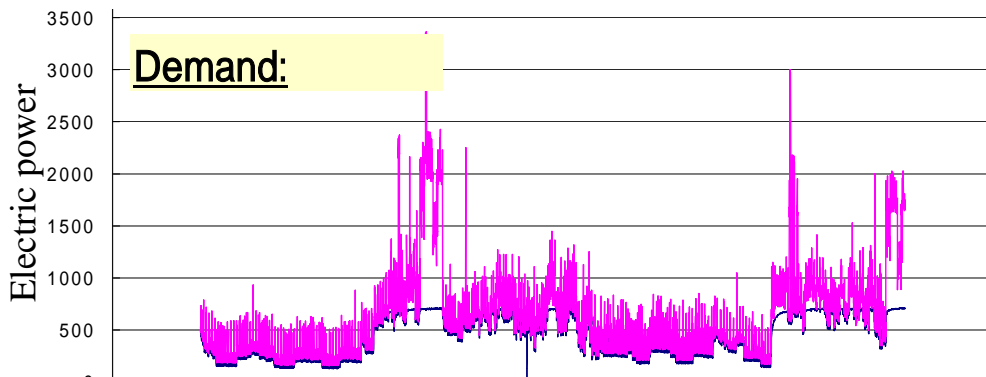


- ✓ Primary energy reduction fell in Summer as hot water demand going down
- ✓ No remarkable change through year in CO₂ reduction

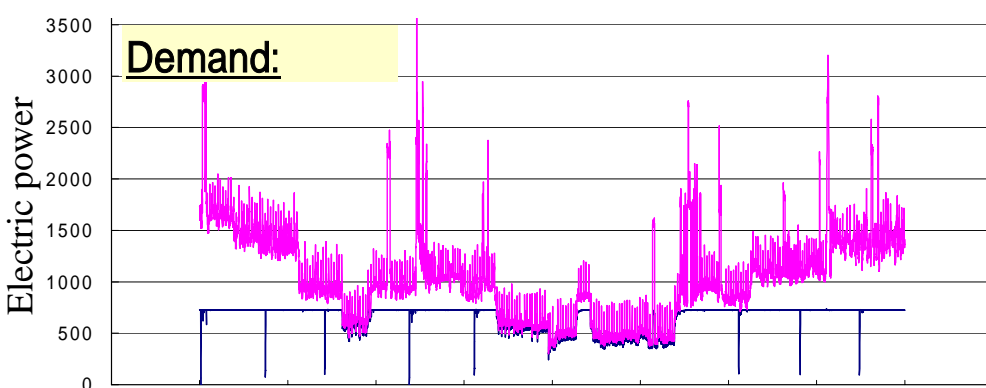
Daily chart of SOFC CHP operation



Demand	Electricity	294 kWh/month
	Hot water	1015 MJ/month
Supply ratio	Electricity	81.5%
	Hot water	51.9%
Average electric output		371W
Merit	Primary energy reduction	8.3%
	CO2 reduction	29.2%



Demand	Electricity	462 kWh/month
	Hot water	1566 MJ/month
Supply ratio	Electricity	73.2%
	Hot water	51.0%
Average electric output		461W
Merit	Primary energy reduction	15.8%
	CO2 reduction	34.7%



Demand	Electricity	765kWh/month
	Hot water	3186MJ/month
Supply ratio	Electricity	55.8%
	Hot water	31.9%
Average electric output		580W
Merit	Primary energy reduction	26.7%
	CO2 reduction	42.7%

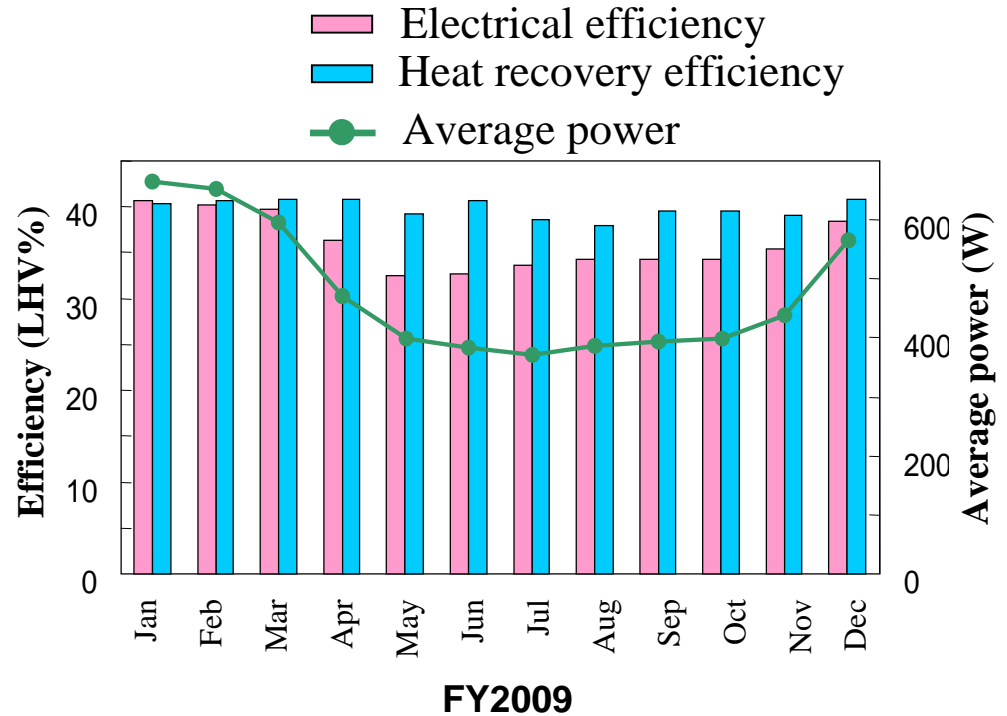
Operation in a cold district

【Operation in Hokkaido】

2009 with shelter



2010 open



Option for cold district



standard



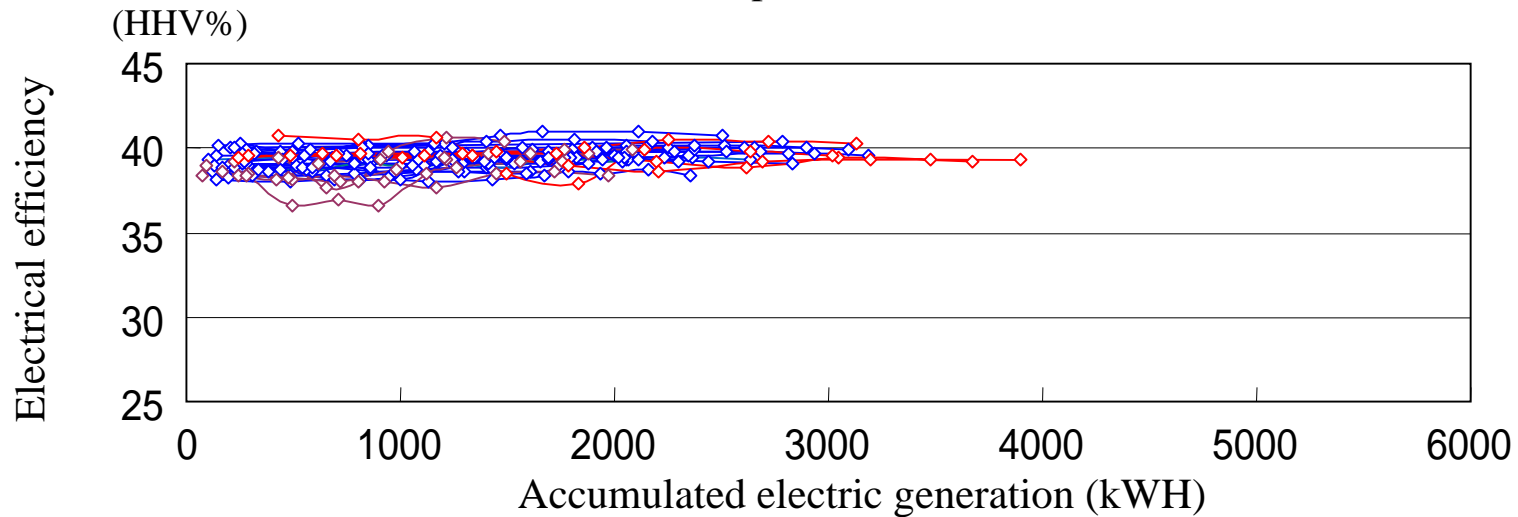
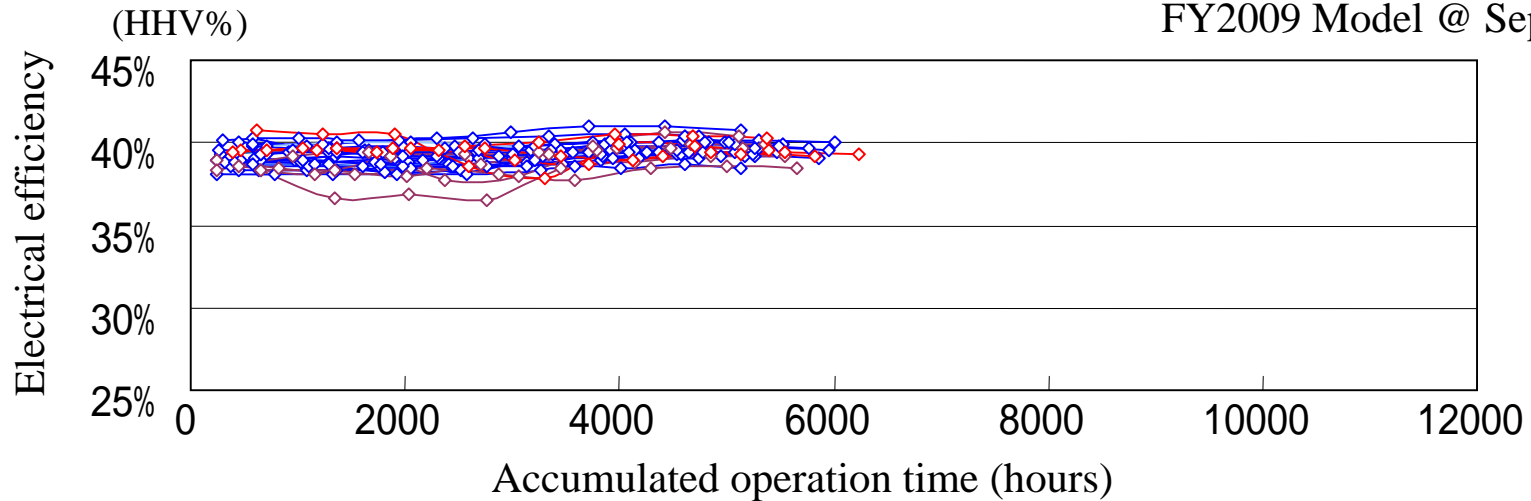
Cold district

adding the small shelter for driving snow

Good reliability in a cold district

Durability of Electrical Generating Unit

FY2009 Model @ September 2010



Remarkable change has not observed.

Summary of presentation

Result of Demonstrative research

Research proved the merchantability of our SOFC CHP as below;

- ✓ advantage in CO₂ reduction and energy saving
- ✓ no remarkable trouble including durability during the field test

Next Step

Priority to commercialize our SOFC CHP

- ✓ further field test of reliability to verifying quality as a product
- ✓ further development for ten-year product life through both field test and laboratory test
- ✓ reduction in cost of power generation unit

Future possibility

Penetrating and expanding the market of SOFC

- ✓ pursue higher efficiency of electric generation aiming mono-generation (on site generation)
- ✓ Increasing capacity aiming commercial use such as an office, a shop and so on