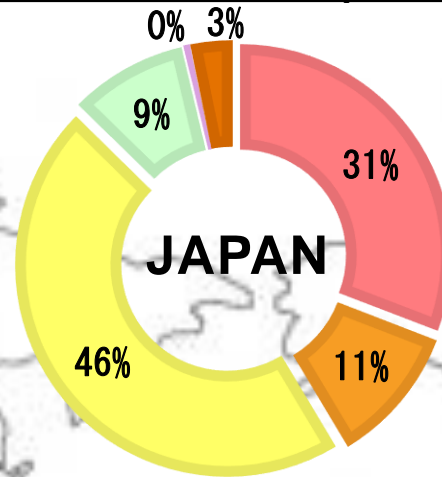


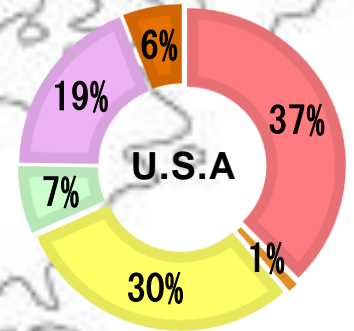
# Overview of Renewable Energy in Japan

**Hidetomo Uchida**  
**Forum of Electrical Safety Inspection Association**

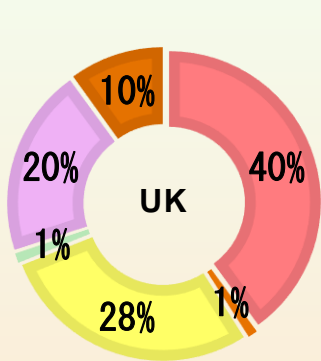
# Energy self-sufficiency and power source make-up of different countries (As of 2012)



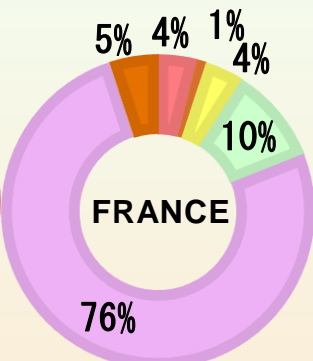
Energy self-sufficiency **6.3%**



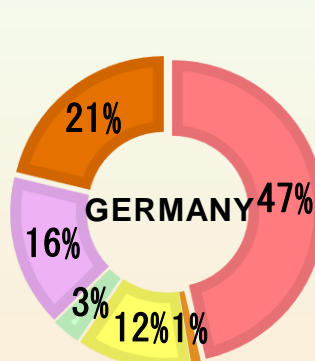
Energy self-sufficiency **84.4%**



Energy self-sufficiency **61.1%**



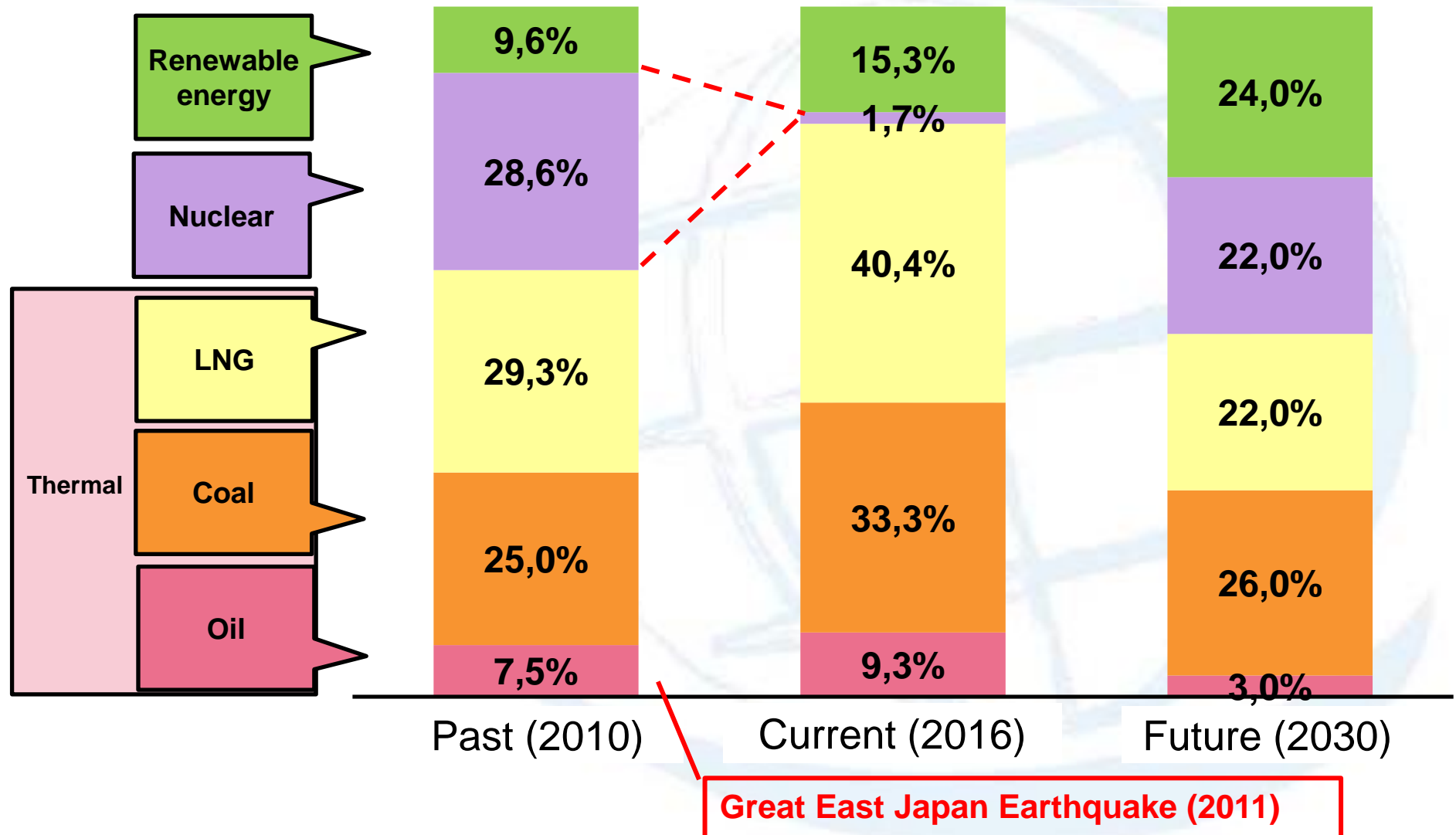
Energy self-sufficiency **53.3%**



Energy self-sufficiency **39.5%**

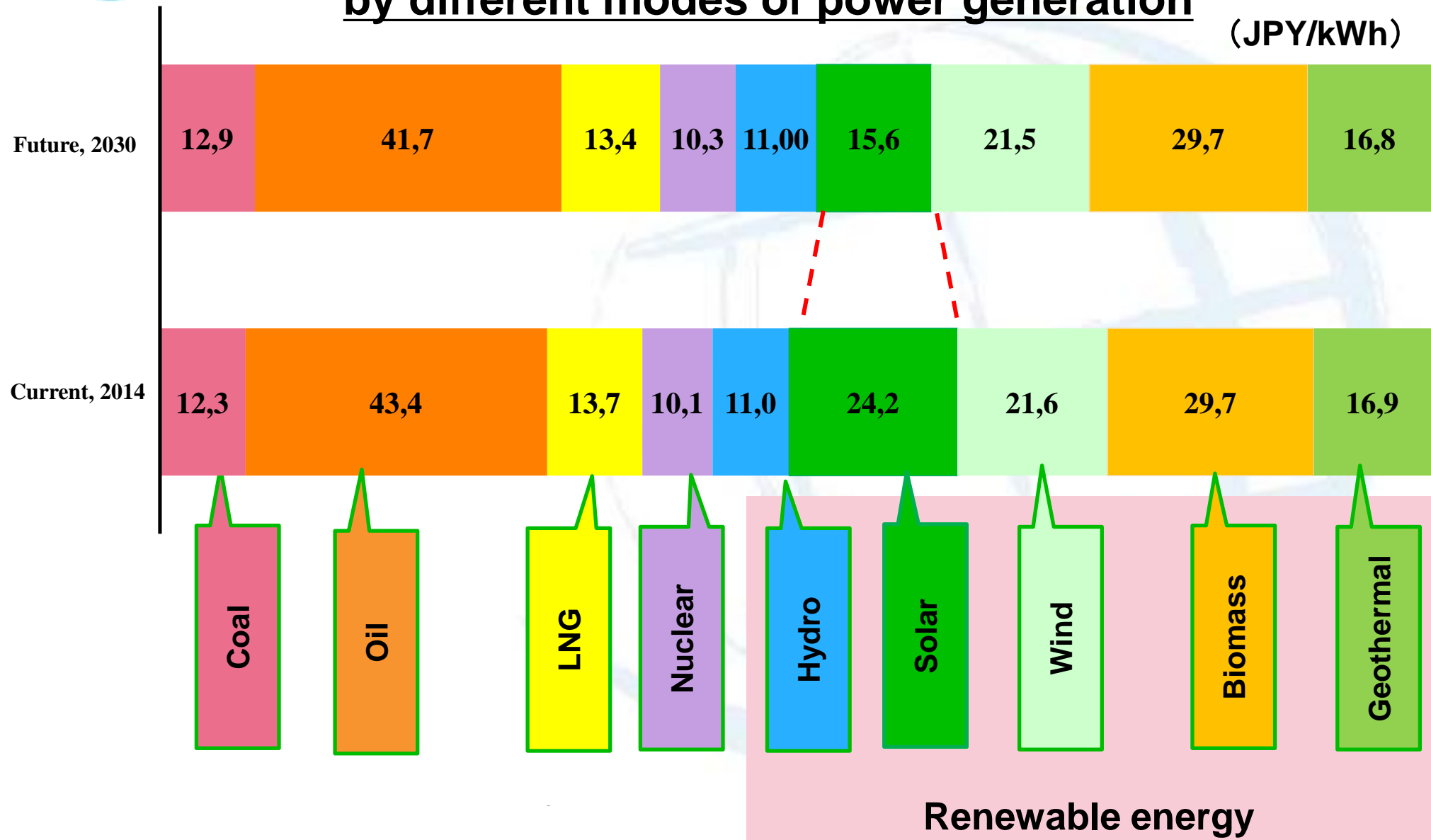


# Japan's power source make-up — Past, current and future



# Costs of generating 1 kWh of electricity in Japan by different modes of power generation

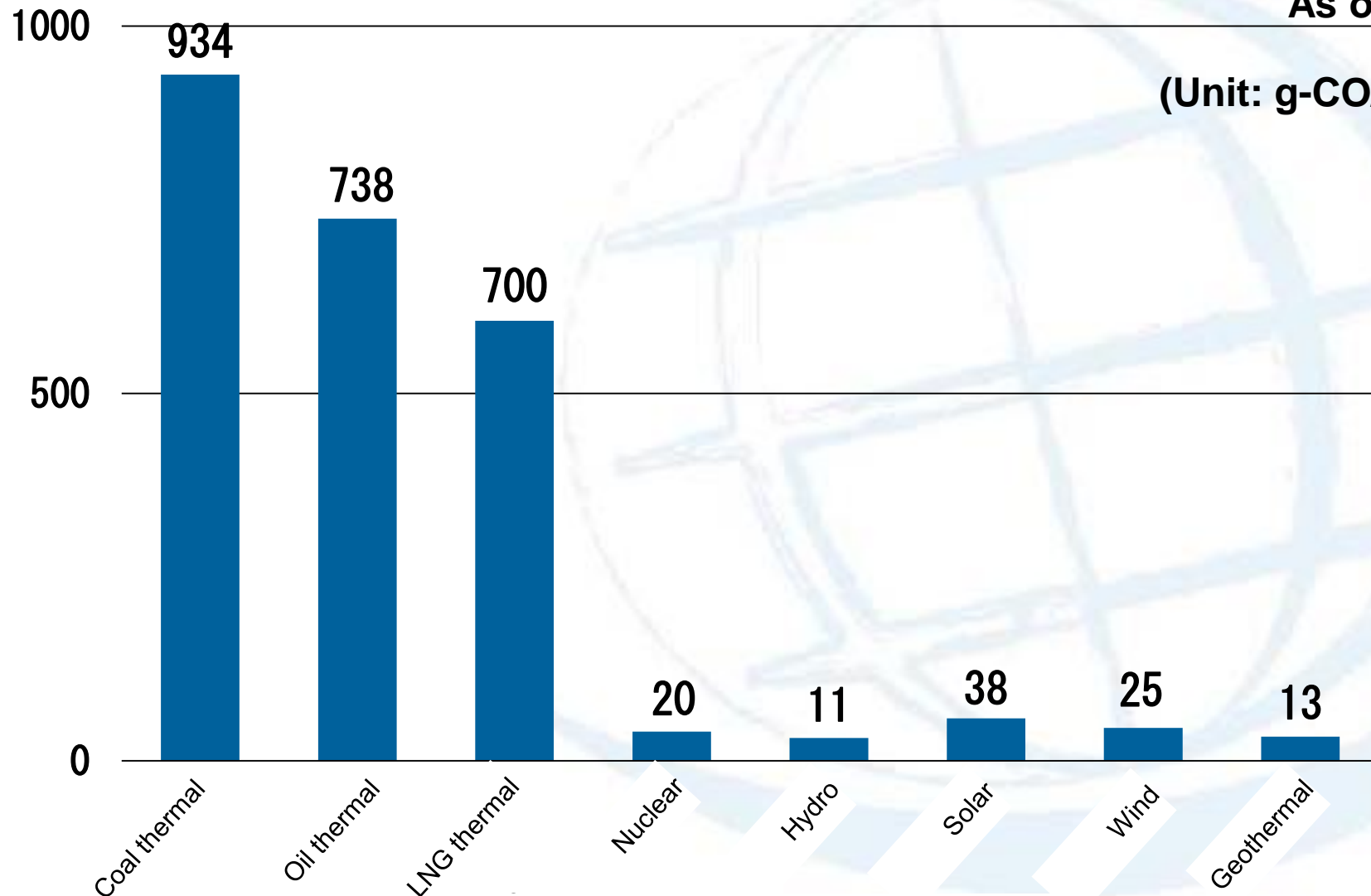
(JPY/kWh)



# CO2 emissions for every 1kWh generated in Japan by different modes of power generation

As of 2010

(Unit: g-CO/kWh)



# Key Point [1] The advantages and disadvantages of different modes of power generation

## Advantages

◎ Fuel is liquid and therefore easy to transport and store.

◎ Cheaper than oil or LNG.  
◎ Available globally and supply is consistent.

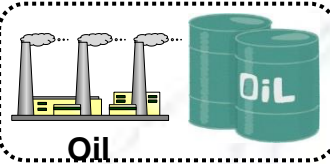
◎ Available globally and supply is consistent.  
◎ Best power generating efficiency among all thermal fuels.

◎ Only small amounts of fuel needed to generate large amounts of power inexpensively.  
◎ No CO<sub>2</sub> emissions when generating power.

◎ Requires no fuel.  
◎ No CO<sub>2</sub> emissions when generating power.

◎ Requires no fuel.  
◎ No CO<sub>2</sub> emissions when generating power.

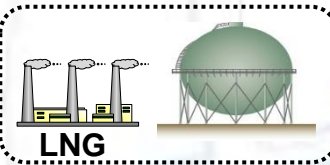
## Thermal



Oil

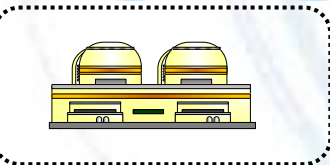


Coal

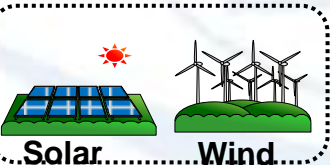


LNG

## Nuclear

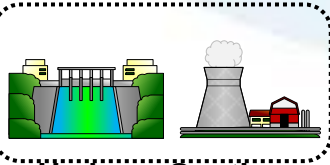


## Renewable energy



Solar

Wind



Hydro

Geothermal

## Disadvantages

✗ Volatile prices. Production is concentrated in the middle east.  
✗ Emits large amounts of CO<sub>2</sub> when generating power.

✗ Emits large amounts of CO<sub>2</sub> when generating power.  
✗ Ashes are left over after generating power.

✗ Emits CO<sub>2</sub> when generating power, albeit in smaller amounts than from oil.  
✗ Volatile prices. Cannot be stockpiled for long periods of time.

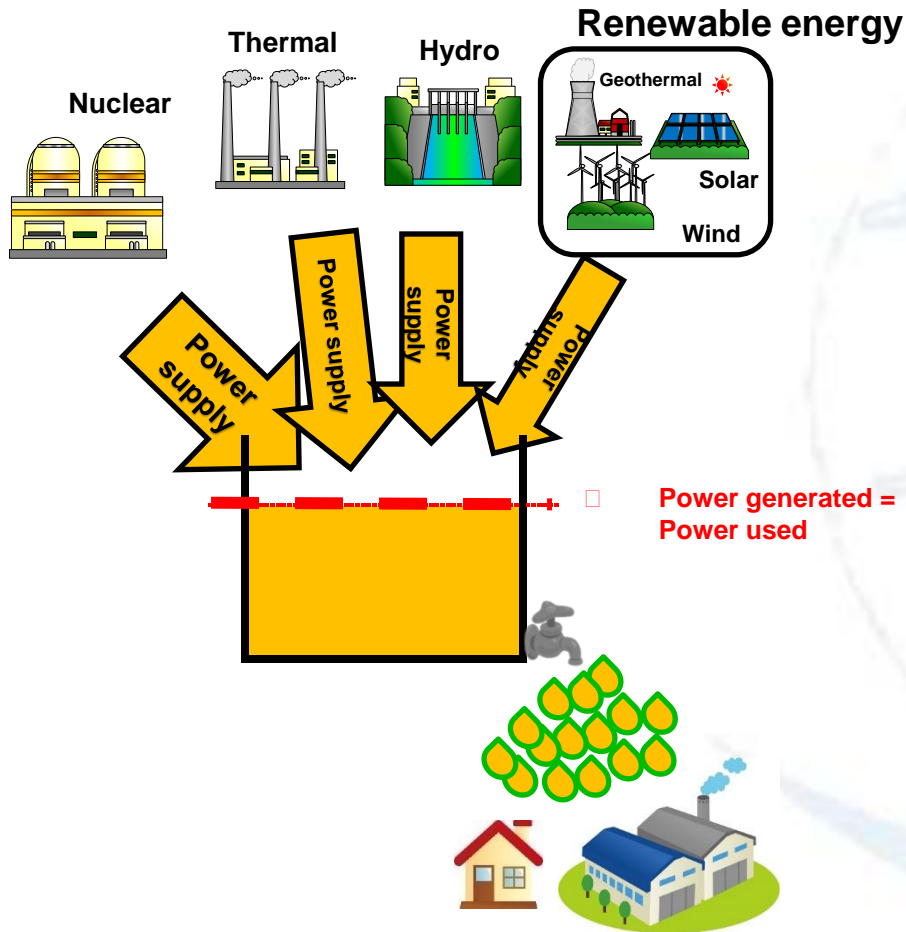
✗ Consequences from accidents are severe.  
✗ Requires stringent management of radioactive material.

✗ Is affected by weather and other natural conditions, resulting in inconsistent power generation.  
✗ Unable to generate power in large amounts.

✗ Only being developed in a small number of regions.  
✗ Requires long development lead times, and developable areas are limited.

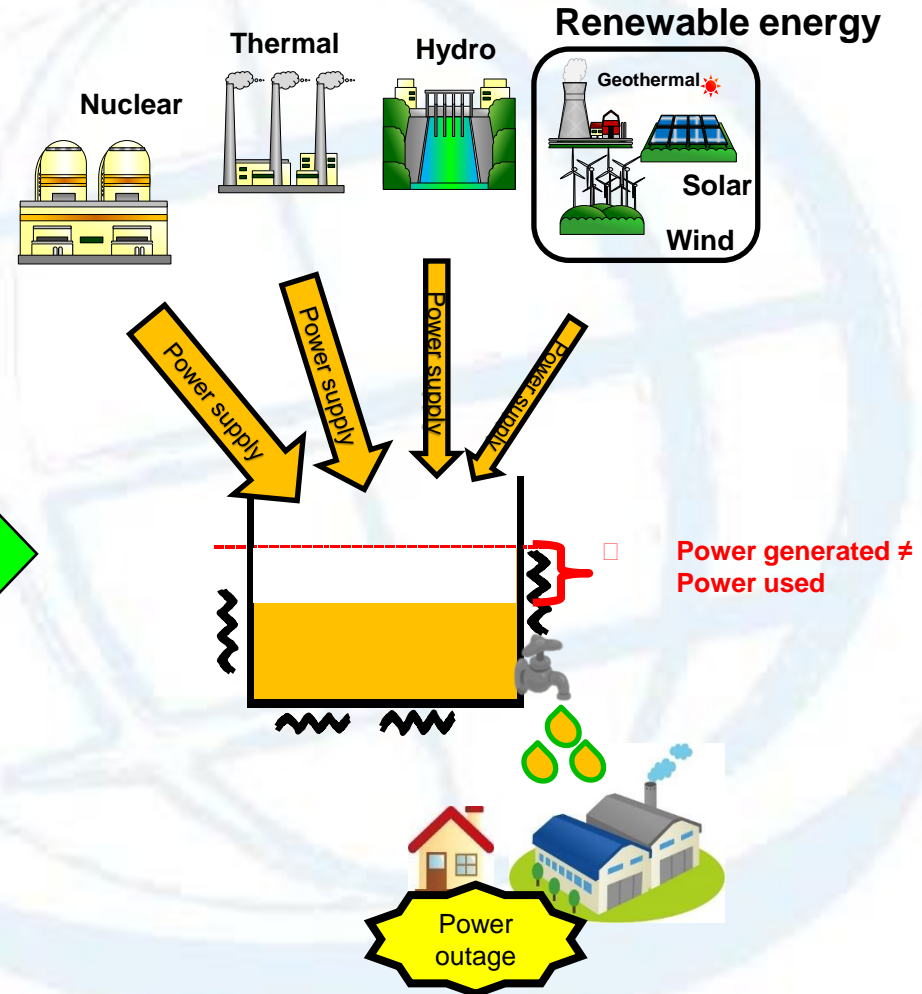
# Key Point [2] Equalizing the amount of power generated and used

Amount of power generated (power generated)



Amount of power used (power consumed)

Amount of power generated (power generated)



Amount of power used (power consumed)

## Key Point [3] Four perspectives for choosing modes of power generation

### **Energy security**

This is about providing users with a supply of power that they are able to use in the amounts that they need, when they need it, with few power outages.

### **Economy**

This is about lowering the cost of power as much as possible so as not to seriously affect household finances or other economic activities.

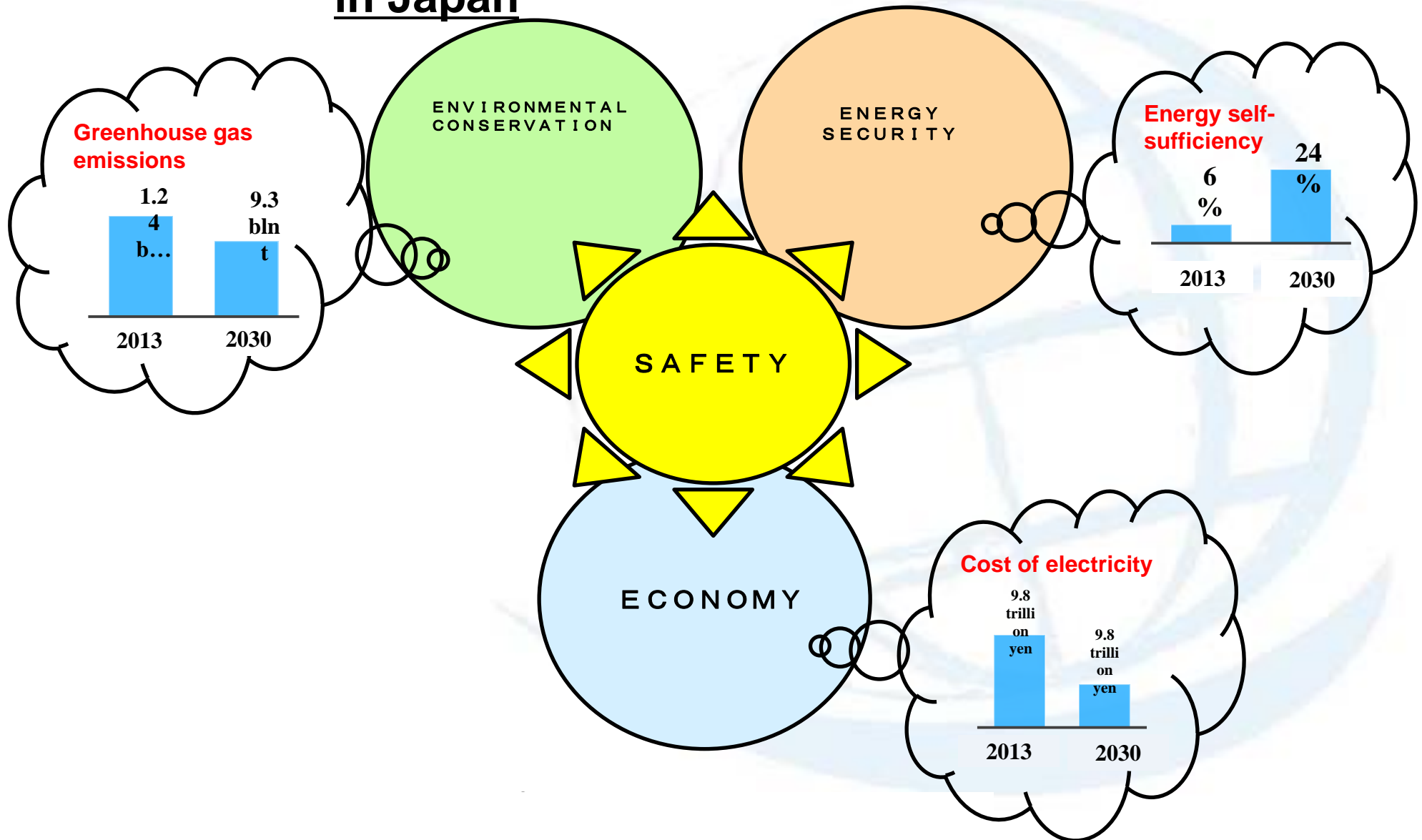
### **Environmental conservation**

This is about controlling CO<sub>2</sub> emissions as we protect our natural environment into the future.

## **Safety**

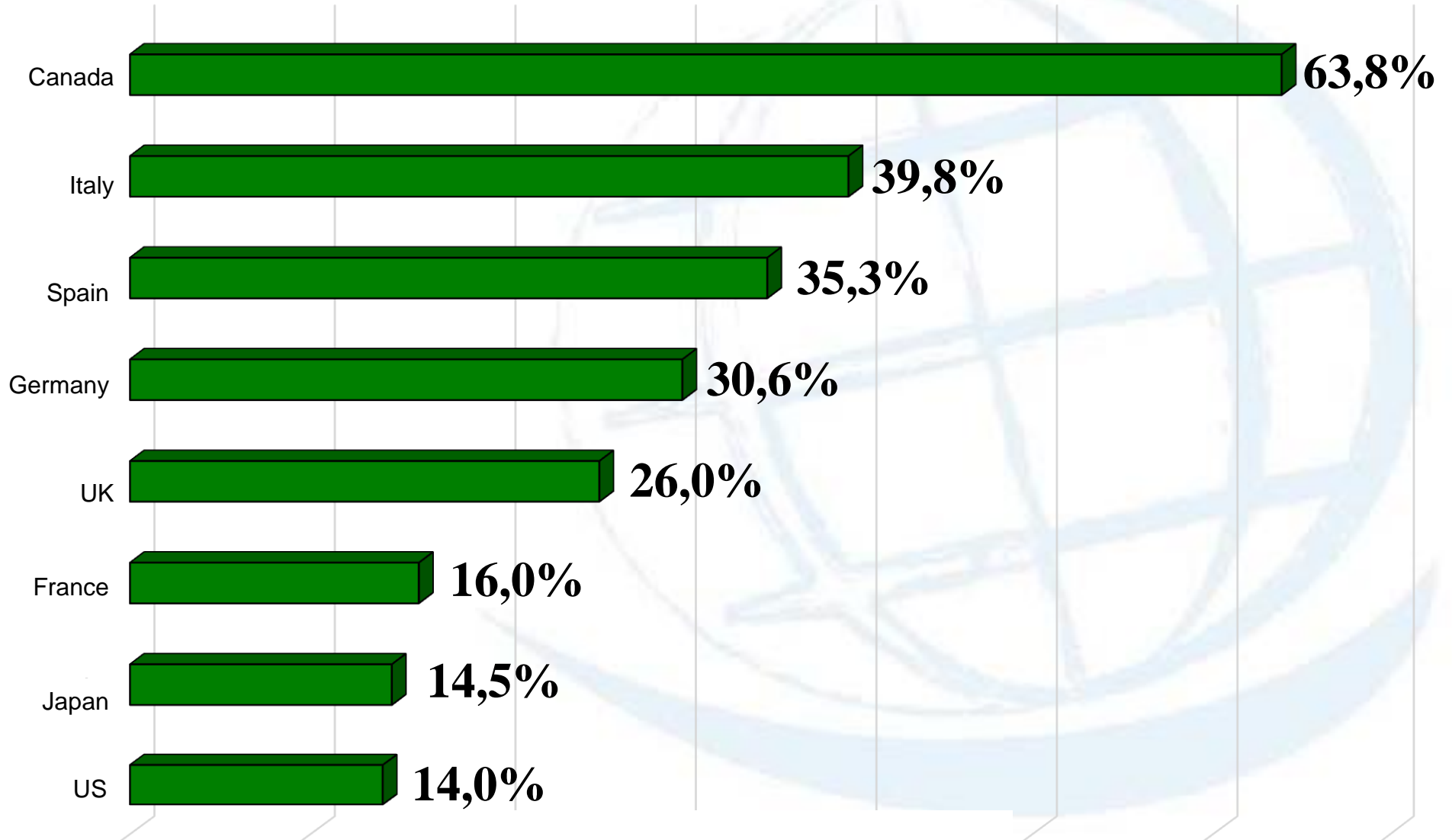
This is a critical factor in generating and transmitting electricity. Regardless of the mode of power generation we choose, it is absolutely essential that we protect our facilities from accidents and natural disasters.

# "Basic Plan" for envisioning the future of energy in Japan



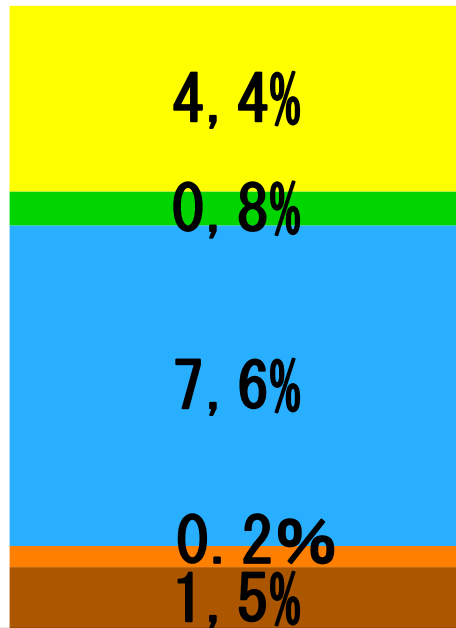
## Percentage of renewable energy deployment in different countries

As of 2016



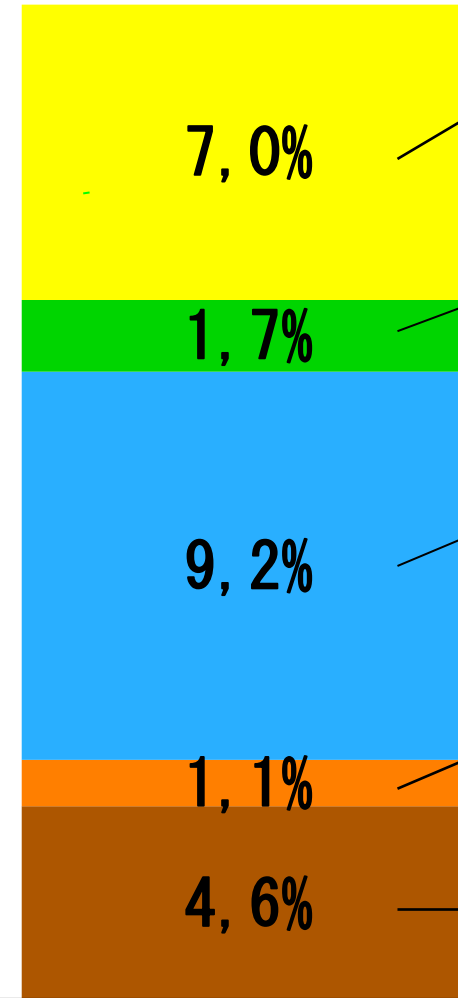
# Current state of renewable energies in Japan, and future power source make-up target

Total: Roughly 15%

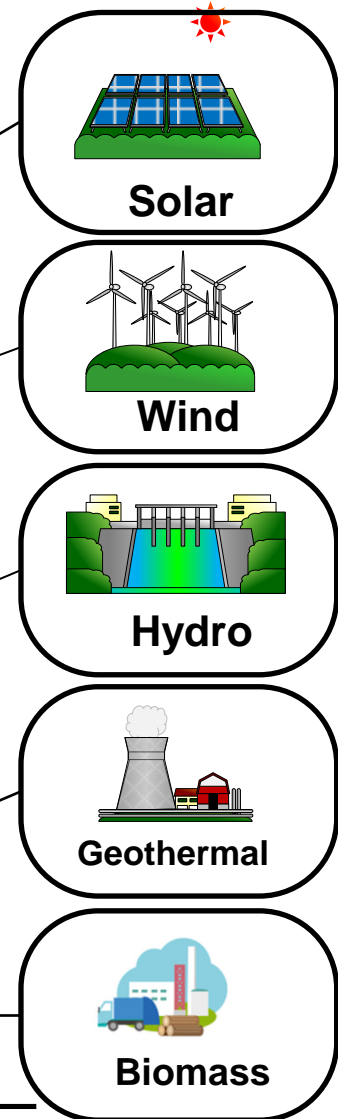


Current 2016

Total: Roughly 24%



Future target 2030



# Growing deployment of renewable energies in Japan

10,000kW

6000

5000

4000

3000

2000

1000

0

2003

2004

2005

2006

2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

Average annual growth rate 5%

Average annual growth rate 9%

Average annual growth rate 26%

Solar

Wind

Hydro

Geothermal

Biomass

FIT program (fixed price purchasing scheme)

Surplus power buy-up program

RPS program (Renewable Portfolio Standard)

Source: Agency for Natural Resources and Energy; Ministry of Economy, Trade and Industry

# Information on different renewable energies in Japan



Solar



Wind



Hydro



Geothermal



Biomass



Wave-power

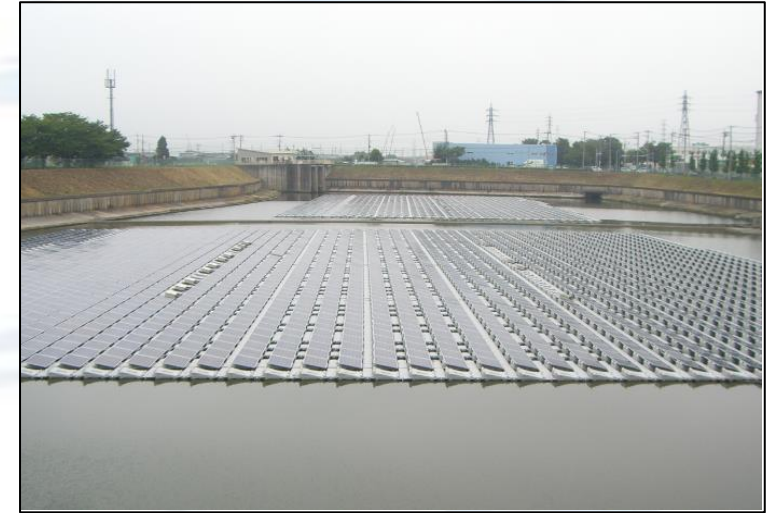
## Solar power generation



**Example of installation  
on home rooftops**



**Example of large-  
scale installation**



**Example of installation  
on body of water**



**fisuel**

## **Wind power generation**



**Example of installation  
in mountain areas**



**Example of  
installation at sea**



**fisuel**

## **Hydro power generation**



**Example of installation using agricultural water channel**



**Example of installation using a dam**

Source: Agency for Natural Resources and Energy; Ministry of Economy, Trade and Industry



**fisuel**

## **Biomass power generation**



**Example of facility that  
uses woodchips produced  
in the lumber sawing  
process**



**Example of facility that  
uses wood pellets and  
palm kernel shells**



**Example of facility in a special district of a national park**



**Example of facility in a hot spring resort that uses geothermal steam to drive turbines**



## **Wave-power generation**



**Example of a wave-power generation installation**

# THANK YOU

## MERCI



# fisuel