

Development of A New Model of Residential PEM Fuel Cell CHP System

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Tokyo Gas Co., Ltd.

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Venue: KL Convention Centre



Patron



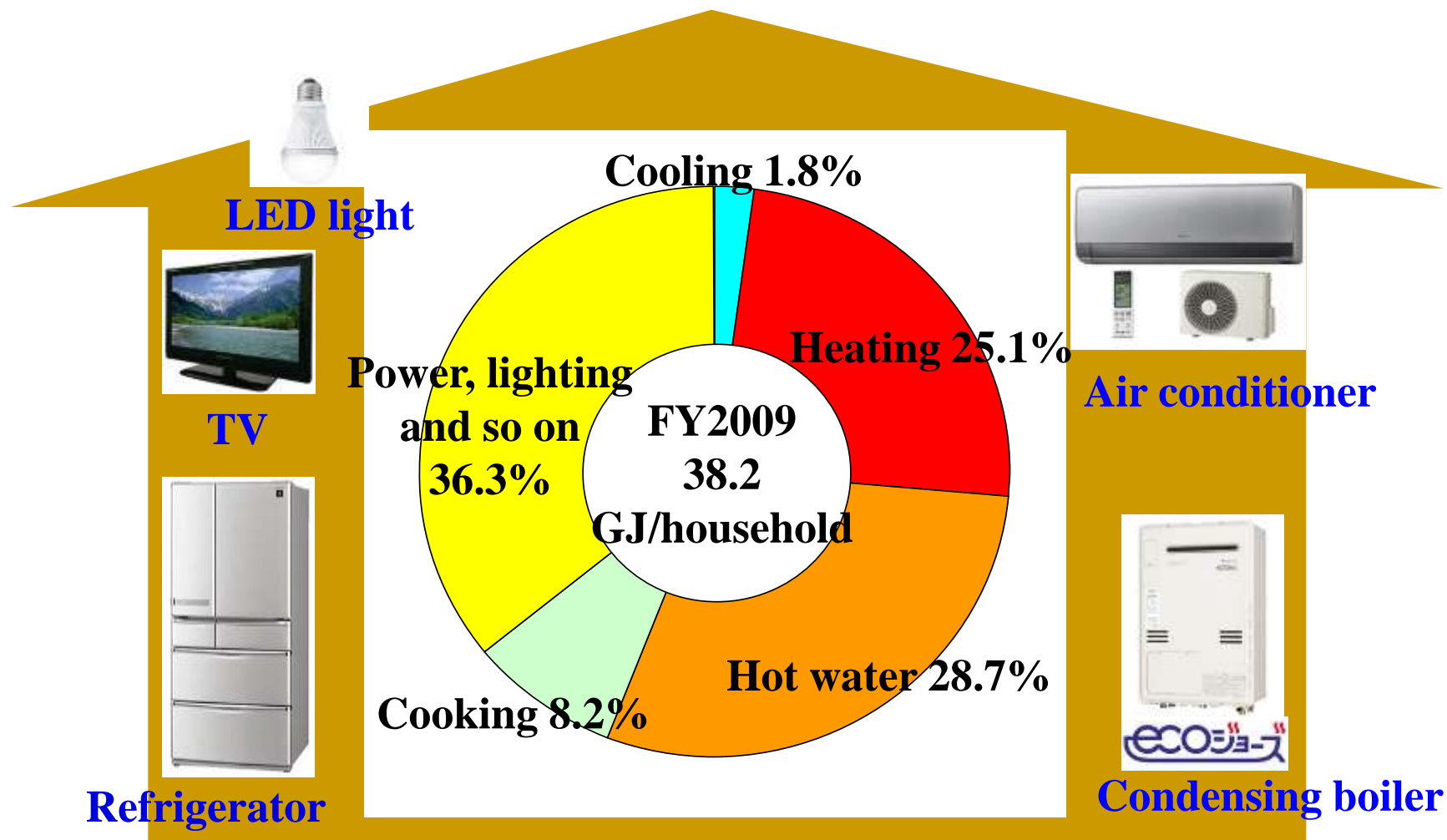
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Energy consumption in a Japanese residence



Reference: FY2011 Annual Energy Report Agency for Natural Resources and Energy

Successful launch of the first model of a residential PEM fuel cell CHP in 2009



Electrical Output	0.3 kW ~ 1 kW
Electrical efficiency	37 %LHV / 33 %HHV
Heat recovery efficiency	52 %LHV / 47%HHV
Heat recovery temperature	60 deg C
Capacity of hot water tank	200 litter
Backup burner max. input	64.7 kW HHV *condensing boiler

- Superior performance was demonstrated in 2008 at the Large Scale Demonstration Project.
- Approx. 4,000 systems were sold in 2009 and 2010.

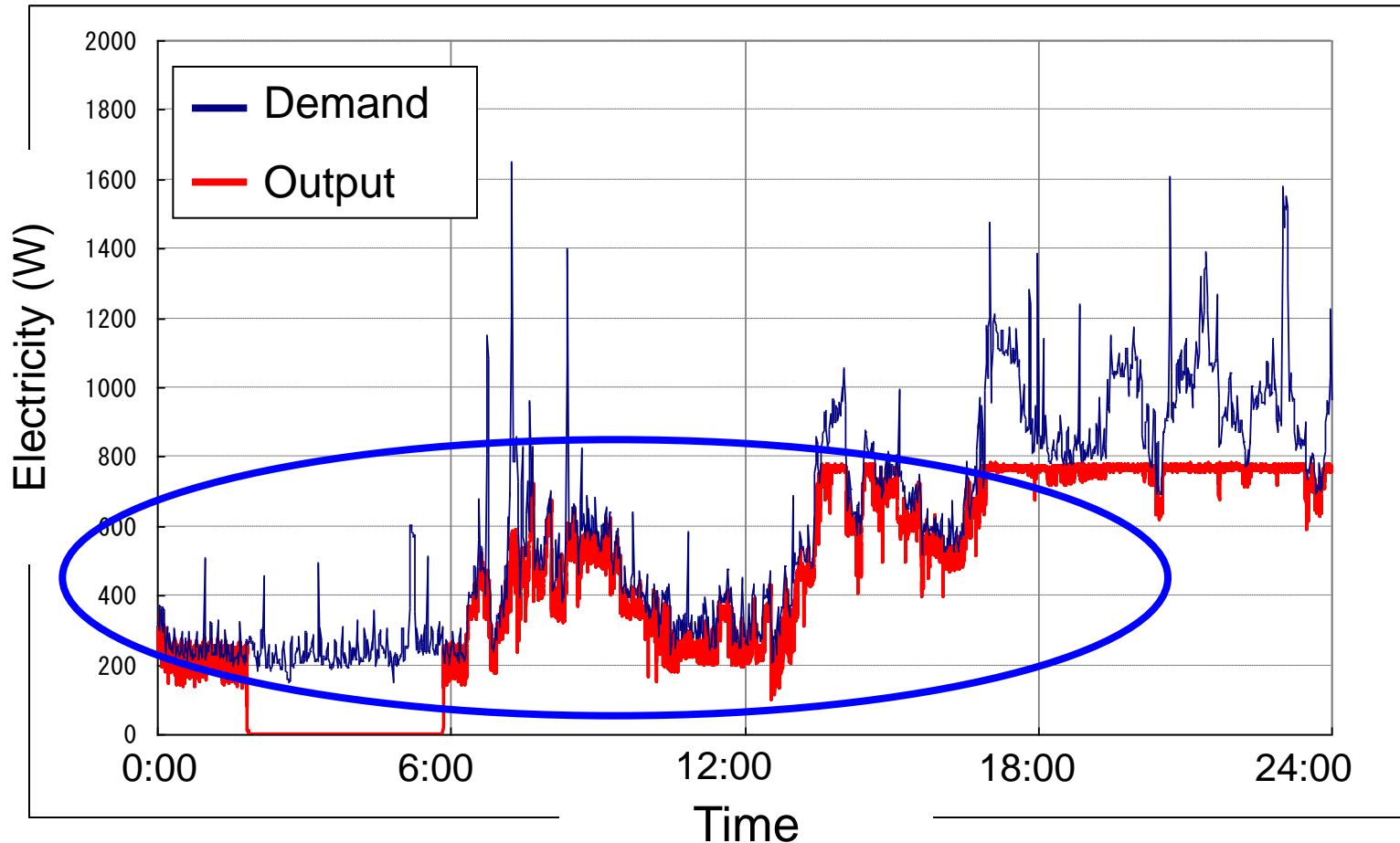
Issues provided by the experience of sale of the first model

Today's focus

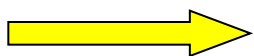
- Fitting smaller energy demand customers
- Smaller installation space
- Improvement of user interface
- Cost reduction

Example of operation

- Importance of turndown operation



Power output is limited to the extent of the electricity demand.



Performance at turndown is important.

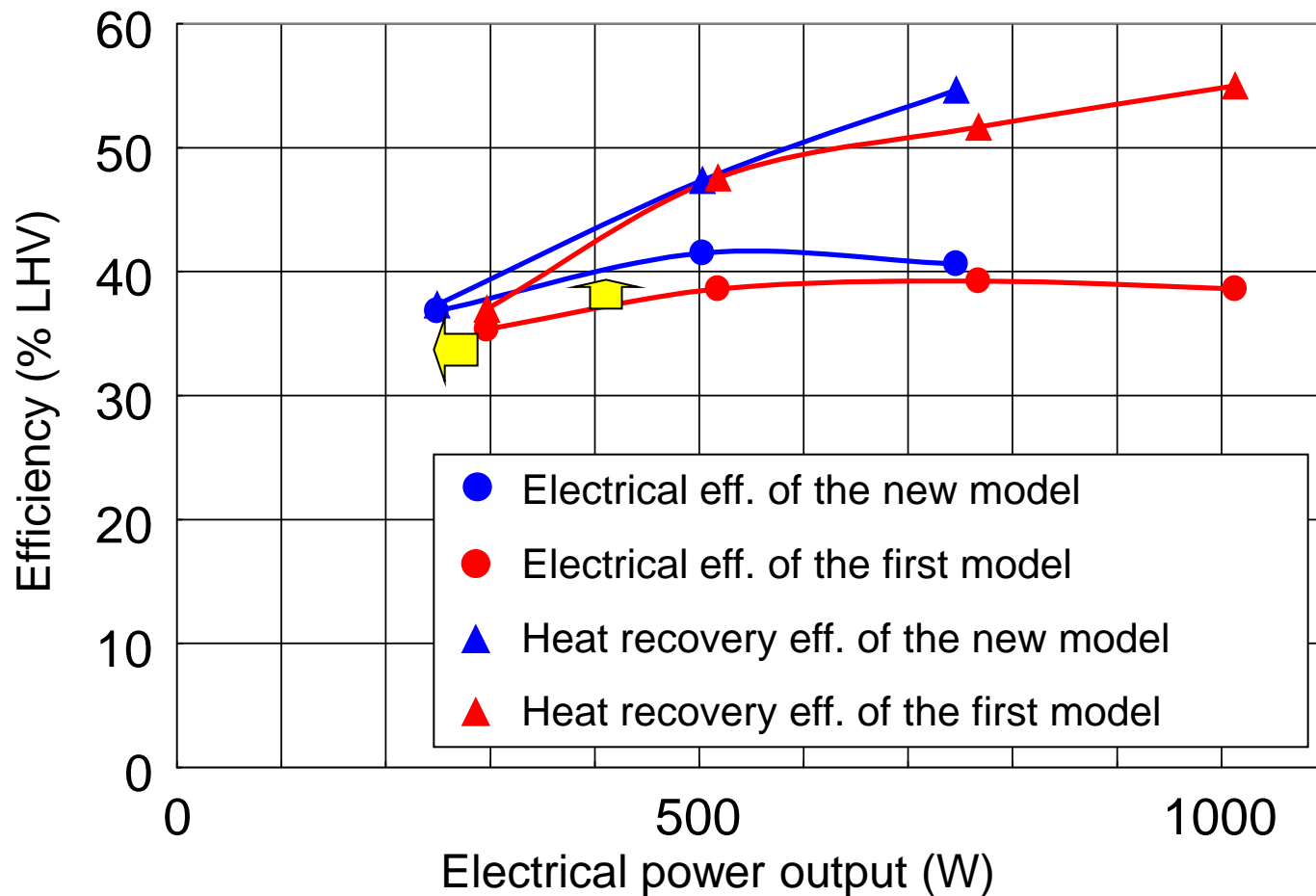
Specifications of the new model



Electrical Output	0.25 kW ~ 0.75 kW
Electrical efficiency	40 %LHV / 36 %HHV
Heat recovery efficiency	50 %LHV / 45%HHV
Heat recovery temperature	60 deg C
Capacity of hot water tank	200 litter
Backup burner max. input	64.7 kW HHV *condensing boiler

- Improved electrical efficiency
- Smaller minimum power output

Comparison of efficiency curve between the first model and the new model



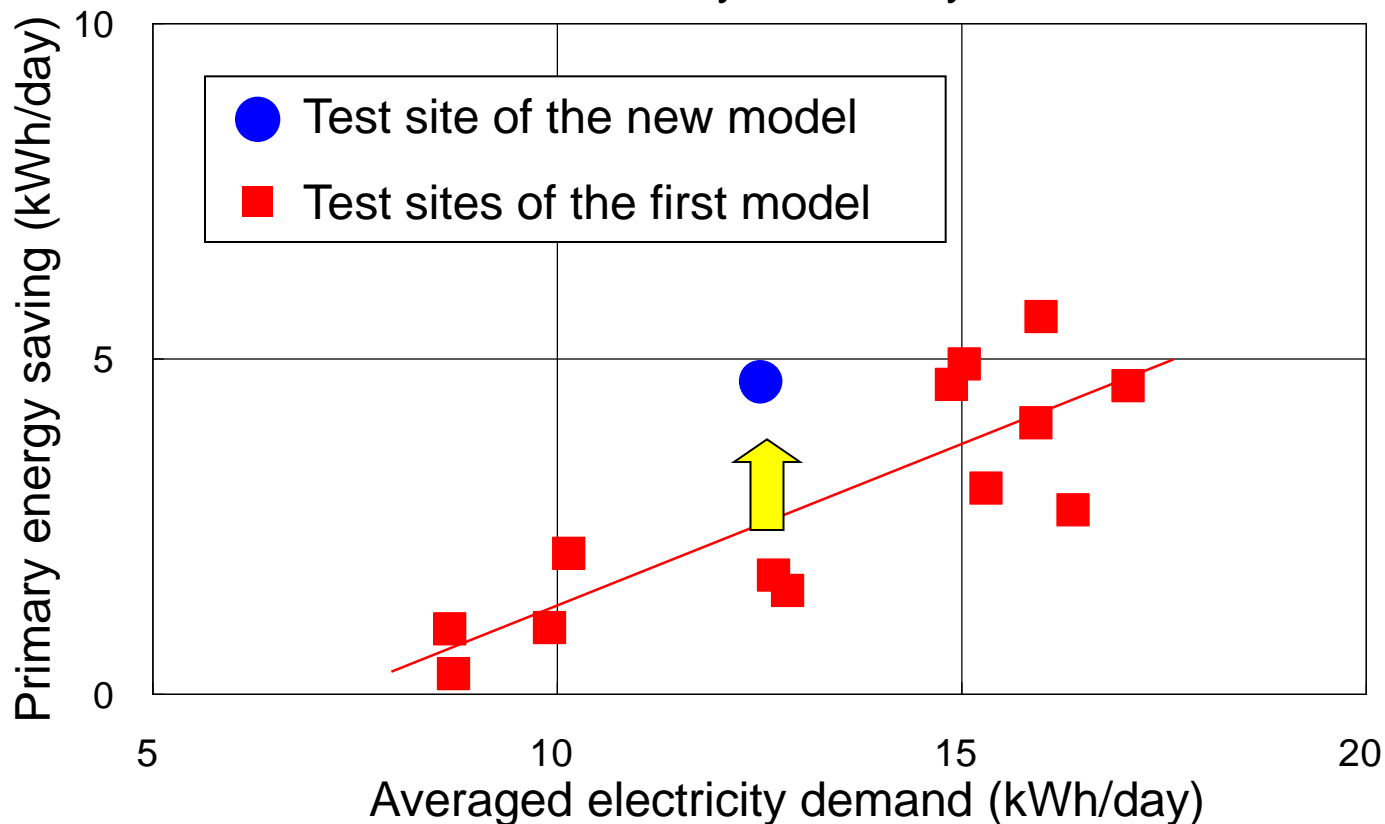
Efficiency at turndown operation is improved.

Minimum power output is lowered.

Improved performance at a house with smaller energy demand

Comparison of the field trial data at the same level* of hot water demand between the first and the new model

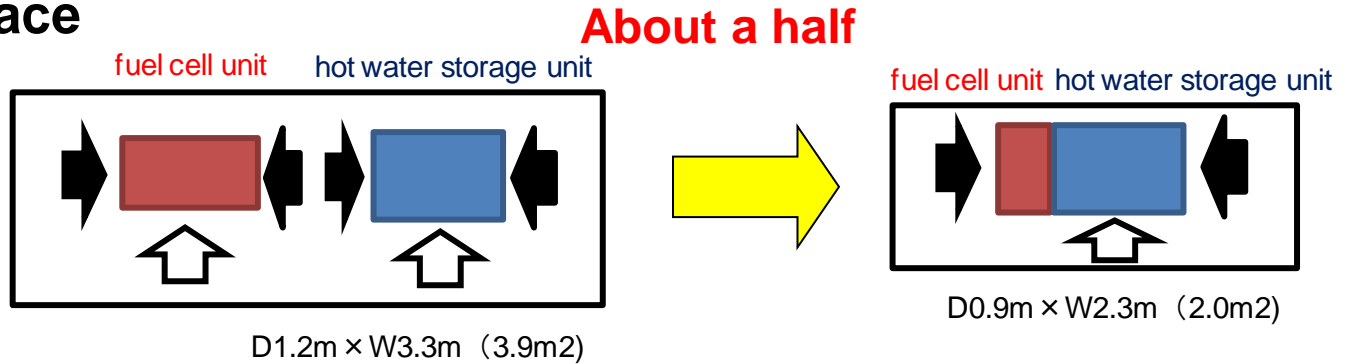
*7.5 kWh/day : relatively small hot water demand



Primary energy saving is improved at smaller energy demand site.

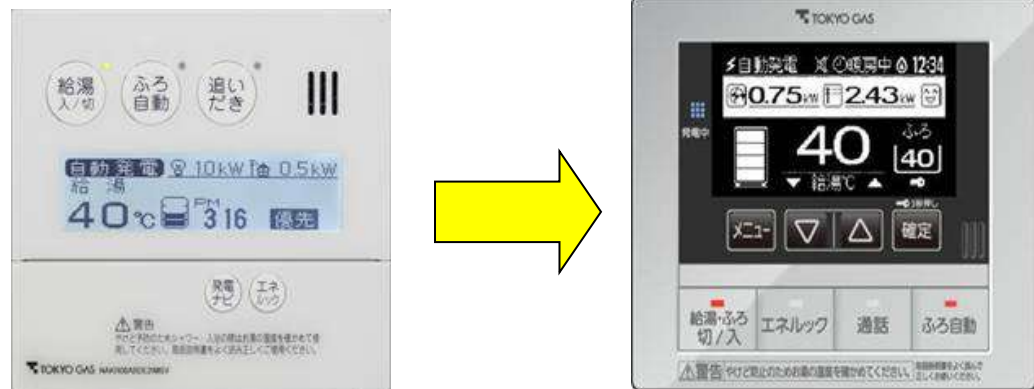
Other improvements of the new model

Installation space



User interface

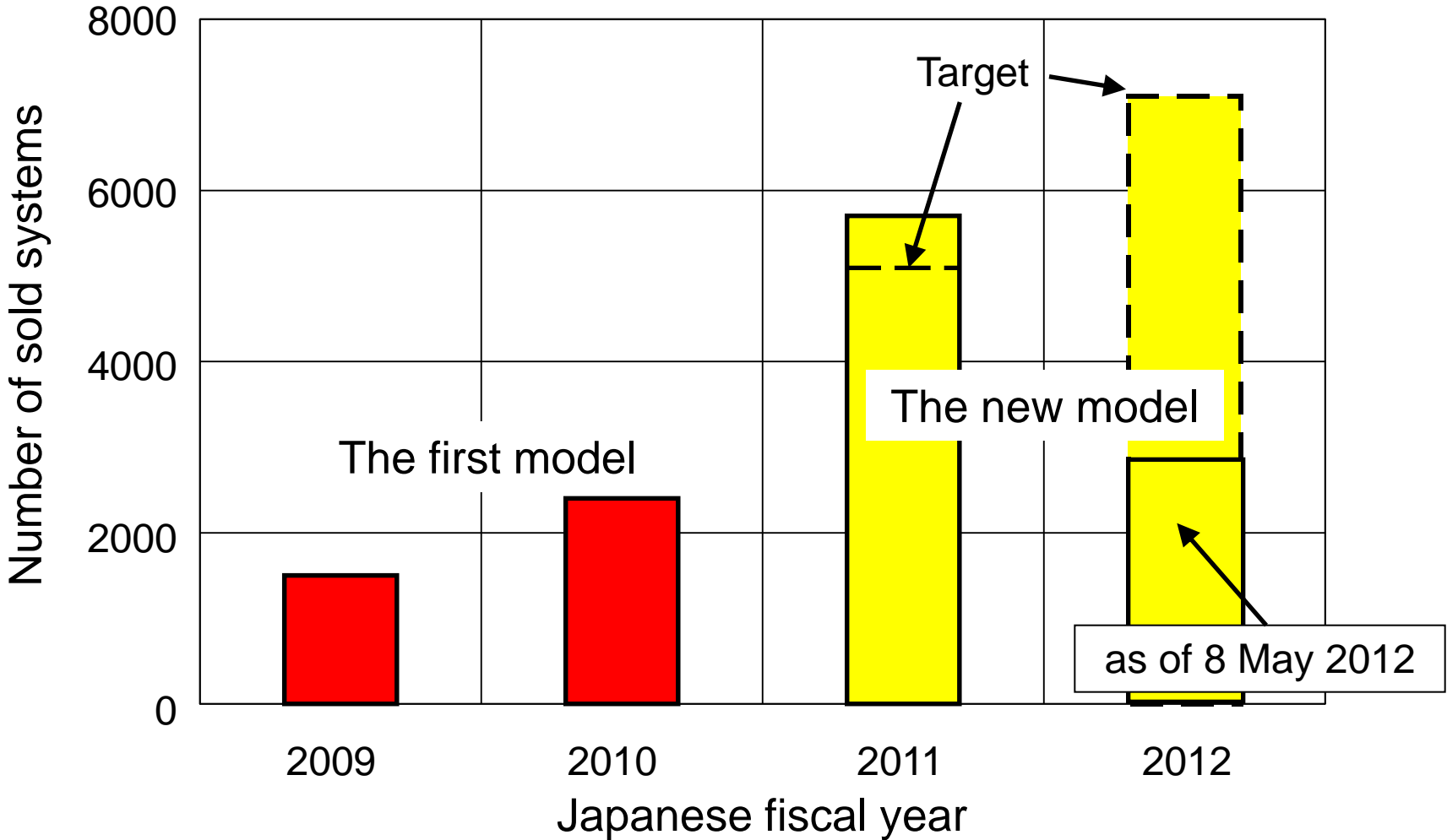
Larger display and easier access to the CHP related information



Cost reduction

System simplification, reduction of installation labor, reduction of maintenance interval and parts, and so on

Trend of the sales of residential PEM fuel cell CHP at Tokyo Gas



Summery

Tokyo Gas succeeded in developing the new model of its residential PEM fuel cell CHP.

➤ Improved efficiency at turndown and lowered minimum power output contribute to improvement of performance at a house with smaller energy demand.

Thanks to improvements in many aspects, such as installation space, user interface, cost reduction etc. in addition to that performance improvement, sales of the new model is going well.

*Thank you for your kind
attention!!*

You can see the mockup of the new model with real outlook and size at the **Japan Gas Association booth (8420, HALL 8, Level3)**.

* Some data described in this presentation were obtained under the Large Scale Demonstration Project supported by NEF, NEDO, and METI. The authors would like to express many thanks to them.