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Hitachi's experience in developing Smart Grids

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Renewable Energy & Smart Grid Division, Hitachi Ltd.

Required Technologies for Smart Grids

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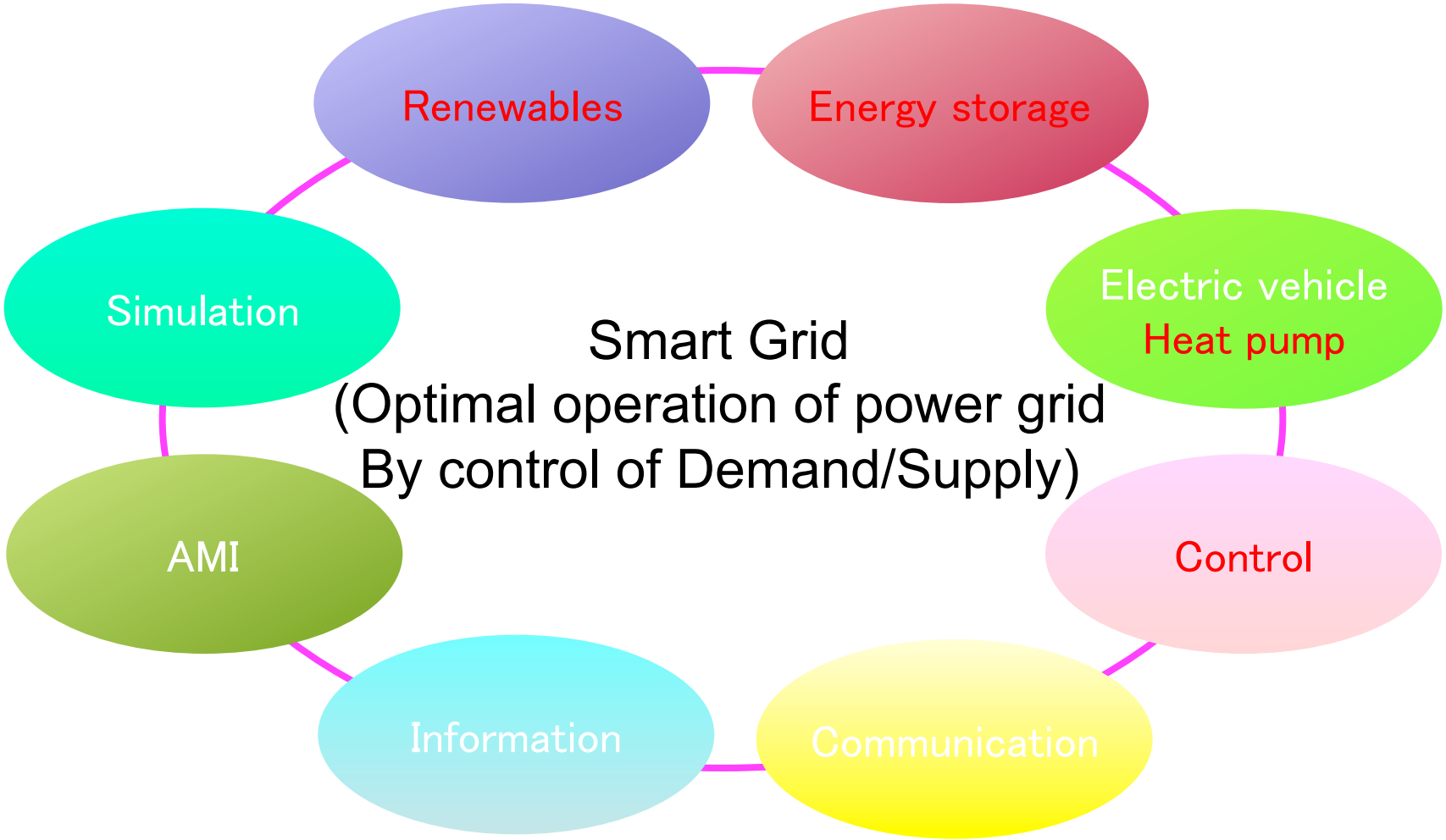
- Hitachi has a lot of experiences based on our products and technologies for Smart Grids



Mega Solar Plant & Bifacial PV Panel

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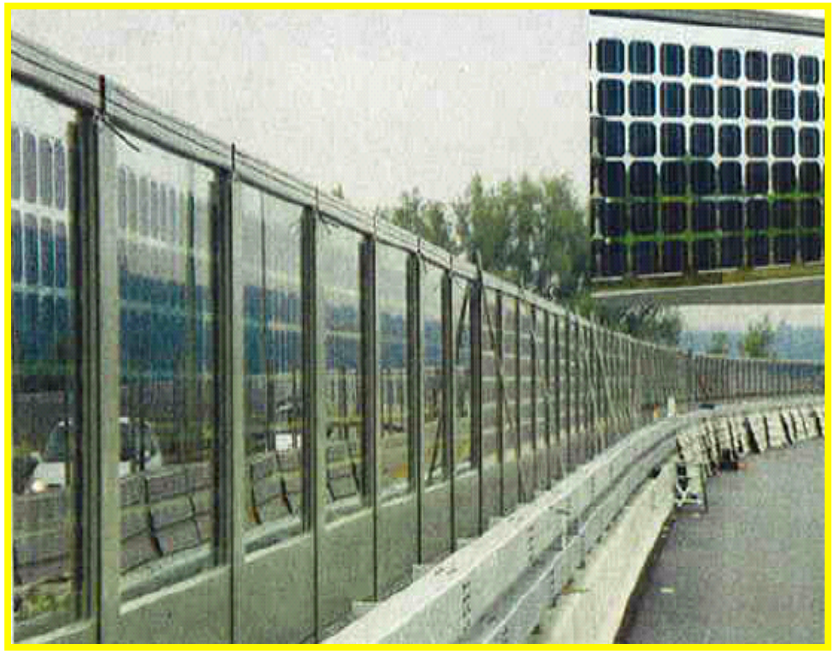
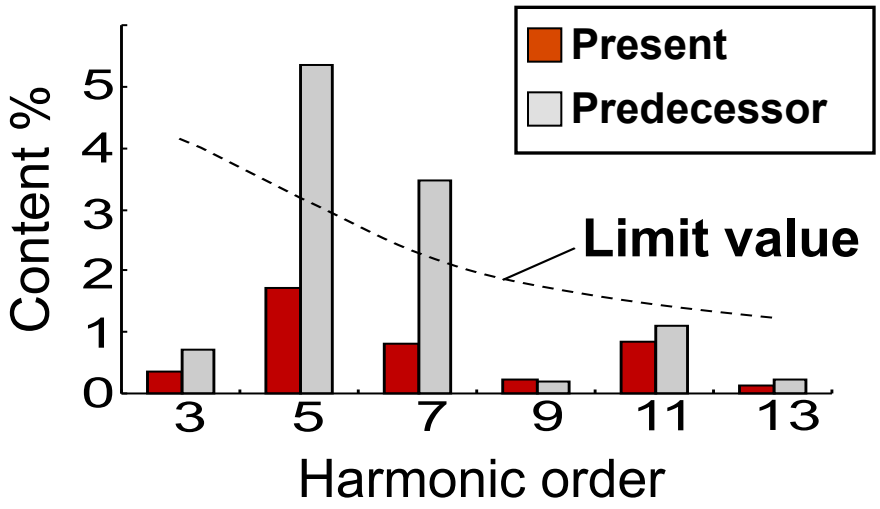
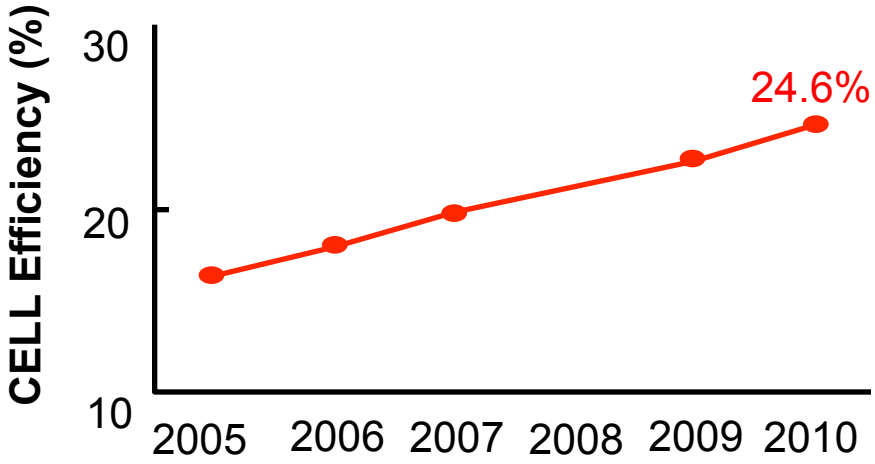
13MW-class Solar Plant for TEPCO



Application of Bifacial PV Panel





Lead Acid Battery

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Specifications	LL1500W-S
Voltage	8V
Energy Capacity	12kW
Expected life time	17 years
SOC range	30-90%
Recycle rate	>90%

Energy storage model

Wind Power-Kuroshio

Load Shifting System

Heat Pump Water Heater System

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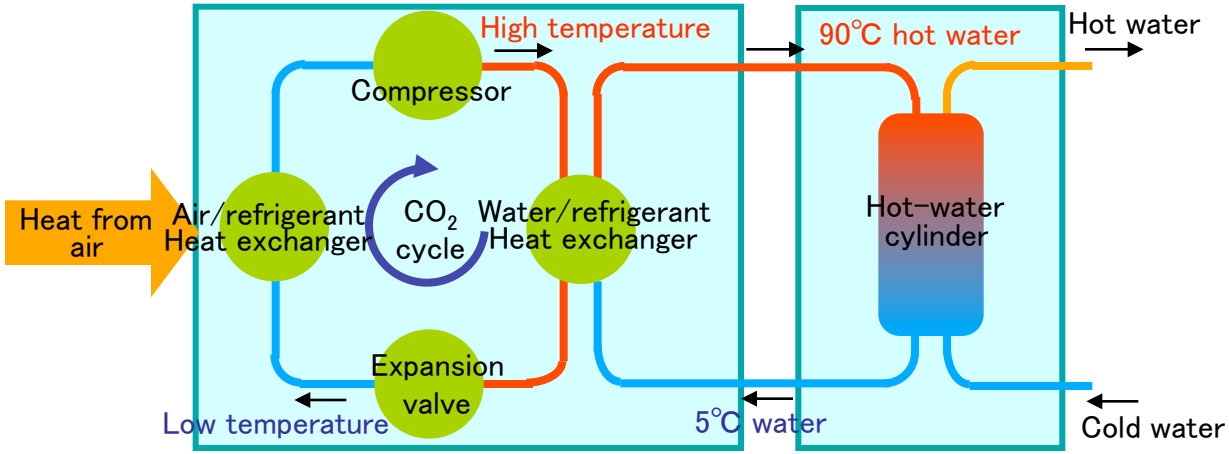
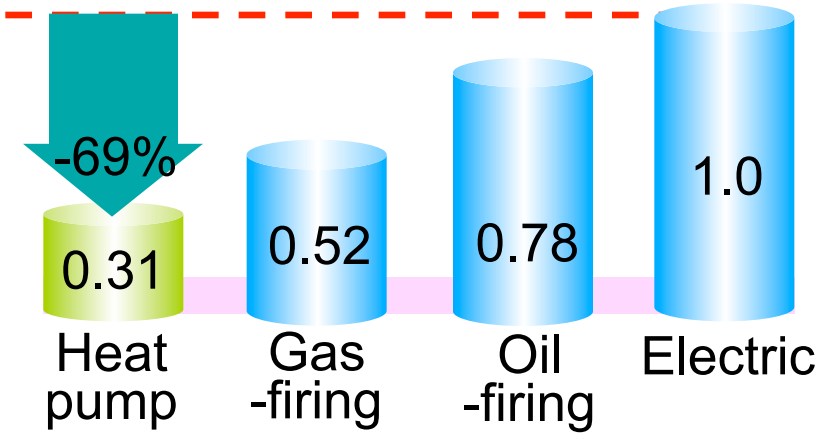
- Reduction of CO_2 emissions of water heater
- Applicable to demand response or load shifting

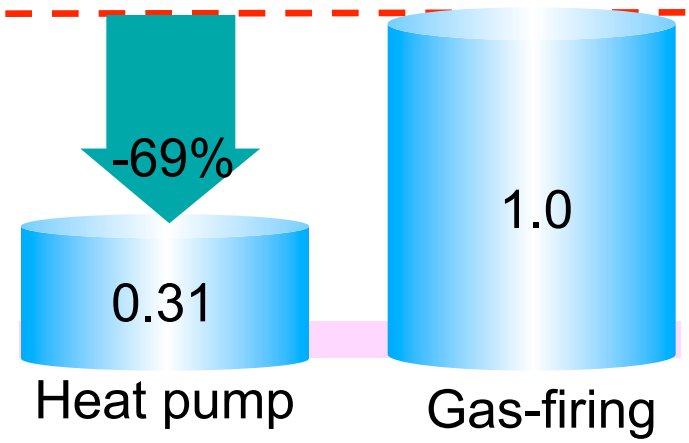
Overview of system



Principle of heat pump water heater



Comparison of relative CO_2 emissions



Comparison of relative operation cost

Smart Grids Trial at Rokkasho Village

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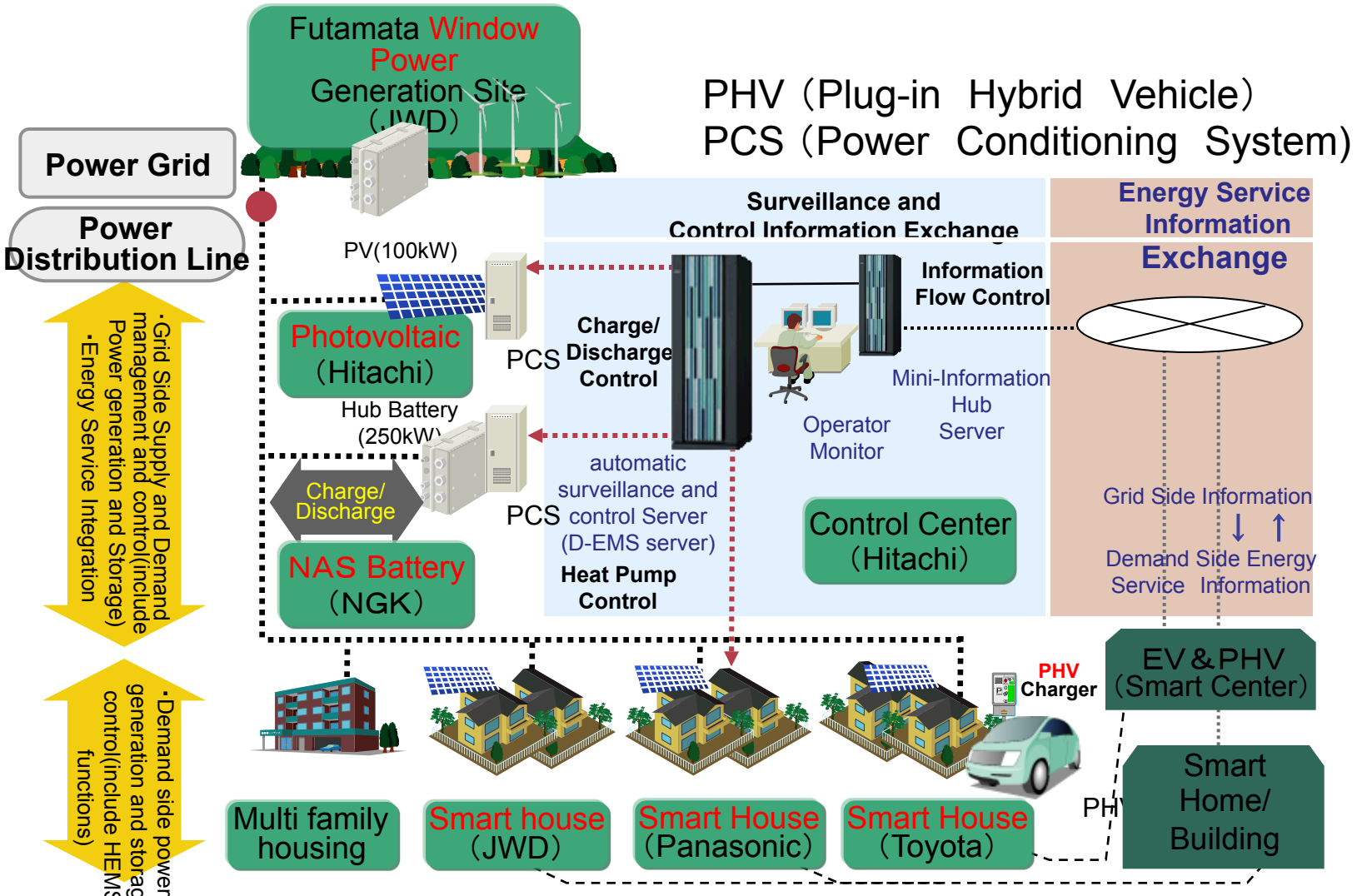
Rokkasho-Demonstration Project

- This project evaluates system functionality and energy optimization by using closed



Over view of PV

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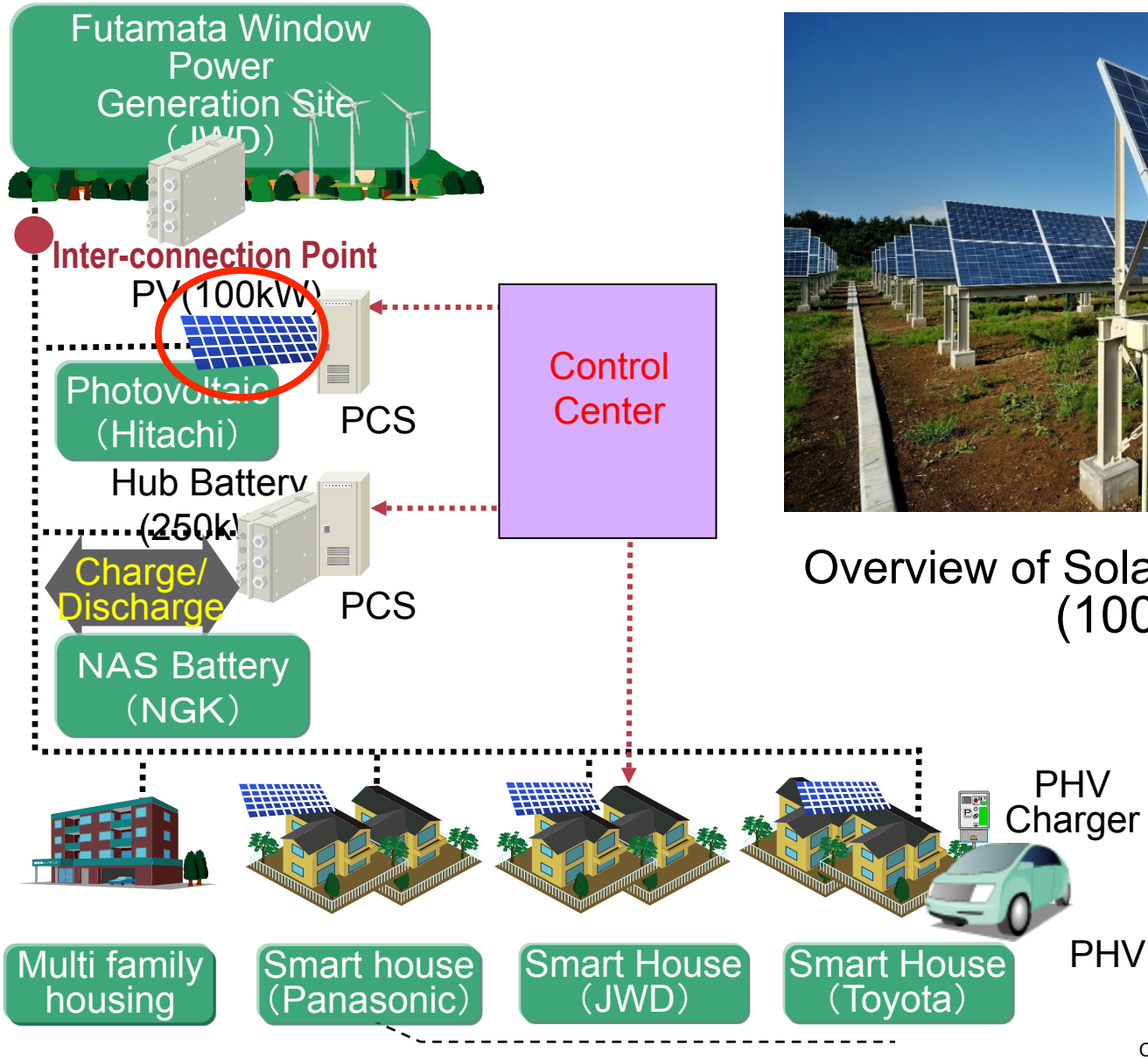

Overview of Solar Power System (100kW)

Over view of the Community

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Futamata Window Power Generation Site (JWD)

Inter-connection Point

PV(100kW)

Photovoltaic (Hitachi)

PCS

Control Center

Hub Battery (250kW)

Charge/ Discharge

PCS

NAS Battery (NGK)

Smart meter

Heat Pump

Multi family housing

Smart house (Panasonic)

Smart House (JWD)

Smart House (Toyota)

The analytical result (24/Sep- 28/Oct,2010)

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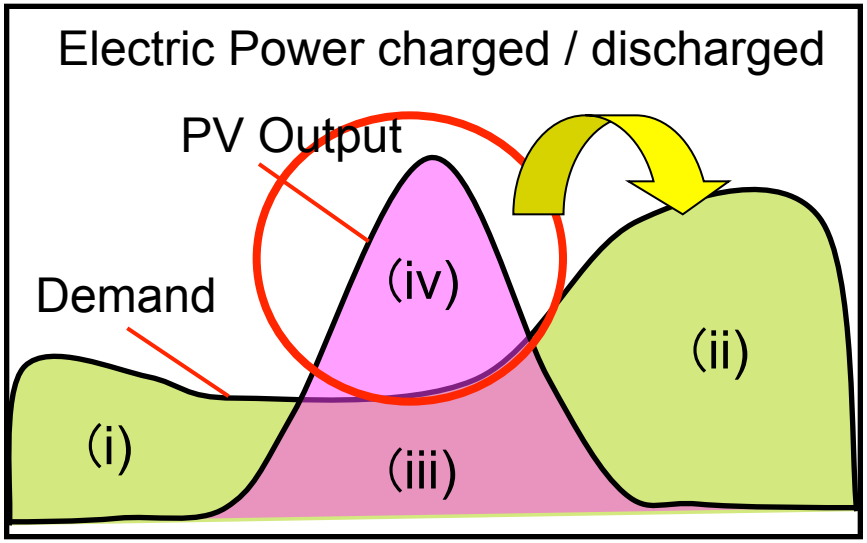
- The self-sustenance ratio is 88%

-88% of the total energy consumption was provided by the electric power of PV (HUB, Rooftop PV) generation with HUB Power storage.

- Operation Results:

■PV+Hub Storage support ratio is
95.9% = (iv) / ((i) + (ii)) (%)
■PV surplus ratio is
56% = (iv) / ((iii)) (%)



Balance of Supply & Demand

Conclusions

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Through actual demonstration projects in Japan, US and other areas, Hitachi is contributing to R&D of Smart Grids technologies.
The concept of Smart Grids should vary in each country and customer. Hitachi is willing to respect the existing power gird, utilities and technologies of the customers.
We are intending to contribute to achieve "Best Mix" of the customers' existing power grids and our leading-edge technologies as WIN-WIN solution.

Thank you for your attentions

