

# Heat Pump Technologies in Japan

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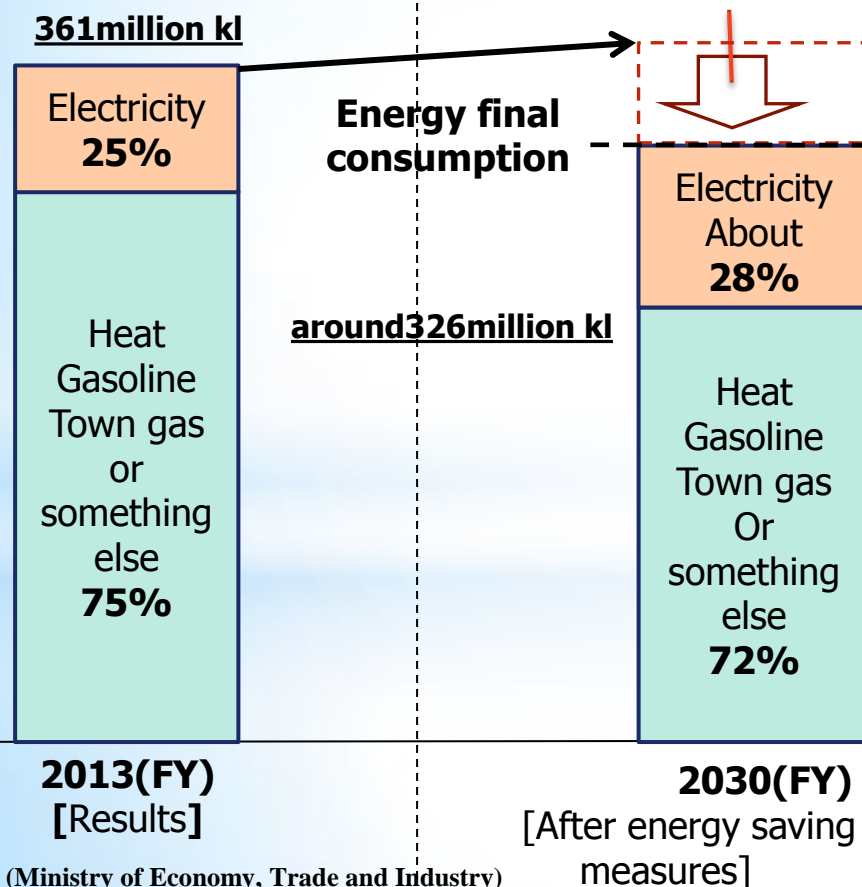
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# Long Term Energy Supply-Demand Outlook 2015, Japan

## Energy Demand

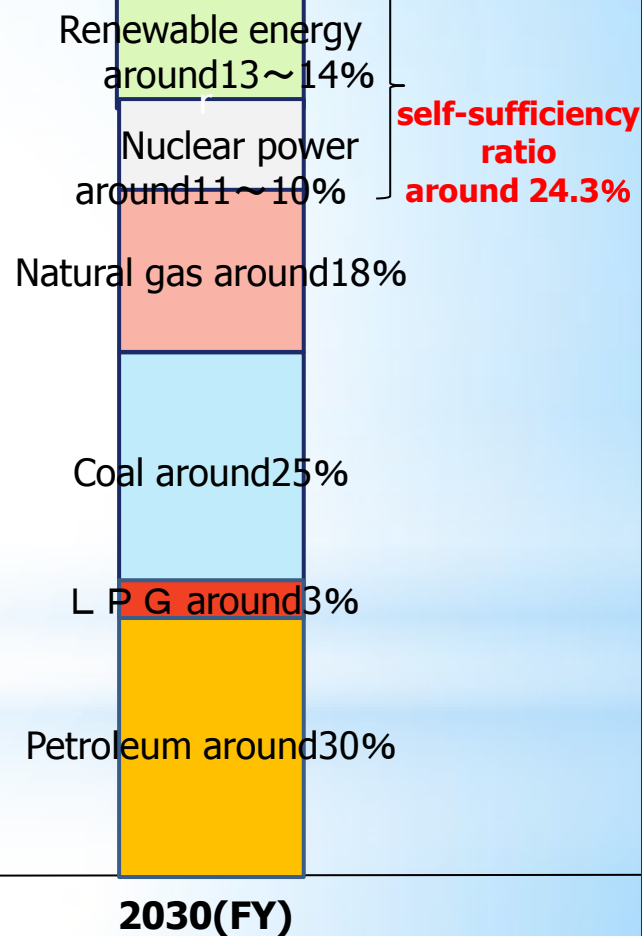
Economic growth rate  
1.7% / year

**By ensuring energy saving to reduce energy consumption 50million kl (▲around13% in contradistinction to 2013 )**



## Primary Energy Supply

around 489million kl



# Energy Saving Measurement Each Sector

## Industrial Sector

### ○Energy Consumption reduction

**: 10million KL**

- 1) Main Industries' contribution to promote low-carbon society
  - 2) Thorough energy management in factories
  - 3) Introduction of Innovative technology
  - 4) Introduction of high efficient equipment
- ⇒ ✓ **High efficient Room air conditioner**  
✓ **Industrial heat pump**

## Transportation Sector

### ○Energy Consumption reduction

**: 16million KL**

- 1) Promotion of Next-Generation Vehicles
- 2) a means of improving the traffic situation

## Commercial and business Sector

**: 12million KL**

- 1) Energy saving of buildings
- ⇒ ✓ **Energy saving regulation on new buildings**
- 2) Improvement of energy management by BEMS
  - 3) Improvement of hot water heater for business use
- ⇒ ✓ **heat pump water heater**  
✓ high efficient steam boiler

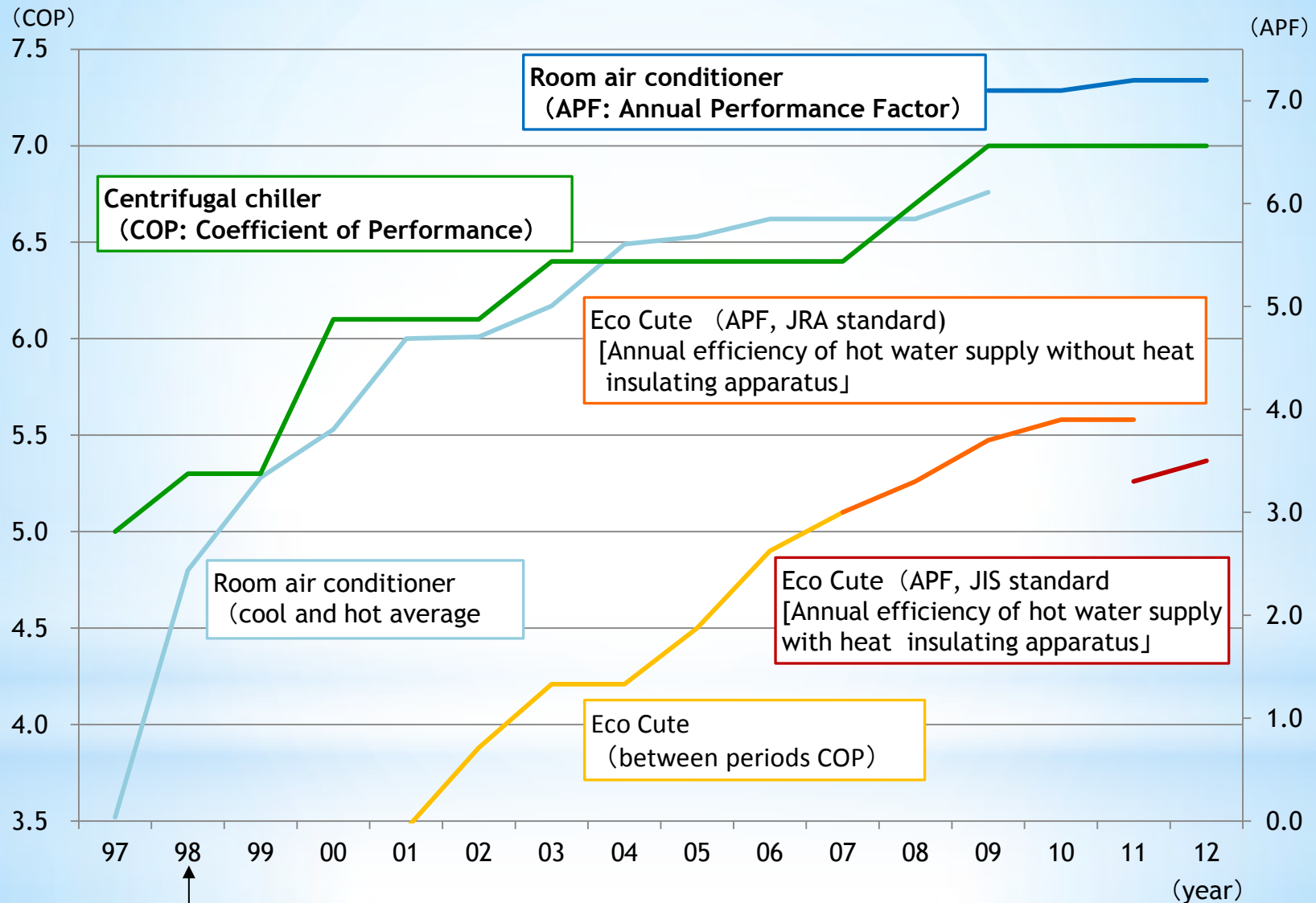
## Residential Sector

### ○Energy Consumption reduction

**: 12million KL**

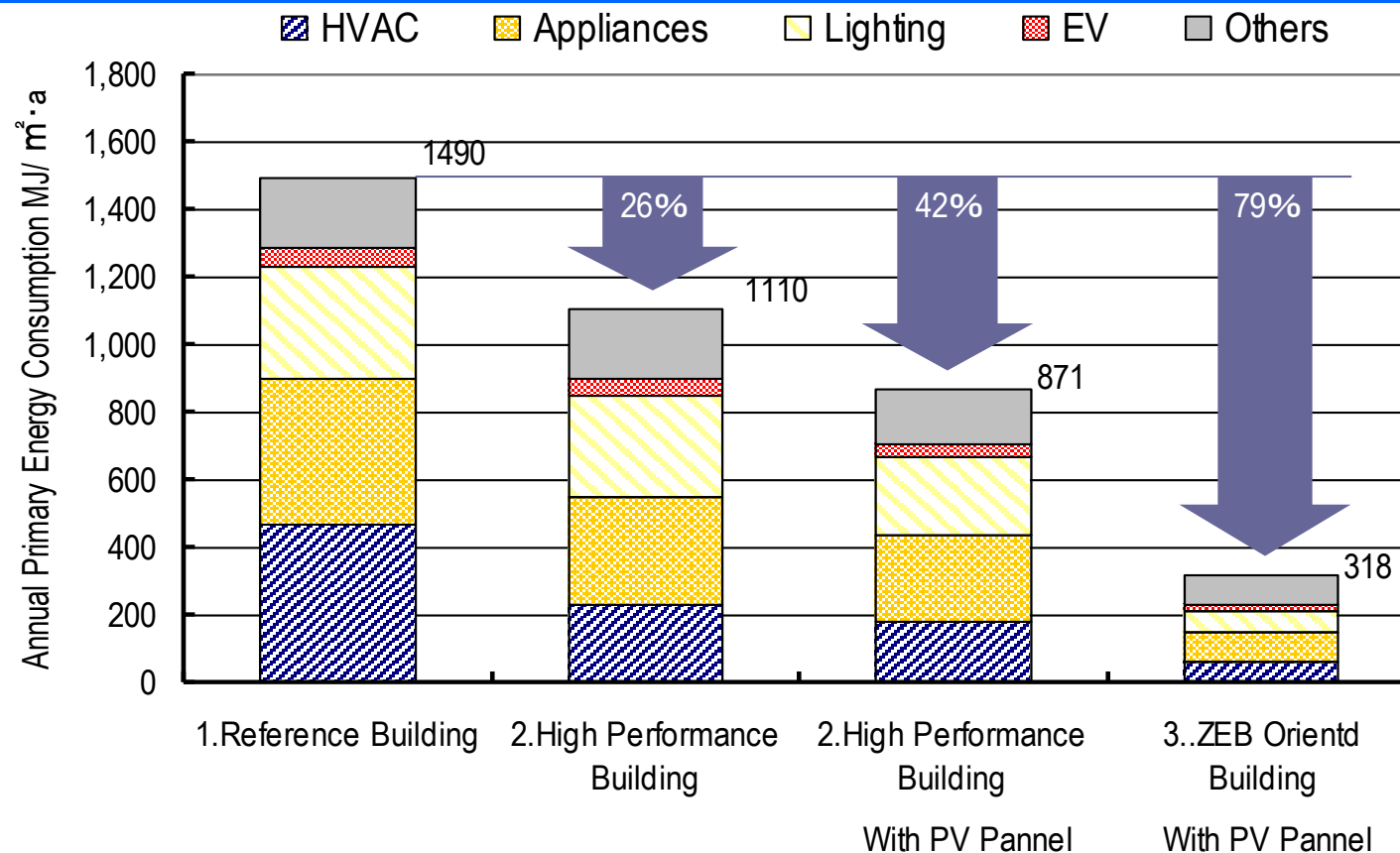
- 1) Energy saving of a dwelling house
- Energy saving regulation on new dwelling houses
- 2) Improvement of energy management by HEMS
  - 3) Introduction of high efficient water heater
- ⇒ ✓ **Introduction of "Eco Cute"**  
**: 14million units as of 2030**

# Heat pump efficiency has been increasing



Top Runner Program was introduce

# Result of the Case study (IEA HPP Annex40 Japanese team)



○The current technological level enables 42% energy reduction

○The prospective future technological advancement enables about 80% energy reduction.

⇒ Achieving NZEB needs improvements of performance coefficient of heat pumps (COP Cooling:7.0%, Heating:7.5%)

⇒ It is clear that utilization of heat pump is inevitable for achieving NZEB

# Result of study on installing water source heat pump(HP) in the radiation panel system

	Air source HP	Water source HP (Well water)	Water Source HP (Well water + mitigated chilled water temp.)
Supply Heat rate [kWh]	85,598	85,598	85,598
Power for Water transfer [kWh]	5,788	9,134	9,134
Power for Air transfer [kWh]	0	0	0
Heat Source Equip. [kWh]	33,148	19,682	16,732
Total Amount [kWh]	38,935	28,816	25,866
System COP[-]	0.79	1.07	1.19
Primary Energy Unit [MJ/m2y]	39	29	26

- The change of the heat source equipment to a water source HP reduced the energy consumption of the heat source itself by 40% compared to the use of an air source HP (33,148 kWh⇒16,732kWh).
- In the case in which the heat source equipment was changed to a water source HP and hot- and cold-water temperature requirements were relaxed at the same time, the power consumed by the heat source equipment decreased to 16,732 kWh.