



Concept of PV System & DC Eco-House

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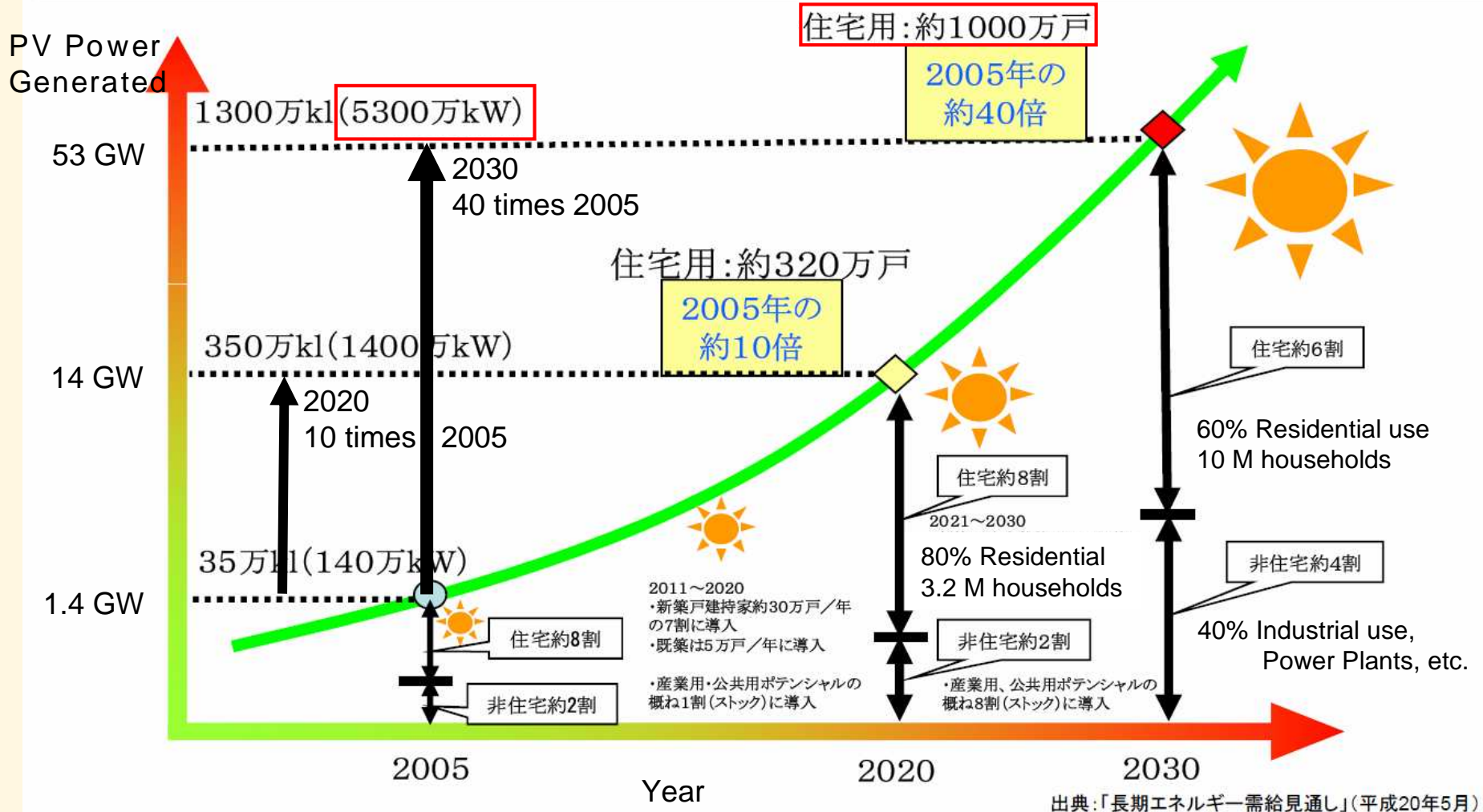
US-Japan Collaboration
New Mexico Green Grid Project
NEDO/Industry Meeting with New Mexico Officials and US Industry
April 13-15, 2009 at Albuquerque Marriott

Outline

- Background of PV market in Japan
- PV generated power characteristics
- Issues with excess powers
- Smart PV system
- DC Eco-House Concept

PV Power Market Penetration (Best Case Scenario in Japan)

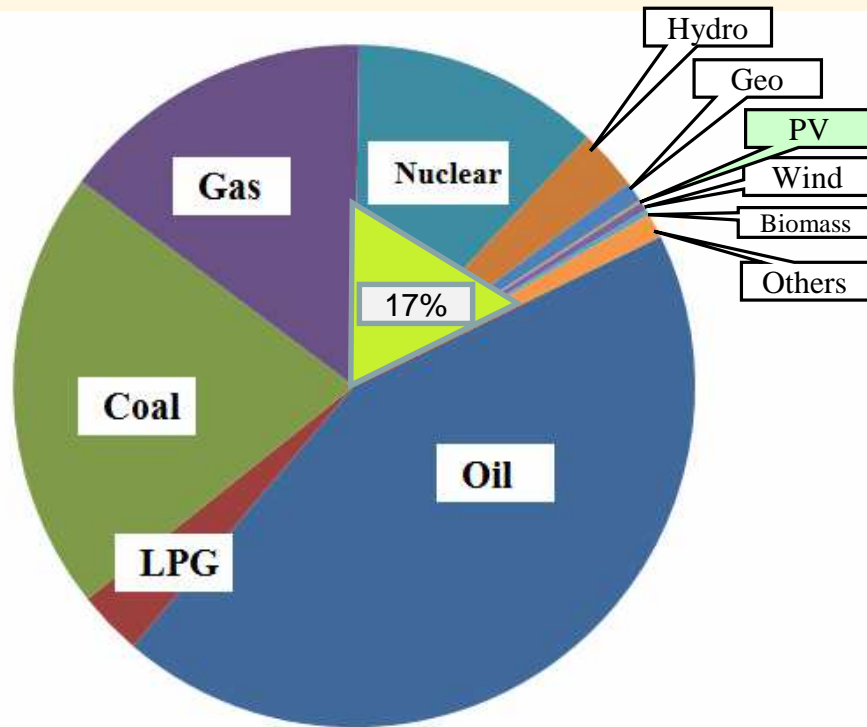
Projection of Power supplied by PV in Japan :
 Yr 2020 14 GW
 Yr 2030 53 GW



Reduction of Carbon Footprint in Japan

2005

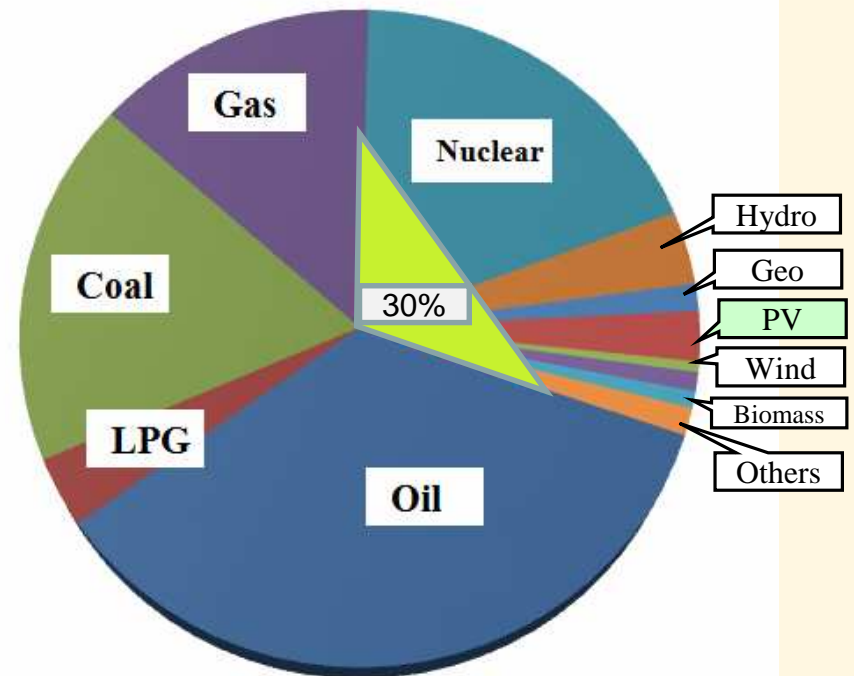
1 GW generated by PV



PV : ~ 0.1%

2030 (Best case scenario)

53 GW generated by PV

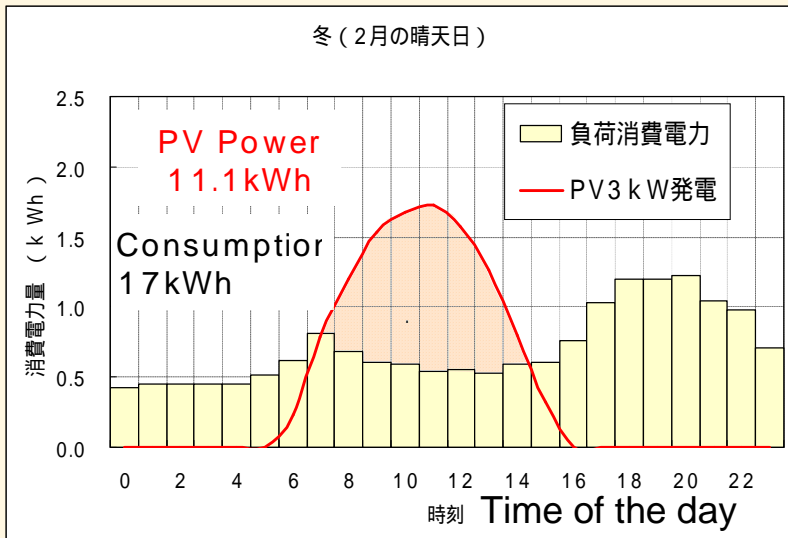


PV : ~ 5%

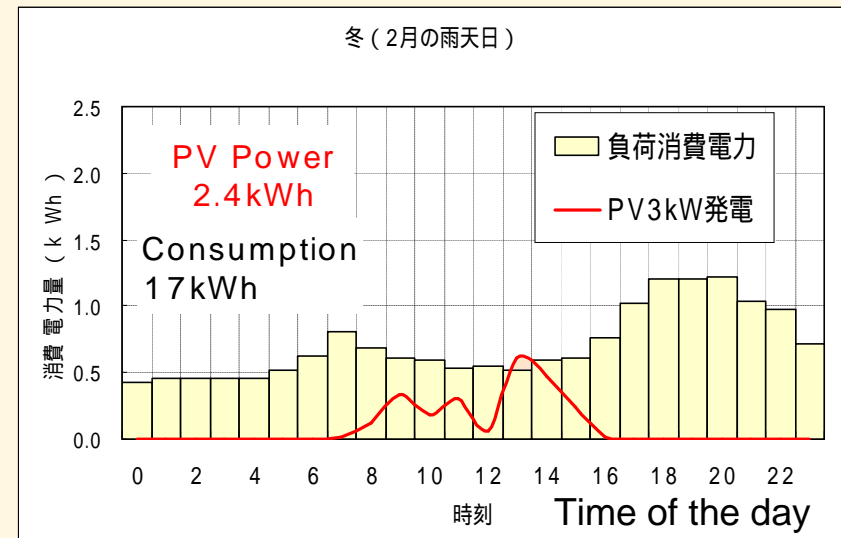
Residential PV Power Generation and Power Consumption

Winter

Sunny day

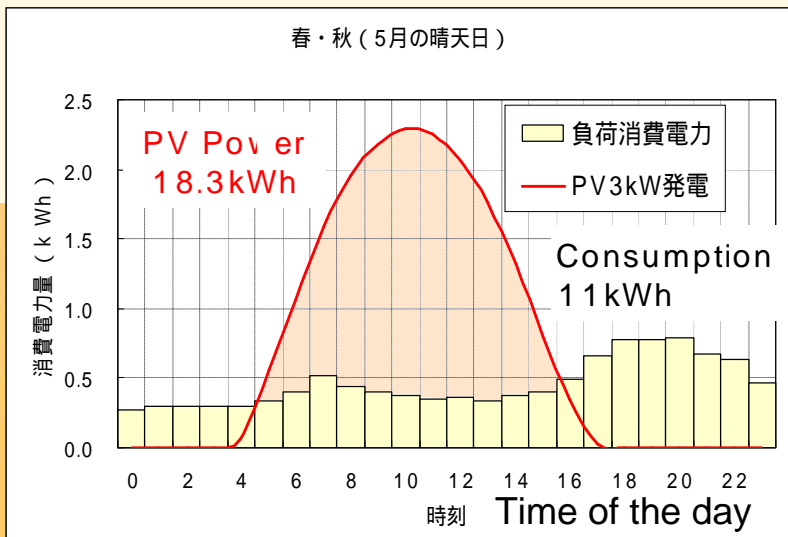


Rainy Day

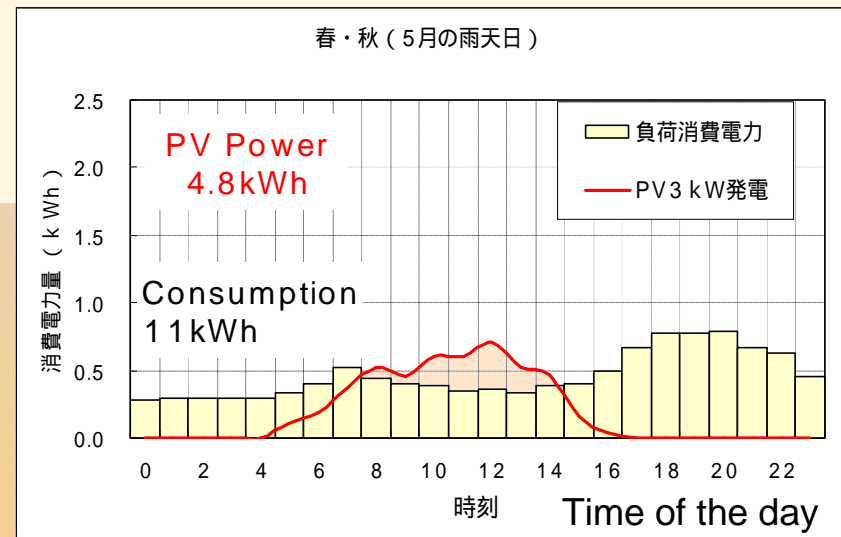


Spring • Autumn

春・秋 (5月の晴天日)



春・秋 (5月の雨天日)

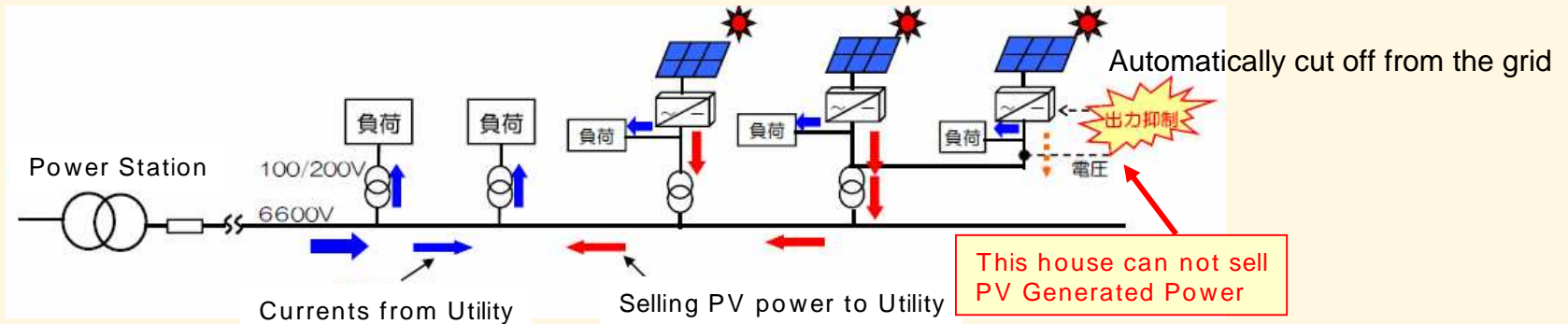


PV cannot supply entire home

Large PV Power fluctuations

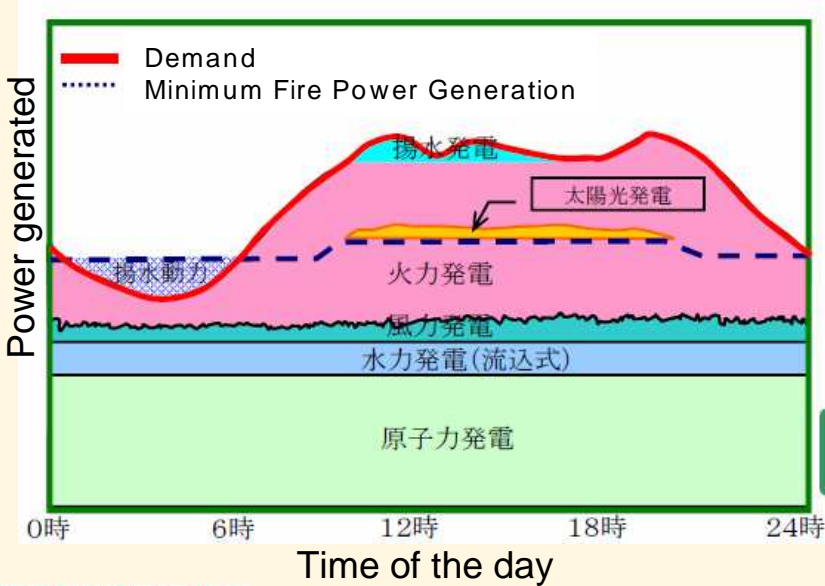
Issues when excess PV power is generated

Difficult to sell PV Power if generated power raises the voltage of the grid.

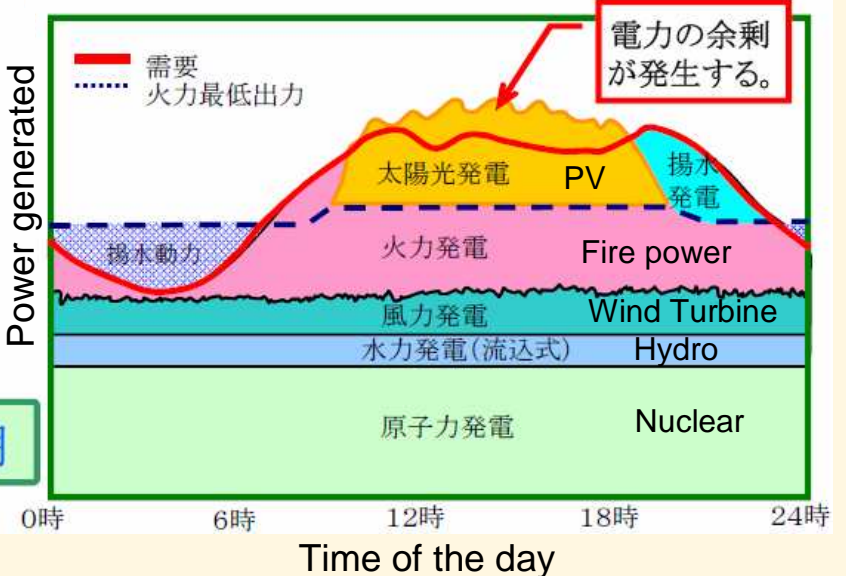


Power surges disrupt the Load Frequency Control (LFC)

Surplus electric power is generated

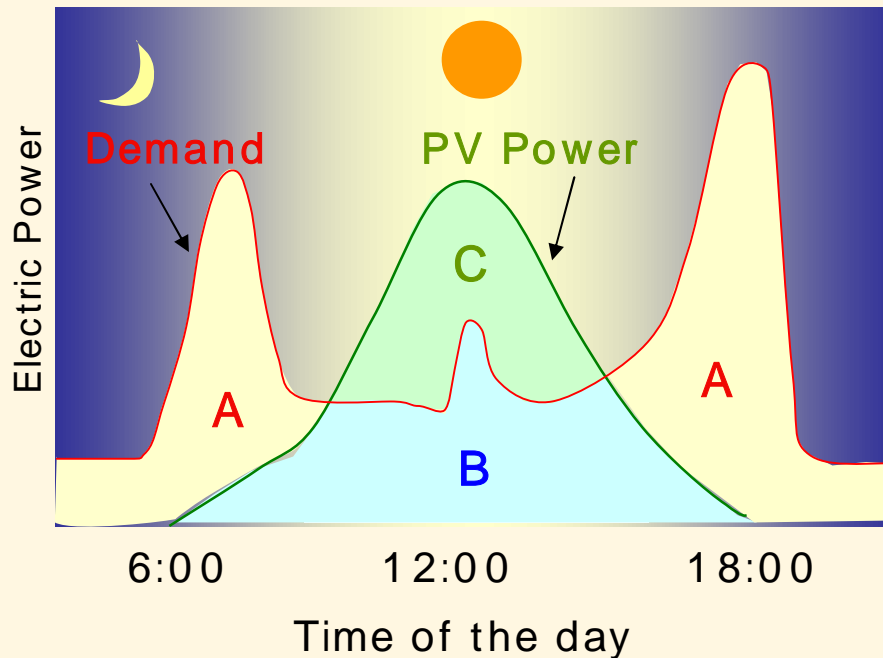


Surplus PV power generated



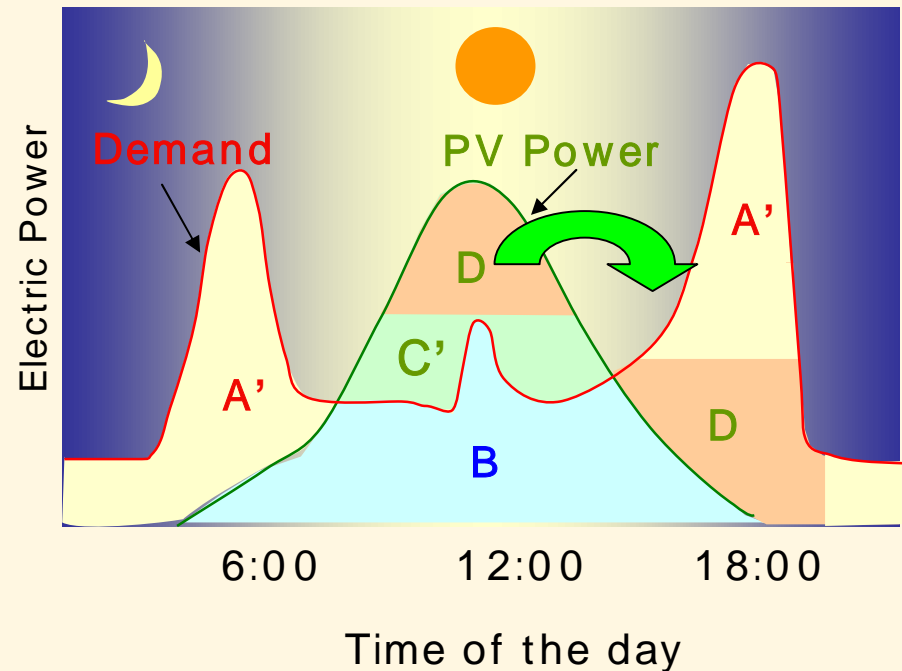
Smart PV System

Current PV system



A : Purchased electric power from the Grid
 B : PV Generated Power
 C : Selling surplus PV Power

PV with storage system

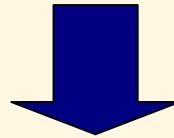


A' : Purchased electric power from the Grid ($A'=A-D$)
 B : PV Generated Power
 C' : Selling surplus PV power
 D : Stored PV power for night

DC Eco-House Concept

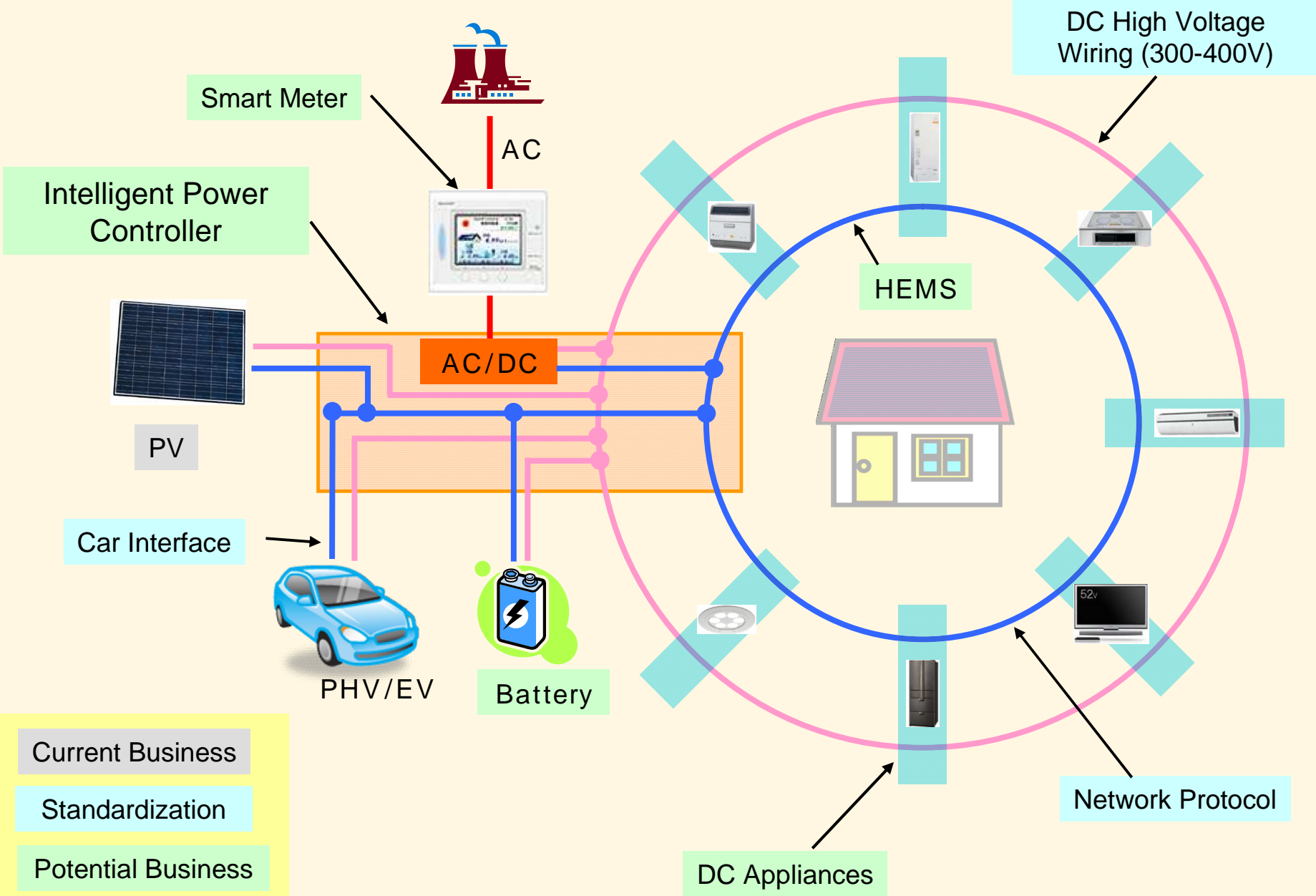
- Co-use of PV power and utility power
- Best combination of utility power, energy generation (PV), energy-saving and energy storage
- Environmental Conservation, Health and Comfort will co-exist

Features



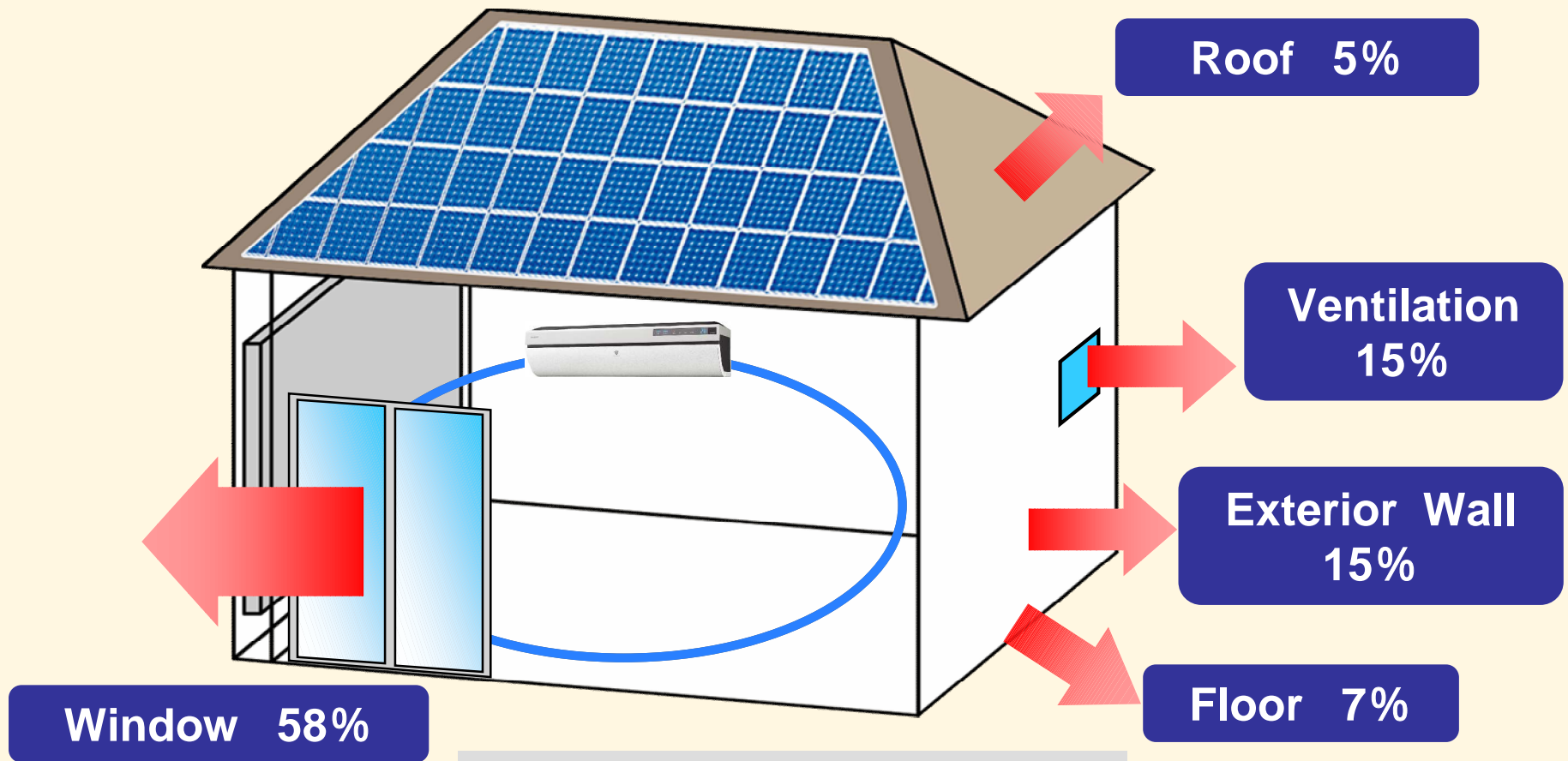
<u>D</u> irect <u>C</u> urrent	DC high voltage wiring at home DC appliances PV, Storage system, HEMS
<u>D</u> ecrease <u>C</u> O2	No fossil fuel (electric power only) Thermally insulated walls/windows Heat pump for hot water supply
<u>D</u> isplay <u>C</u> entric	Large LCD TV information center in the house

DC Eco-House - 1. Direct Current



DC Eco-House - 2. Decrease CO2

The Rate of the Heat Loss from House (Winter)



All Electric Power House
Thermally Insulated Walls/Windows
Hot-water supply using Heat Pump

DC Eco-House - 3. Display Centric

Information and entertainment center of the home



Reduction of Energy Consumption by DC Eco-House

