

Active Role of Coal in Low Carbon Society

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- Policy for Low Carbon Society in Japan
- Technology Scenario for Low Carbon Society
- Efficient Utilization of Fossil Fuels and CCS
- Potentials of Renewable Energies
- Coal in the Strategic Energy Plan of Japan

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Policy for Low Carbon Society in Japan (1)

- Action Plan for Low Carbon Society (July 29, 2008):
 - >more than **50% of zero emission** power source in 2020
 - >promotion of PV: **10 times** in 2020, **40 times** in 2030 relative to that in 2005
- Proposal of **New Feed-in Tariff (FIT)** for PV (February 24, 2009)
- Enhanced Target for Renewables (April 9, 2009)
 - >20% of renewables in final energy consumption
 - >PV: **20 times in 2020** relative to that in 2005
- **2010 Strategic Energy Plan of Japan** (June 2010)
- Announcement of **25% Reduction of GHG by 2020** relative to that in 1990 (September 22, 2010)

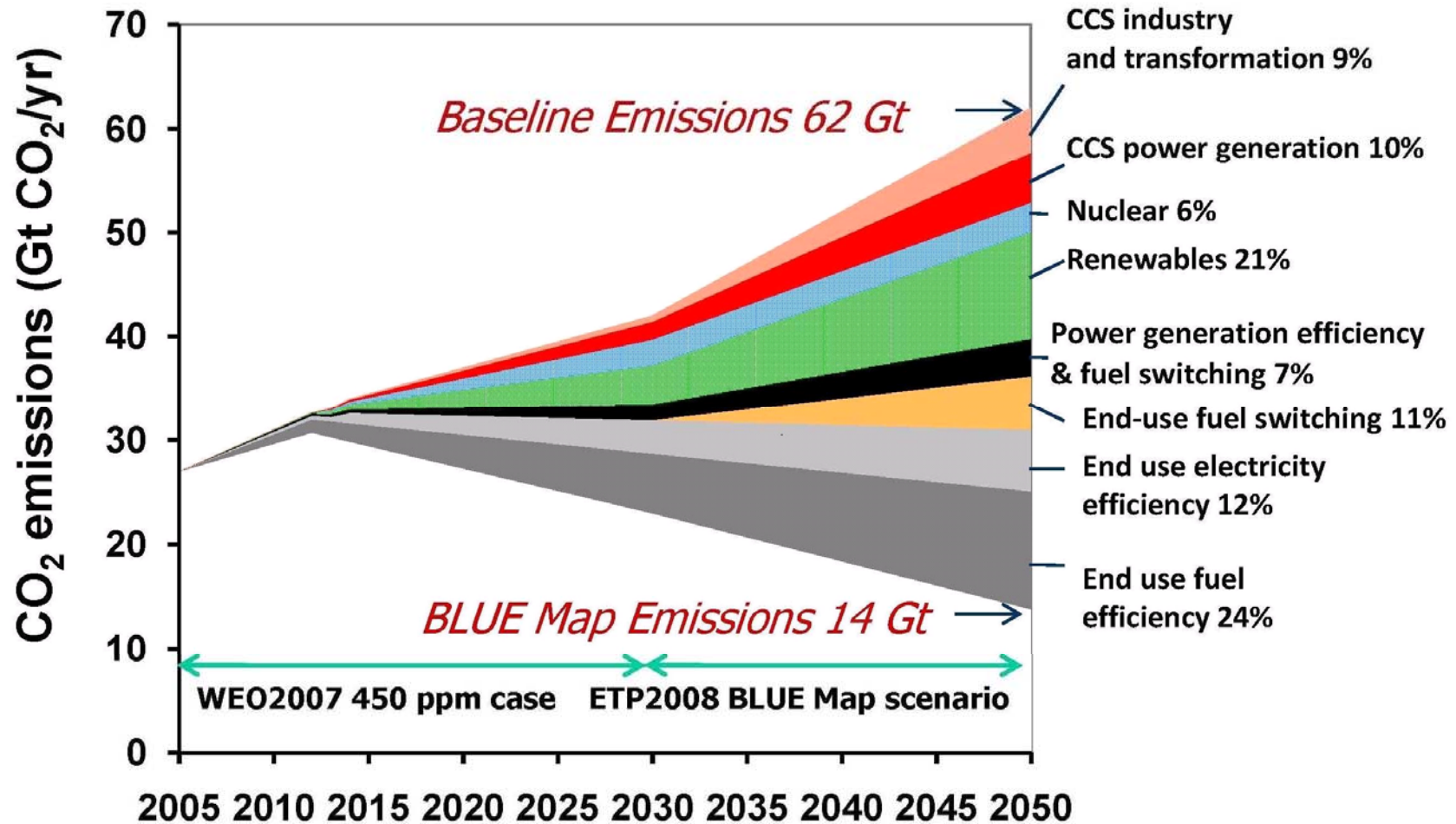
Policy for Low Carbon Society in Japan (2)

- Sub-Committee for **FIT for Surplus Electricity of PV**
 - >Enforcement of FIT for surplus electricity of roof top PVs (Nov. 2009)
 - > ¥48/kWh from residential customers, ¥24 from others for 10 years
 - >fund for FIT is recovered through PV surcharge on electricity
- Project Team for **FIT for All Electricity of Renewables**
 - >outline is set in July 2010; details are remain to be decided
- Committee for **Next Generation Energy and Social Systems**
 - >four areas are selected for demonstration
- Committee for Strategic Energy Plan
 - >**2010 Strategic Energy Plan of Japan** is decided (June 2010)

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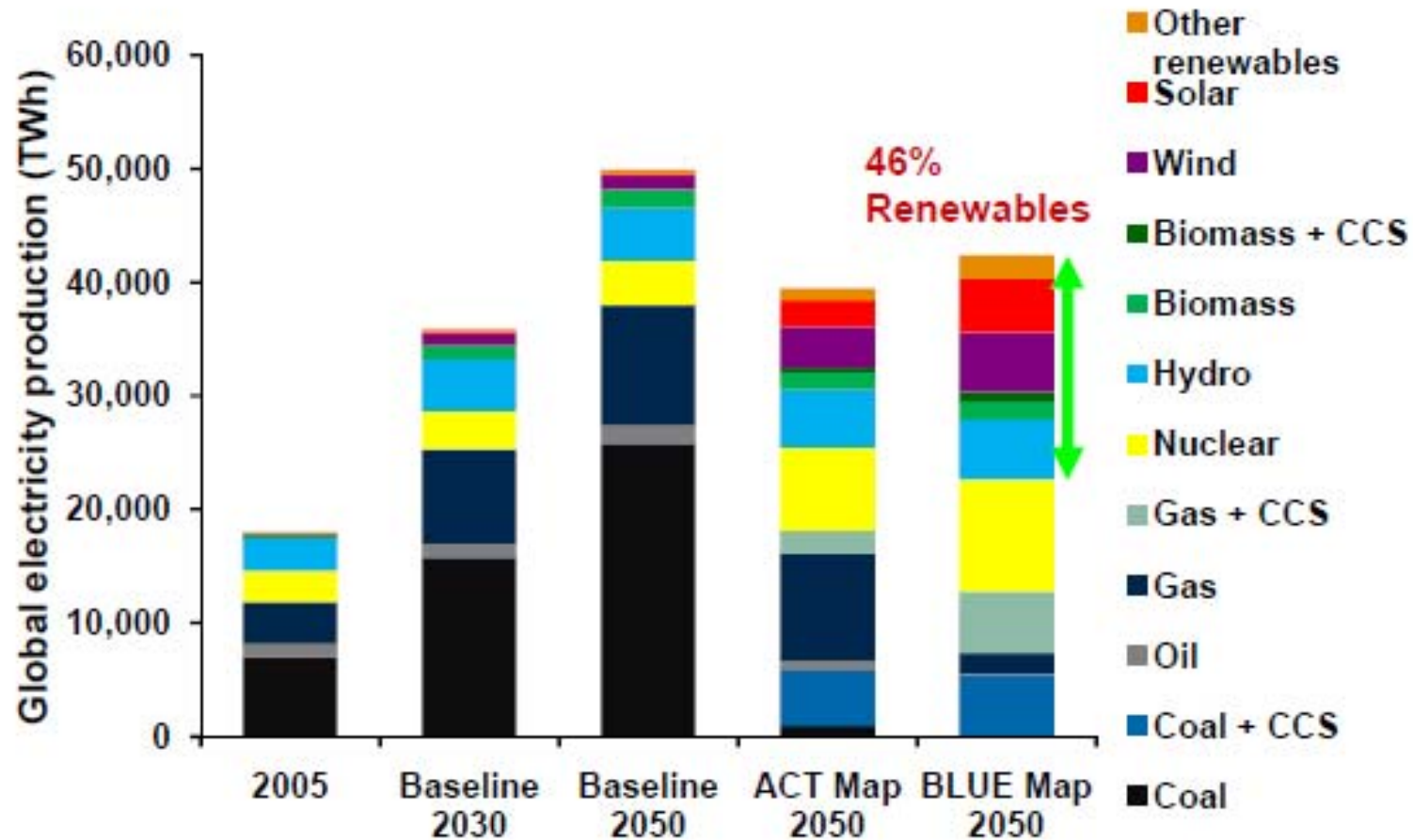
Halving Global GHG Emission by 2050 ?

Technology Scenario for CO2 Emissions from Energy Systems



Energy Technology Perspectives 2008 (IEA)

Power Generation Mix



Importance of Electricity Sector

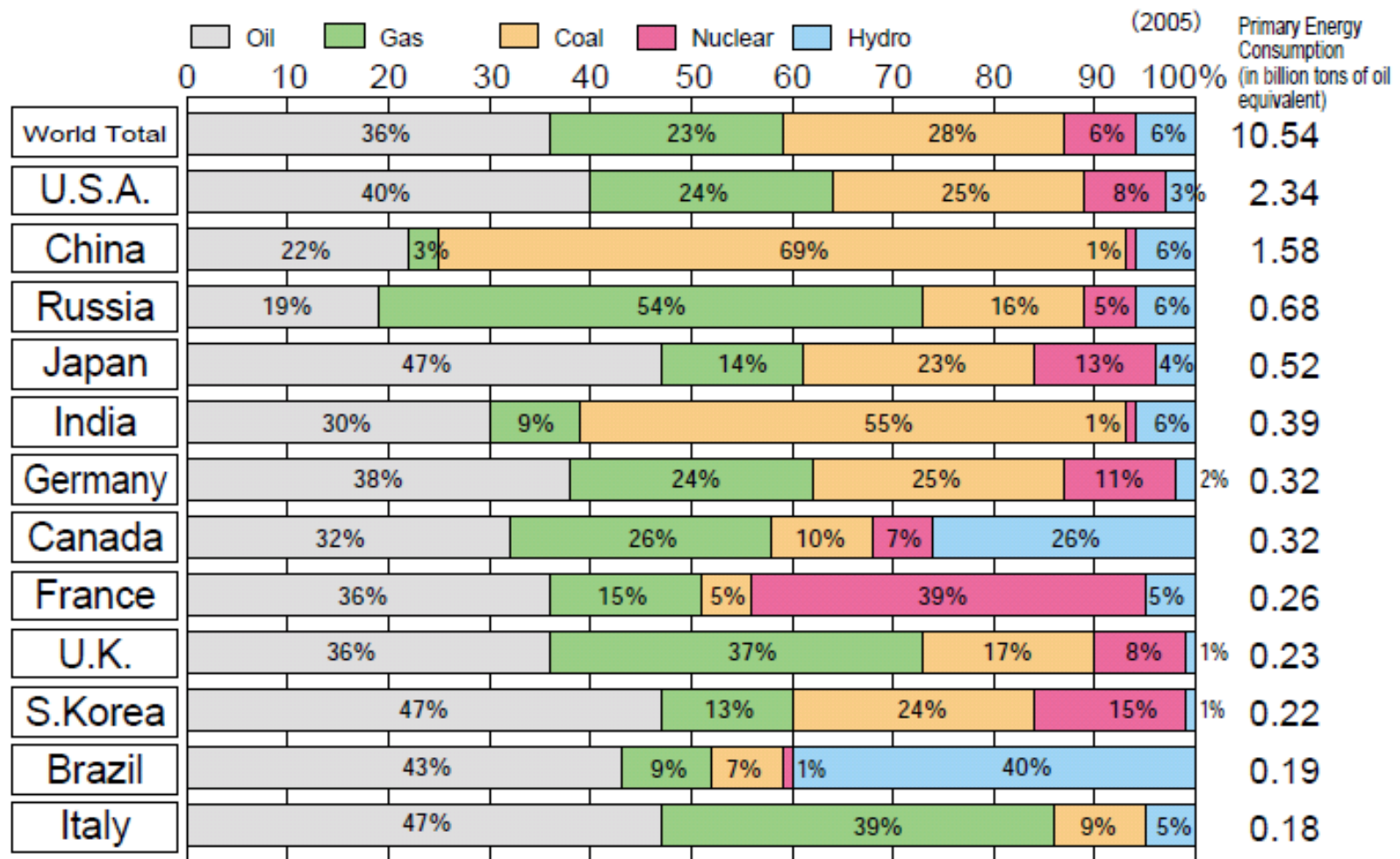
- More than 40% of primary energy is used for power generation
- Electricity can be produced from variety of energy resources
- Electricity is clean and efficient in end-use
- Efficient supply of low temp. heat by heat pumps
- Prospects for electric vehicle (PHEV, EV)

But,

- Difficulty in large and long distance transmission
- Stability of supply (voltage, frequency) : → **smart grid?**
- Difficulty for mobile use : → batteries ?

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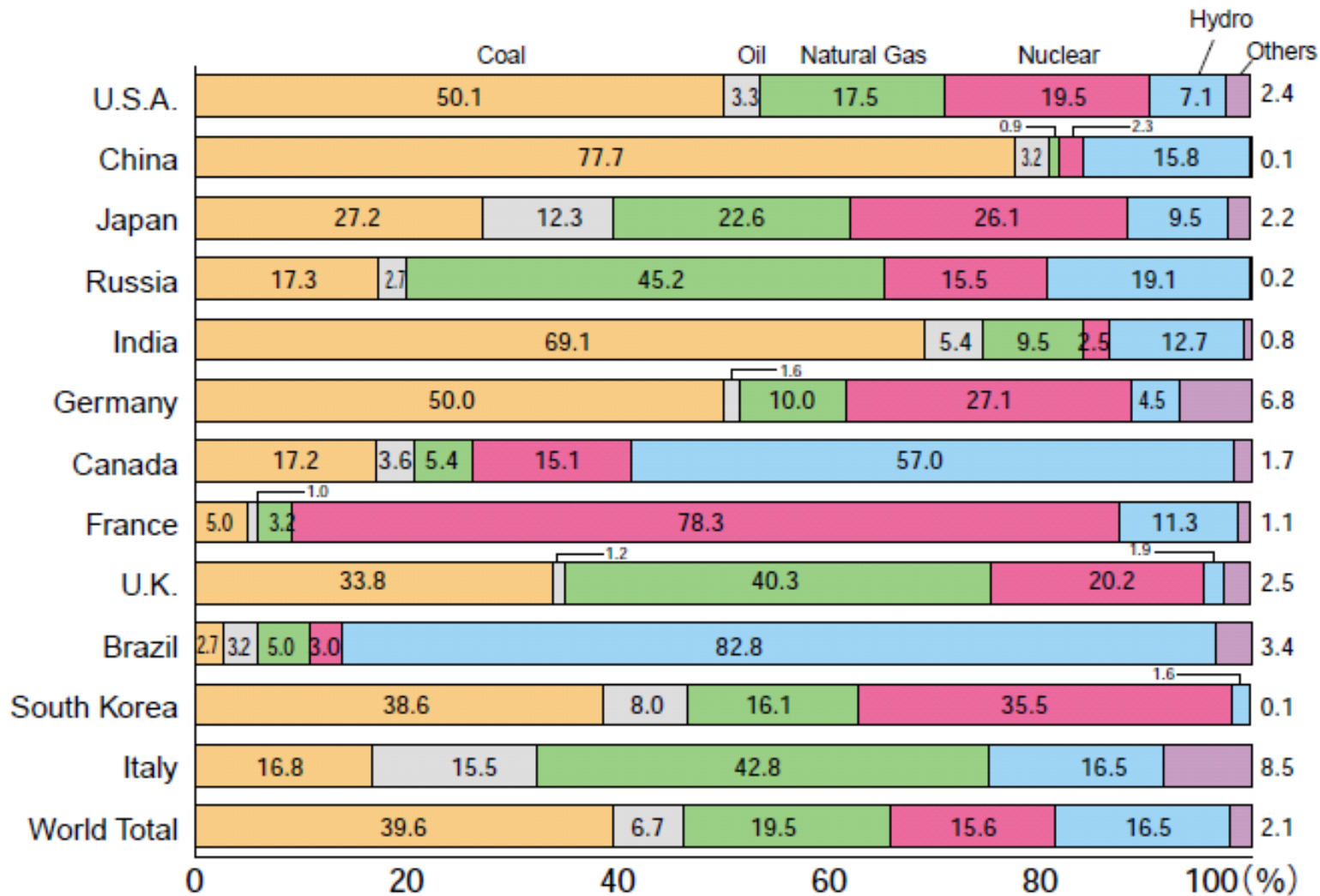
Primary Energy Consumption for Major Countries



(Note) Figures do not necessarily total to 100% due to rounded numbers.
 (Source) BP Statistical Review of World Energy June 2006

Power Generation Volume by Source for Major Countries

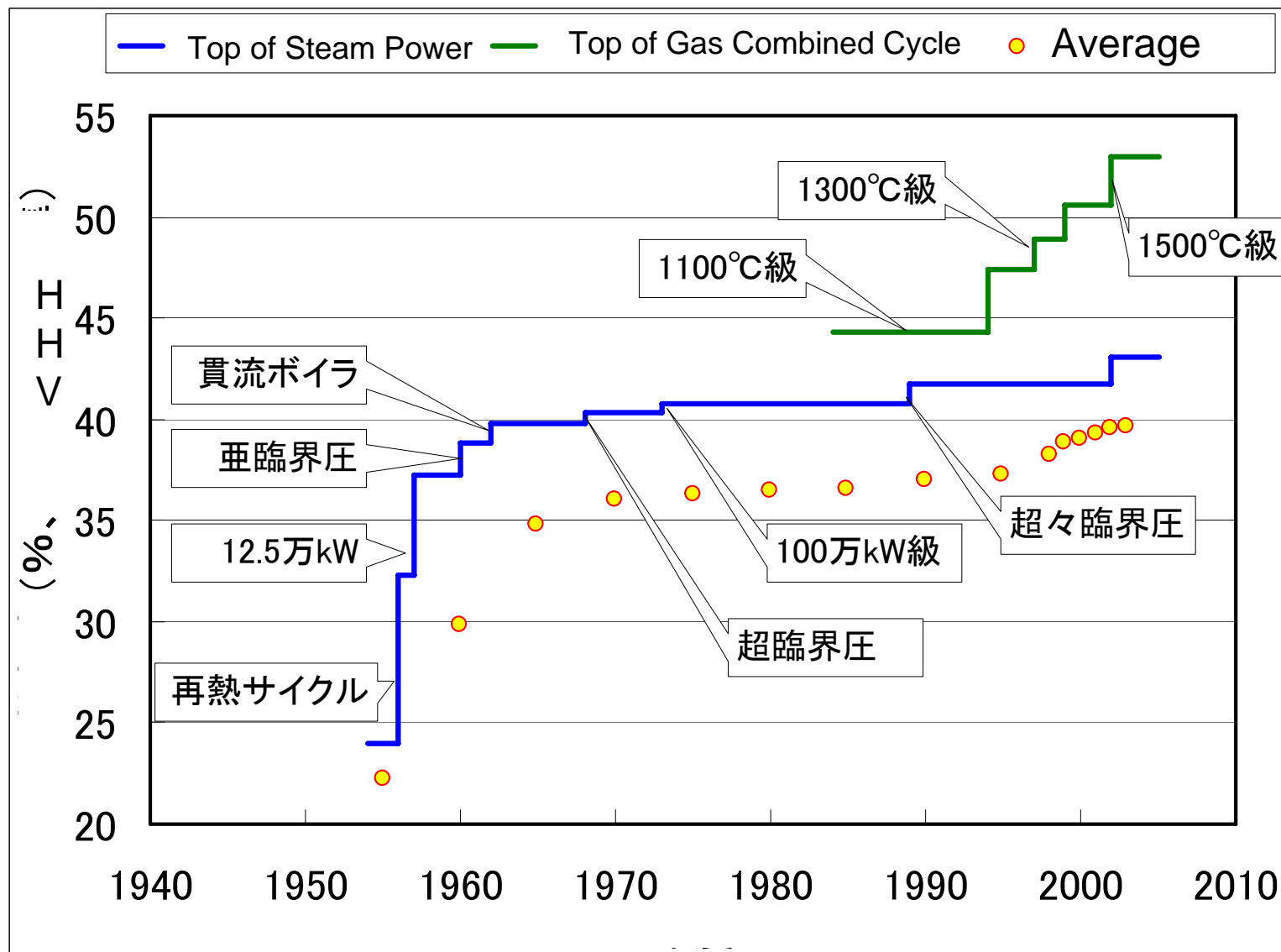
(2004)



(Note) Figures do not necessarily total to 100% due to rounded numbers.

(Source) IEA Electricity Information 2006 Edition

Efficiency of Thermal Power Plants in Japan

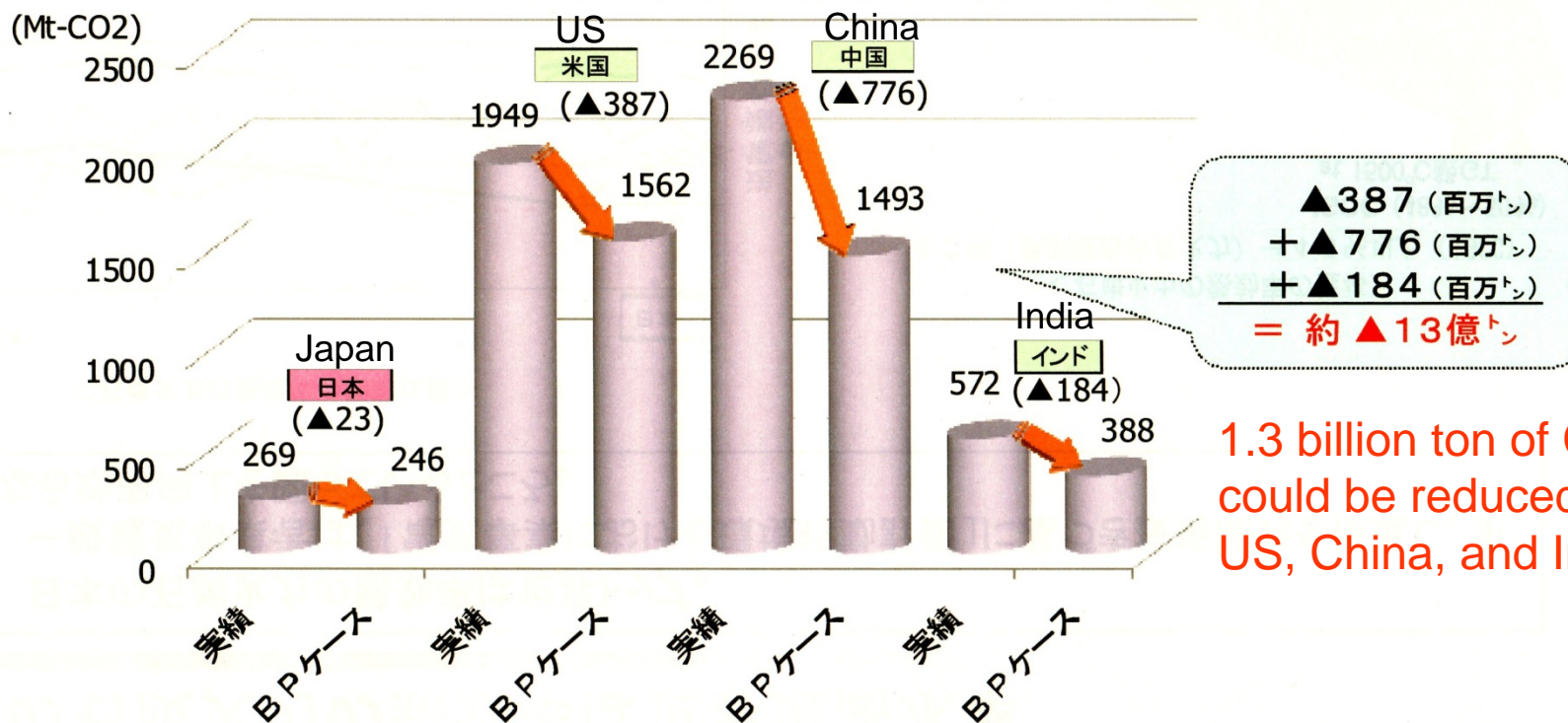


Impact of Efficiency Improvement of Coal-fired Power Plants

- 日本で運転中の最新式の石炭火力発電の効率を米、中、インドの石炭火力発電に適用すると、CO2削減効果は、約13億トン。
- これは、日本一国のCO2排出量に相当。

If best plant in Japan prevailed (2004年)

- 実績 vs 日本のベスト・プラクティス(商業中の最高効率)適用ケース -

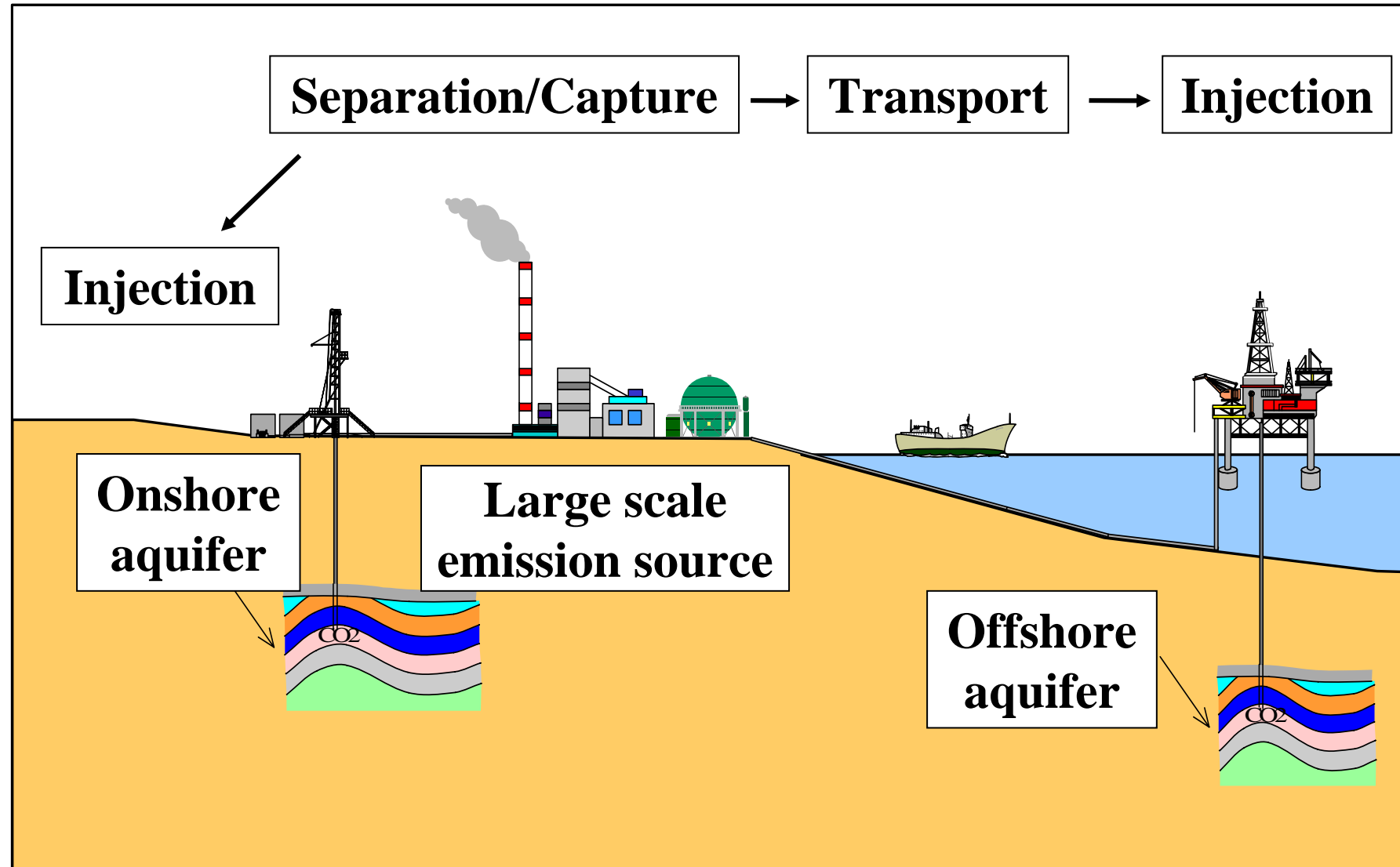


1.3 billion ton of CO2 could be reduced in US, China, and India

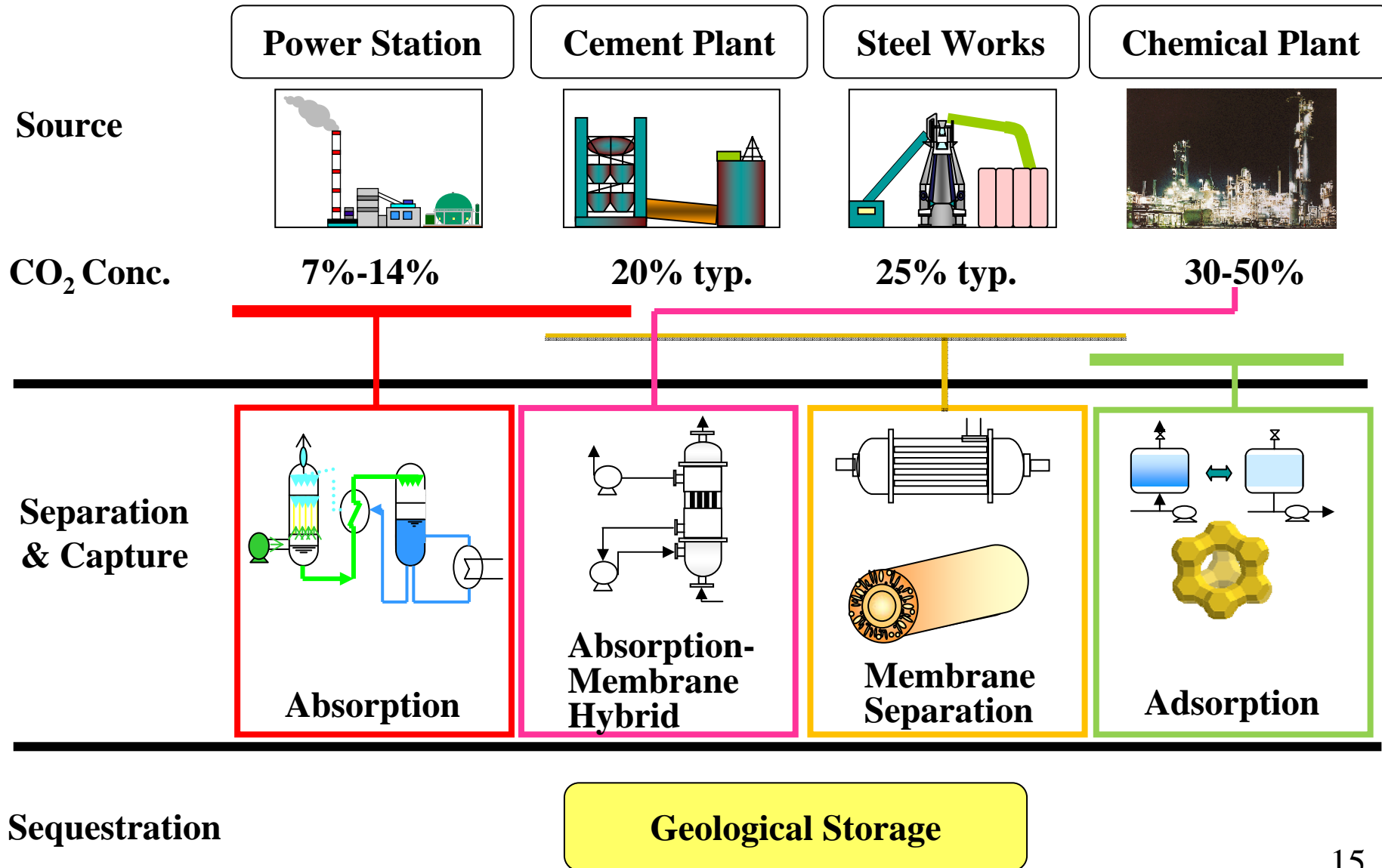
「BPケース」：日本のベスト・プラクティス(商業中発電所の最高効率)を適用した場合の試算。

「実績」データの出典：IEA "World Energy Outlook 2006"

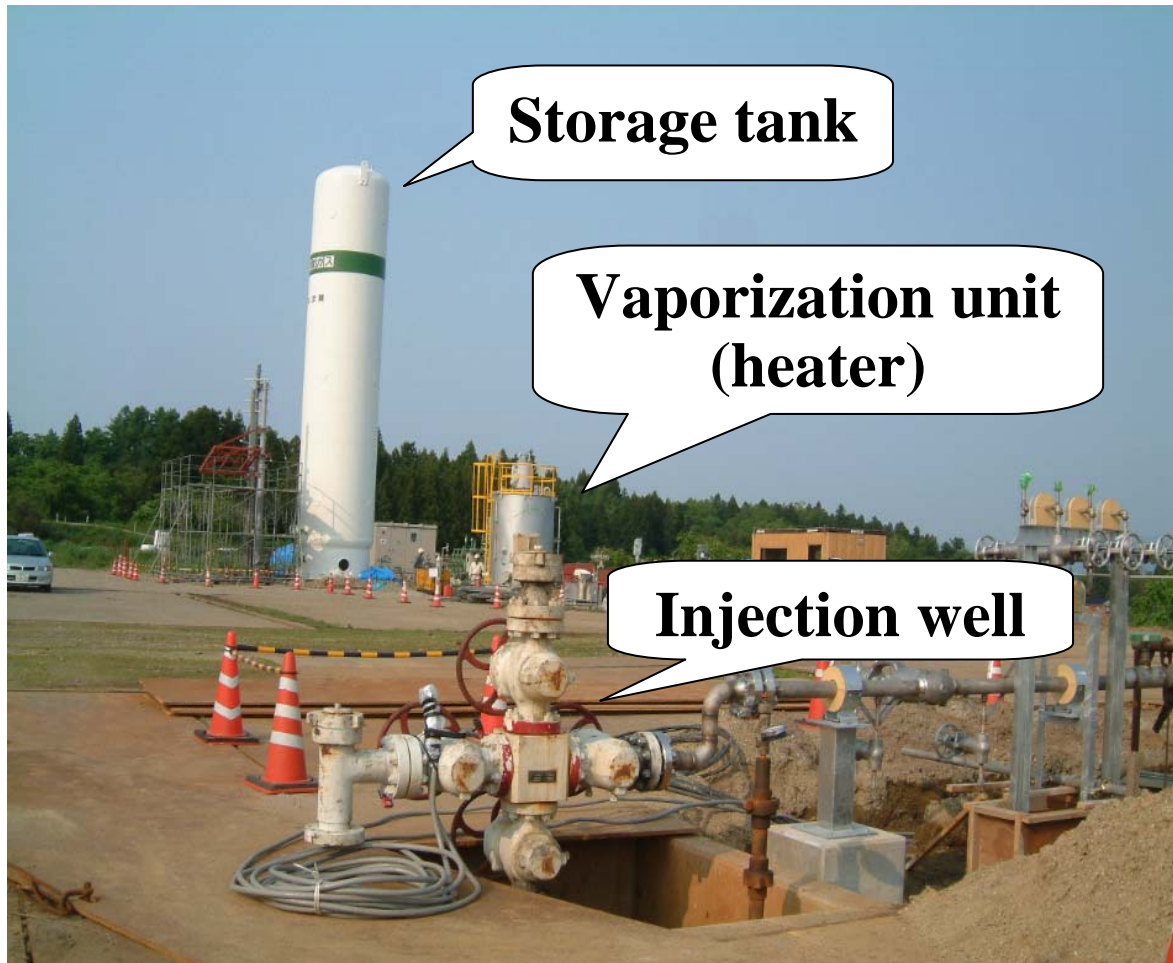
Concept of CCS



Activities in CO₂ separation and capture



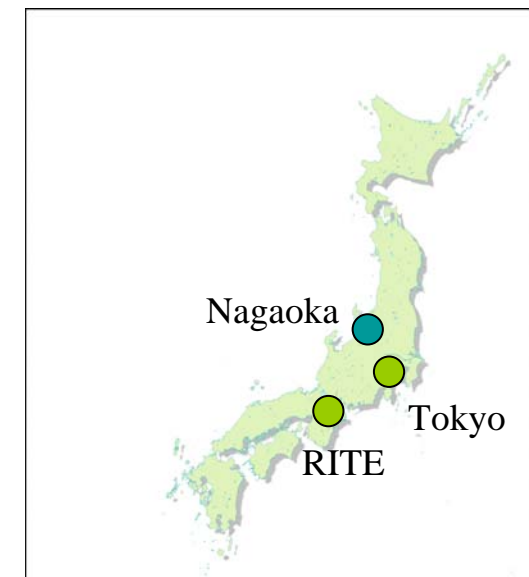
CO₂ geological storage experiment



Location :
Nagaoka, Niigata pref.

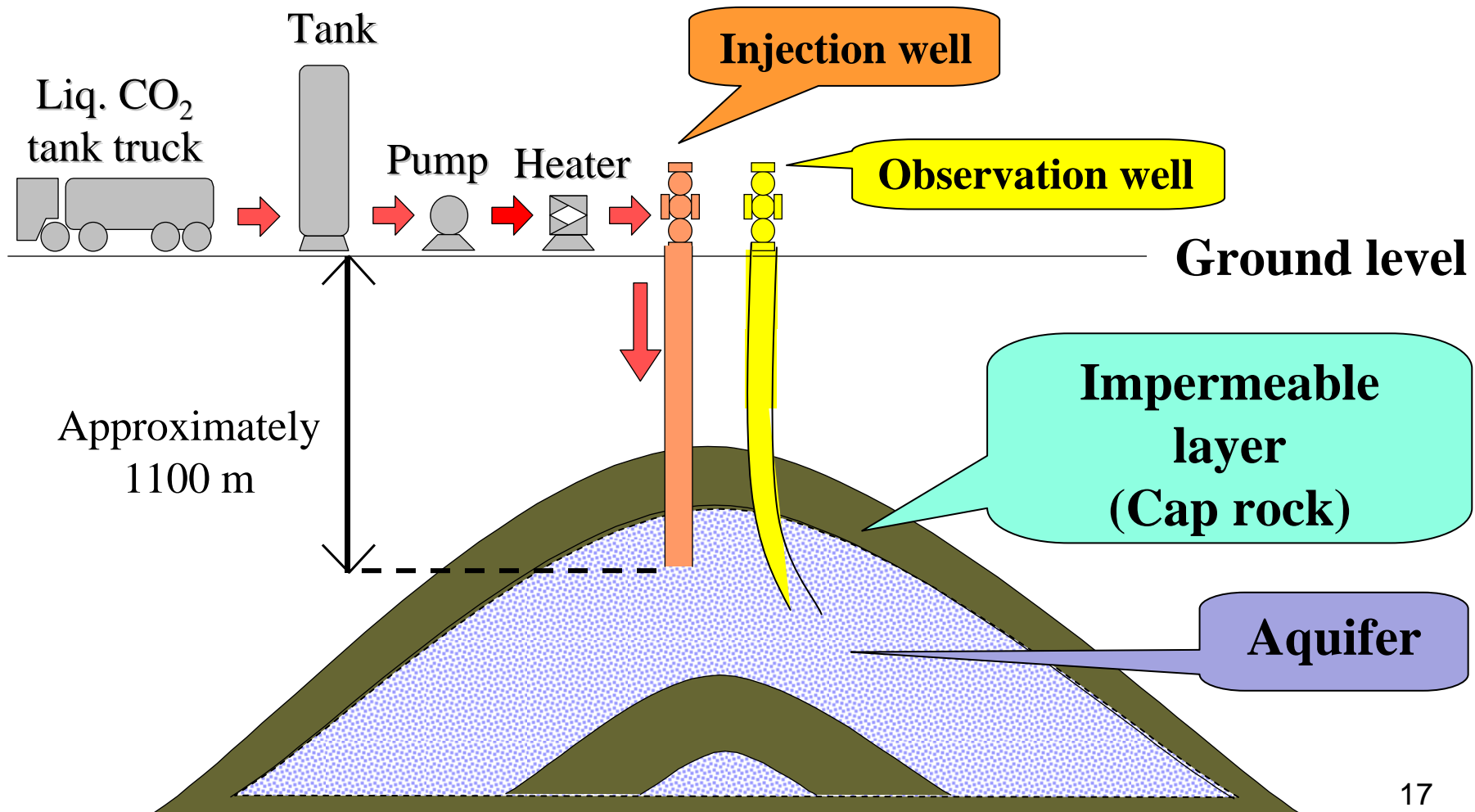
Amount of injected CO₂ :
10,000 tons

Period :
July 2003 —
January 2005



Kenji Yamaji 100908

CO₂ injection in field demonstration

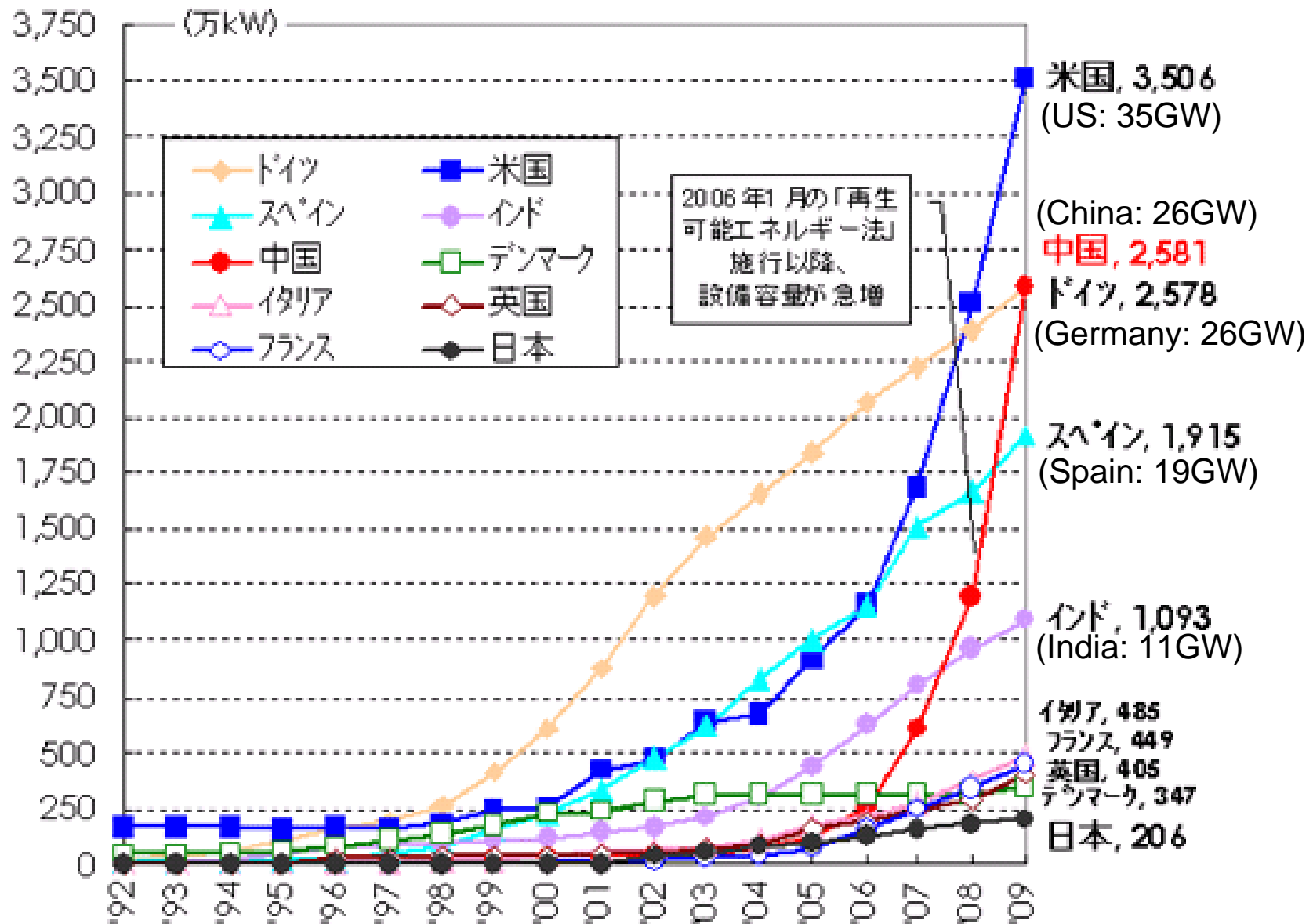


Advanced Utilization of Fossil Fuels

- Role of thermal Power plants remains significant
- Large CO₂ reduction effects by efficiency improvements
- Clean coal technology incl. CCS
- Thermal power plants stabilize power system against unstable outputs of renewable power
- Coal-fired power plants can use biomass efficiently

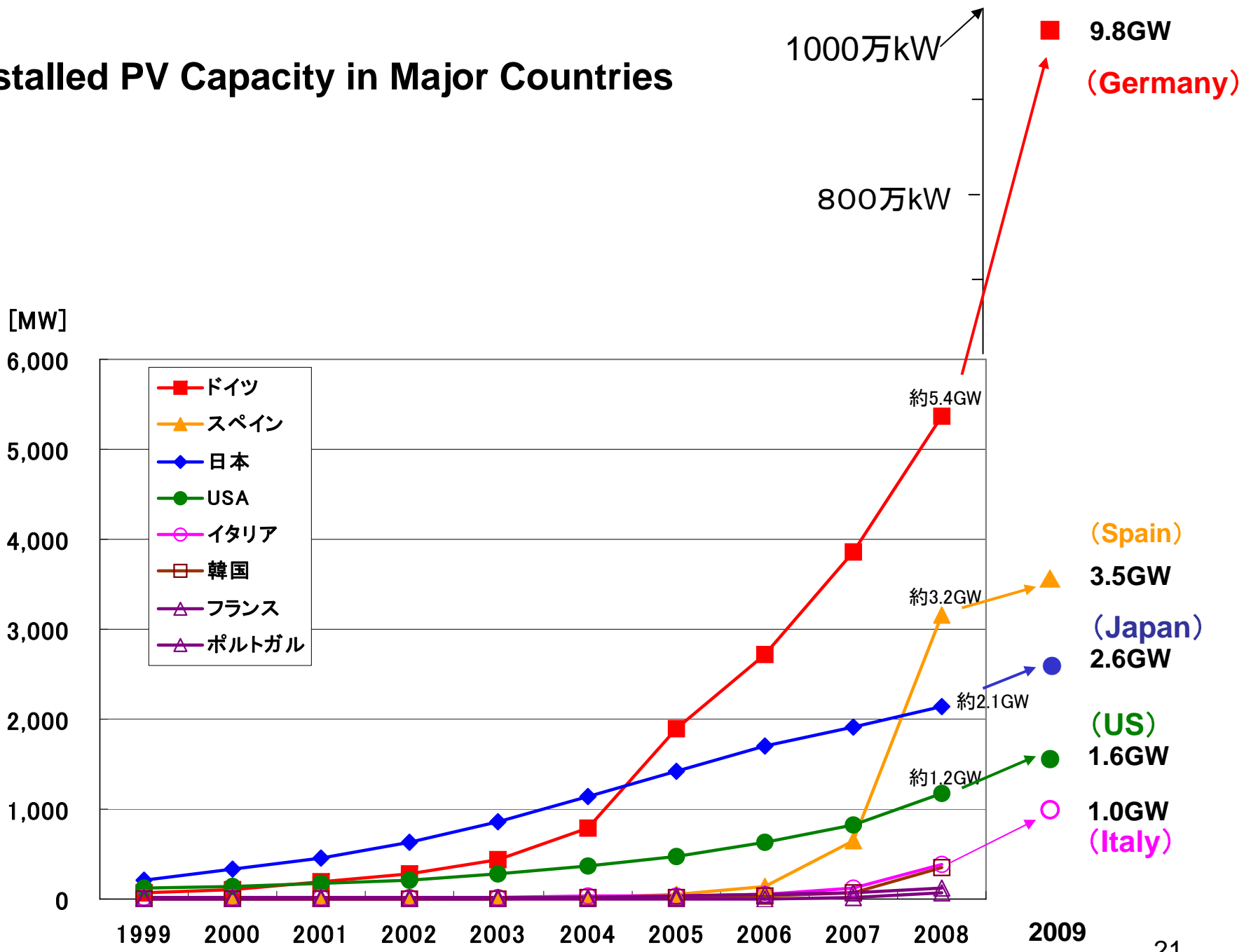
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(10⁴kW) Installed Wind Power Capacity in Major Countries

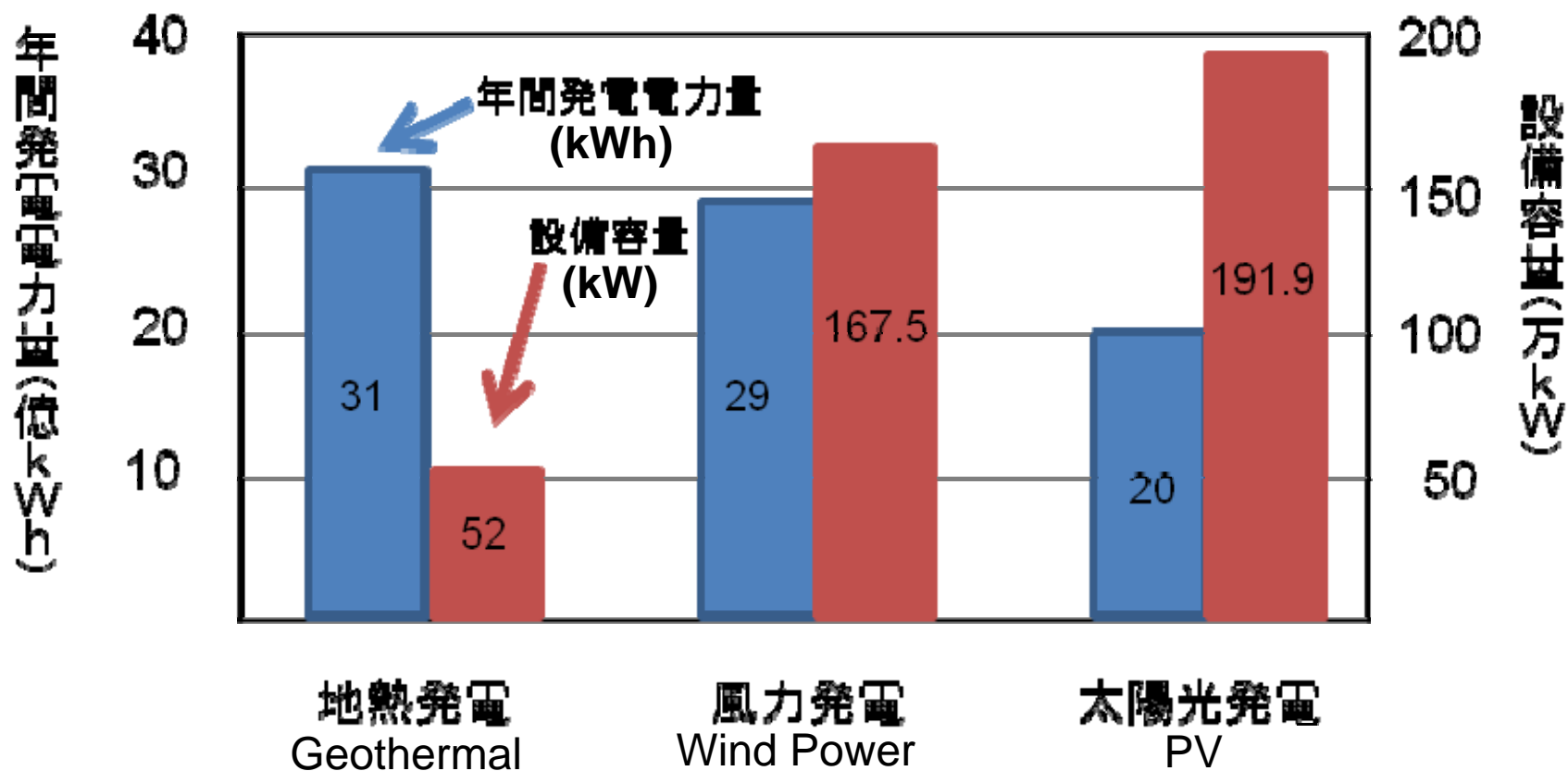


(出所)世界風力エネルギー協会報告書に基づき作成

Installed PV Capacity in Major Countries



Energy (kWh) is more Important than Power (kW)



低炭素電力供給システム研究会資料(090701)

Potentials of Renewable Energies

- Modern Renewables are increasing rapidly
- Increased share of unstable renewable outputs may cause instability of power grids
- R&D and market diffusion are still required
- Sustainability conditions for biomass use
- kWh, not only kW

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Strategic Energy Plan of Japan

The Strategic Energy Plan of Japan articulates the fundamental direction of energy policy in Japan, based on the Basic Act on Energy Policy.

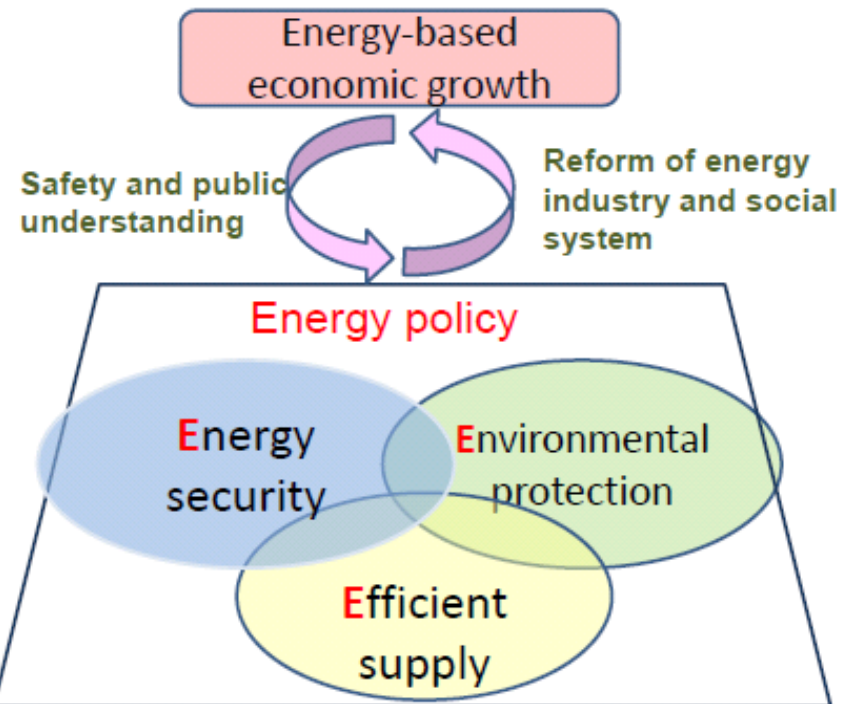
The Strategic Energy Plan of Japan is required to be reviewed at least every three years, and to be revised if needed. (Formulation: 2003, revision: 2007 and 2010)

Basic point of view

○The basic point of view in energy policy is **energy security, environmental protection, and efficient supply.**

○In this revision, two new points of views were added. These are: **energy-based economic growth** and **reform of the energy industrial structure.**

○Japan will **fundamentally change its energy supply and demand system by 2030.**



-Formulating the revised Strategic Energy Plan of Japan is consistent with the “New Growth Strategy”

-Directing bold and quantitative policy targets and specific policy measures

Specific measures to achieve targets (supply side)

Securing resources and enhancing supply stability

- Deepening strategic relationships with resource-rich countries through **resource diplomacy by the PM and ministerial level** and **public-private partnership with the relevant industrial sectors**
- Enhancing **support for risk money** for upstream concessions (JOGMEC, ODA, policy-based finance, trade insurance, etc.)
- Raising **self-sufficiency ratio of strategic rare metals** (including recycling and alternative materials development) to more than **50%**
- Enhancing development of domestic and overseas resources including methane hydrate and sea-floor hydrothermal deposits, etc.

Independent and environment-friendly energy supply structure

○ Expanding the introduction of renewable energy

- **Expanding the feed-in tariff system** (wind, middle-small size hydro, geothermal, and biomass in addition to photovoltaic)
- Strengthening support for introduction (R&D support, FS, initial cost support, tax reduction for introduction, etc.)
- Power grid stabilization and relevant deregulation

○ Promoting nuclear power generation

- Building **9 new or additional nuclear plants** (with the overall plant capacity utilization rate at about **85%**) **by 2020** and **more than 14** (with the rate at about **90%**) **by 2030**
- Achieving long-term cycle operations and shortening operation suspensions for regular inspections
- Improving the power source location subsidy system (by considering measures to promote the construction and replacement of nuclear plants and place a greater weight on electricity output in calculating subsidies)
- Achieving the nuclear fuel cycle establishment including the development of “pluthermal” and fast breeder reactors
- International cooperation for nonproliferation and nuclear safety

○ Advanced utilization of fossil fuels

- Requiring to **reduce CO2 emissions of the plants to the IGCC plant levels in principle**, when planning to construct new coal fossil power plants by the beginning of the 2020s.
- Accelerating the **CCS** (carbon capture and storage) technology development for an early commercialization (around 2020s), requiring **new coal thermal plants for future planning to be CCS-ready** and to be equipped with CCS technology by 2030, on the precondition of commercialization.
- Spreading its advanced **clean coal technologies overseas** and promoting further technology development and demonstration domestically.

○ Enhancing electricity and gas supply systems

- Building **the world's most advanced next-generation interactive grid network as early as possible in the 2020s**
- Considering specific measures to double the electricity wholesale market in three years.