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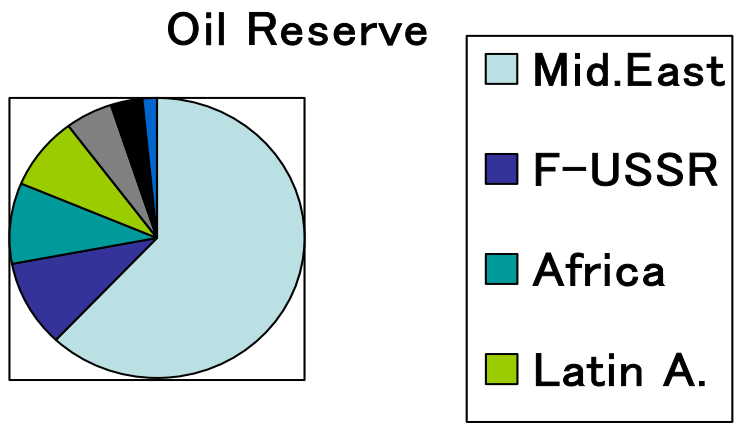
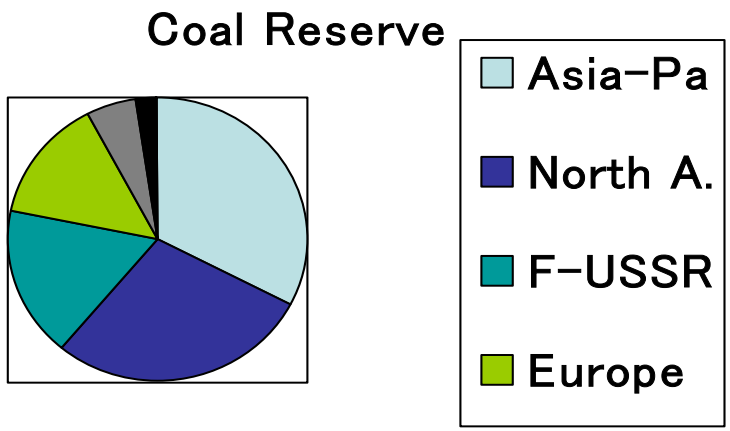
Coal mines: underground & open cut
構内掘り、露天掘り

Oil, Coal reserves (2004)
石油、石炭の確認可採埋蔵量

- Oil reserve;石油
  - 1190 bil.bbl
  - Production in 2004;29.3bil.bbl
  - R/P ratio: 41 years



- Coal reserve;石炭
  - 909 bil. tonne
  - Production in 2004; 5.51bil.tonne
  - R/P ratio：160 years



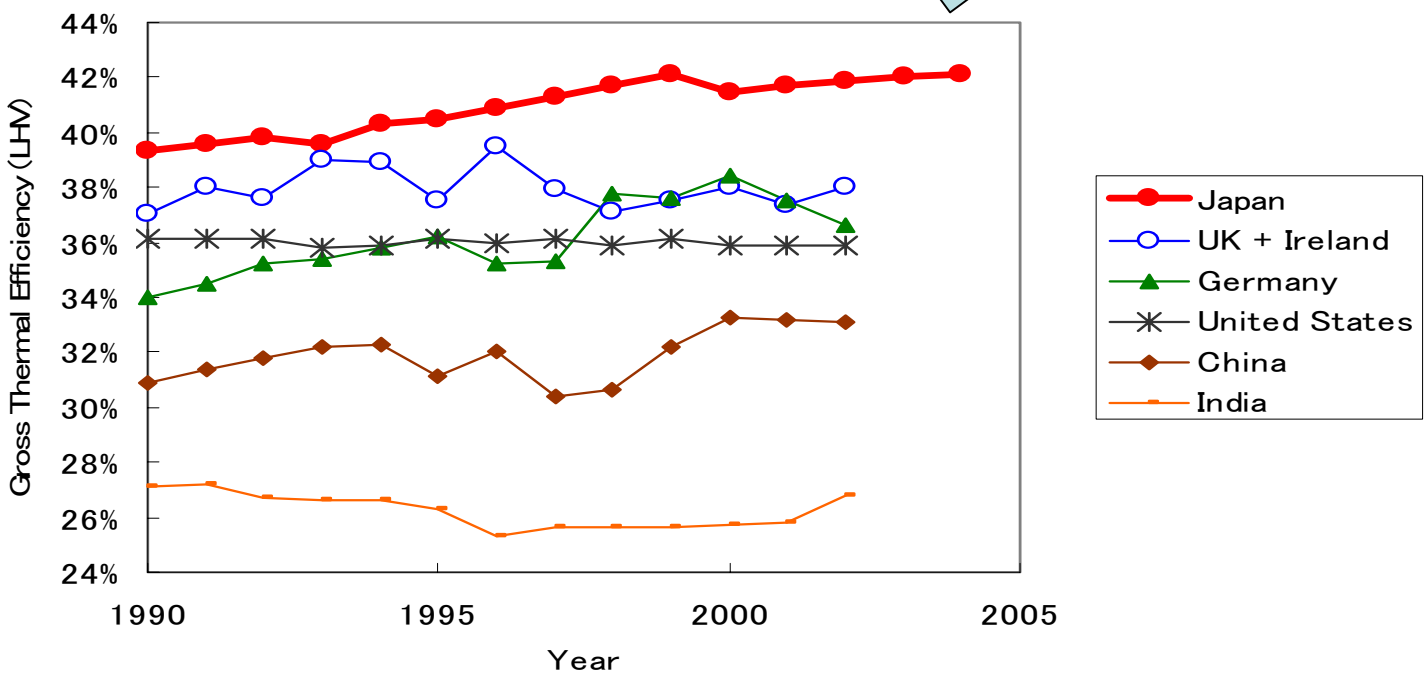
Efficiency of Coal-fired plants

(source: Ecofys Comparison of Power Efficiency on Grid Level 2004,etc.)

IGFC(55%,2025-)

IGCC(50%,2015-)

R & D for higher efficiency



Carbon Dioxide Capture and Storage

（Source: UN IPCC Special Report）

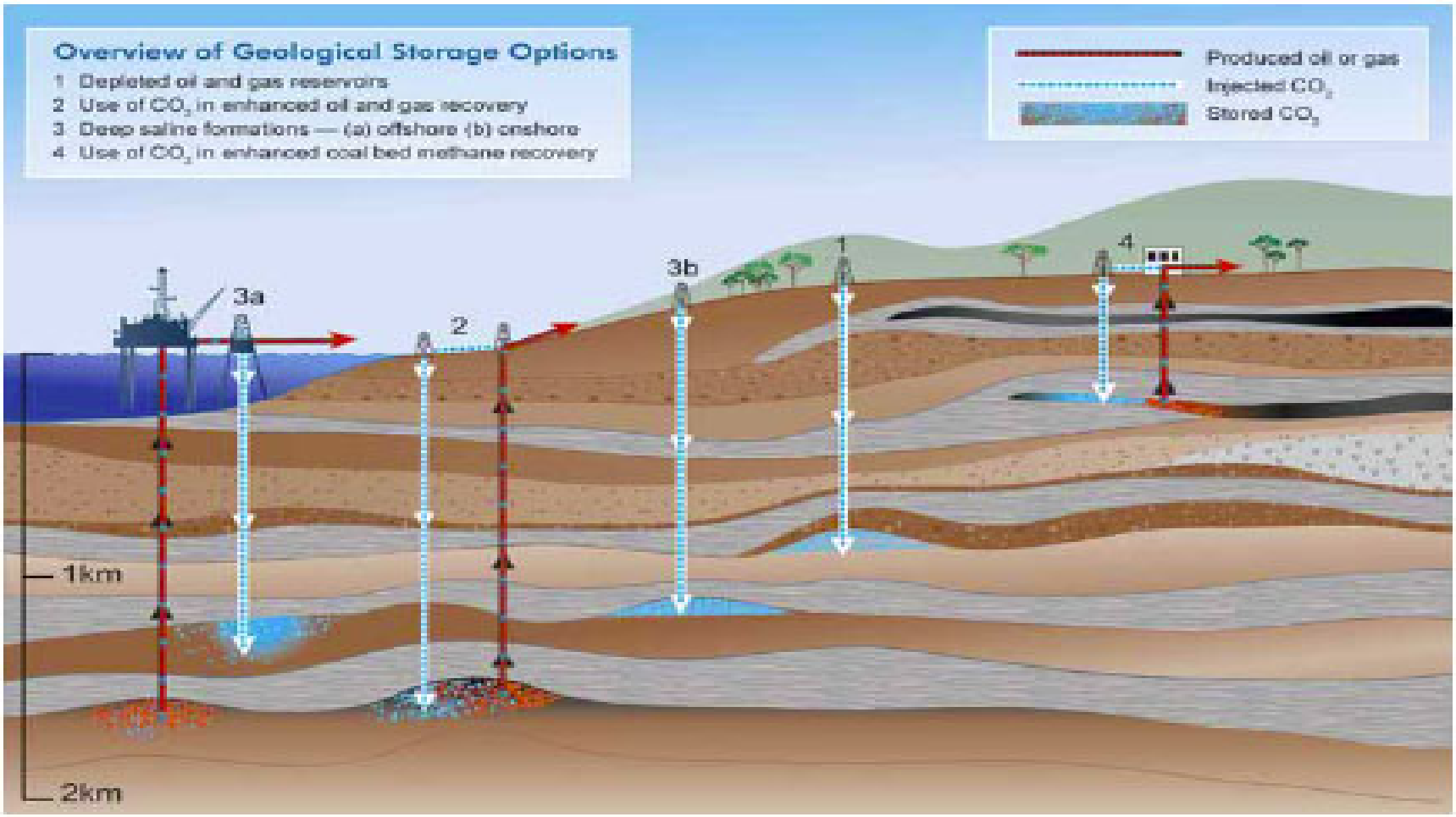


Figure SPM.4. Overview of geological storage options (based on Figure 5.3) (Courtesy CO2CRC).

CO2 Geological Storage
主なCO2地中貯留ﾌﾟﾛｼﾞｪｸﾄの概要

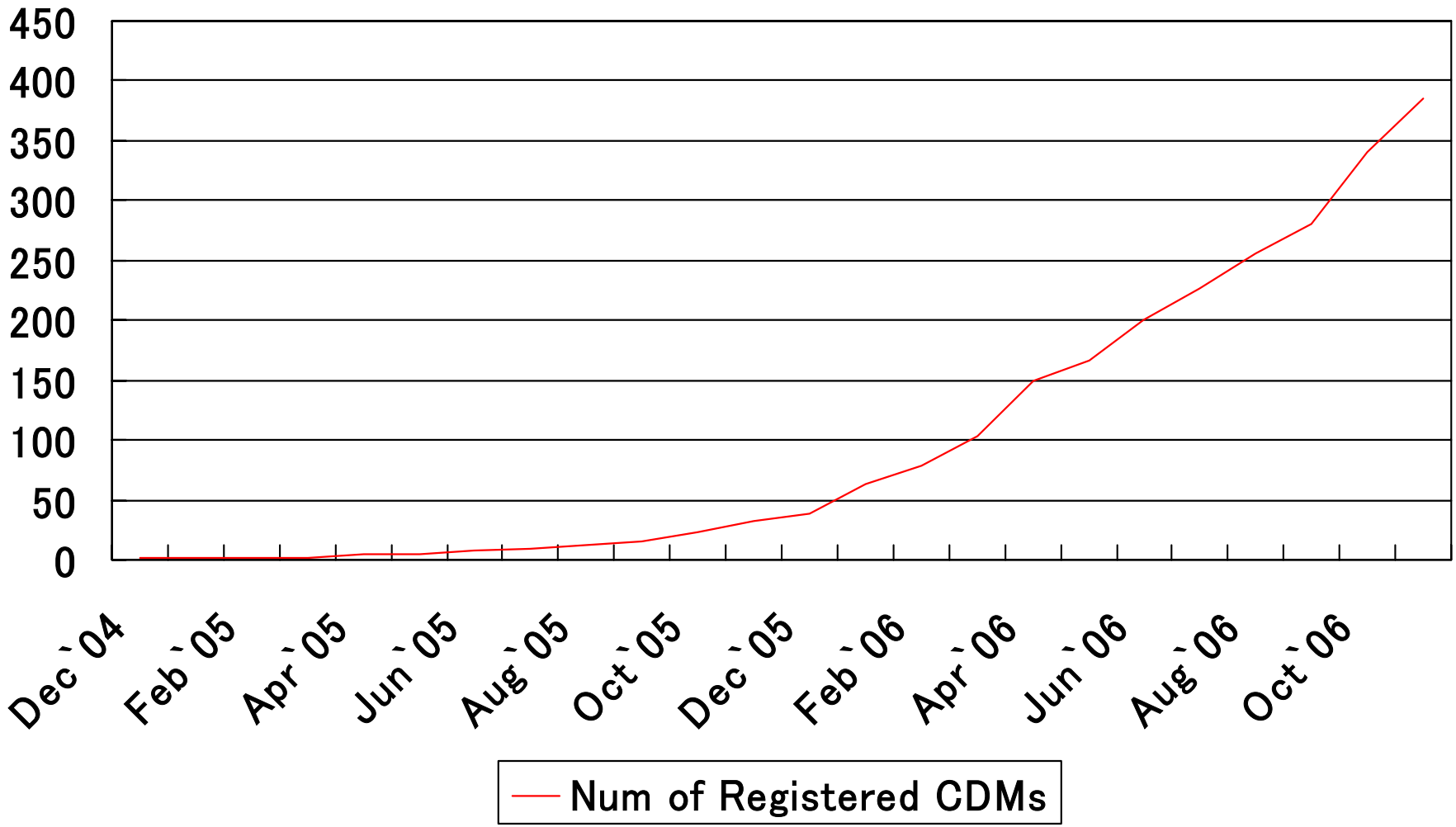
(Source: IPCC Special Report on CCS 2005, Noguchi EPDC)

Project name	Country	Injection start	Daily injection	Total storage **(tCO2)**	Reservoir type **貯留層**
Sleipner	Norway	1996	3000tCO2/d	20,000,000	Saline formation
Weyburn	Canada	2000	3-5,000t/d	20,000,000	油層(EOR)
In Salah	Algeria	2004	3-4,000t/d	17,000,000	Gas field
K12B	Netherlands	2004	100t/d	8,000,000	ガス田(EGR)
Frio	U.S.A	2004	177t/d	1,600	Saline formation
Gorgon	Australia	2008	10,000t/d	unknown	Land/sea formation
Nagaoka 長岡	Japan	2003/7-05/1	20-40t/d	10,000	Land formation
Uhbari-south 夕張	Japan	2002-2010	5t/d	unknown	Coal mine

3 Kyoto Mechanisms;京都メカニズムの3類

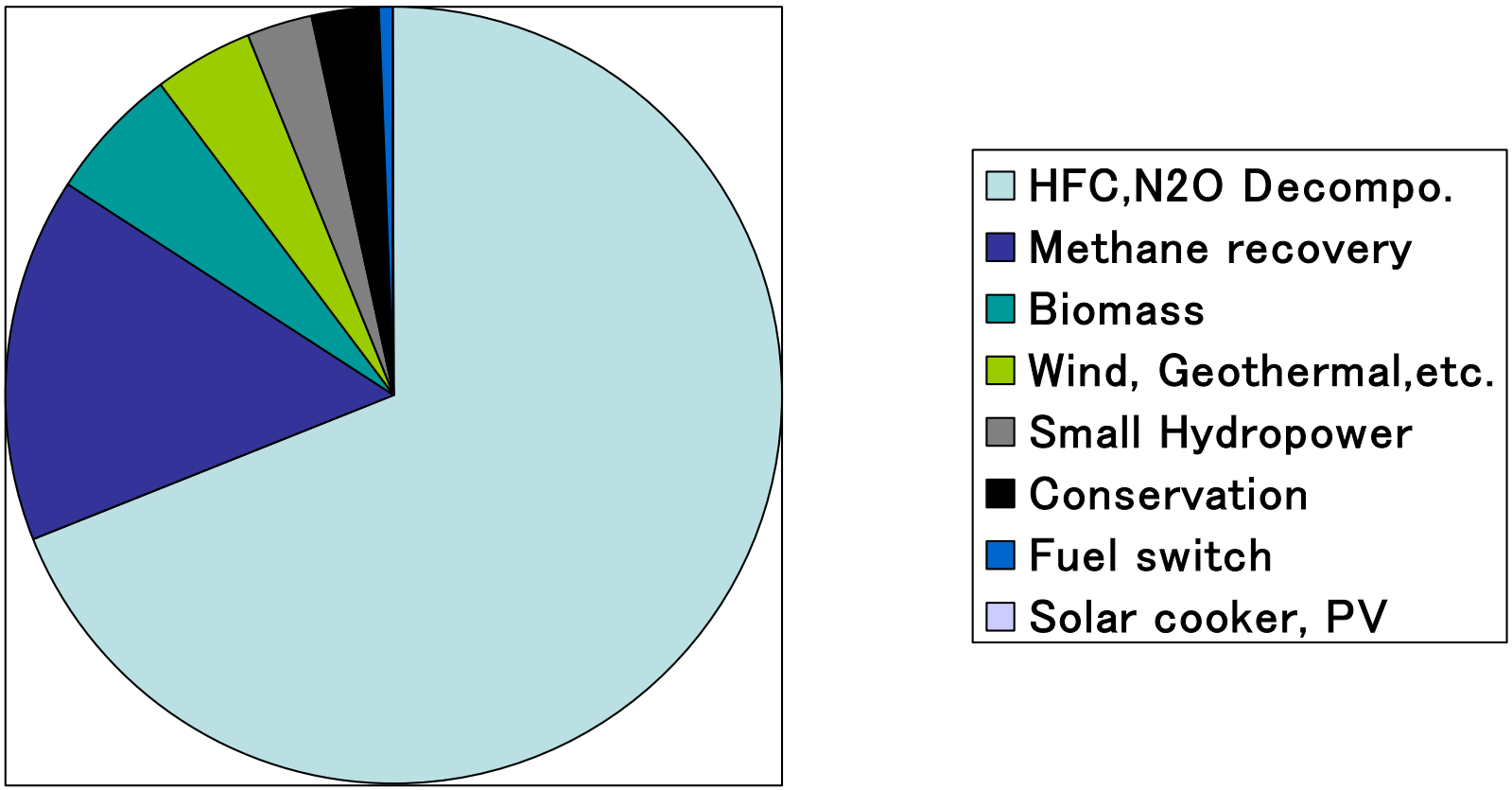
- Clean Development Mechanism;クリーン開発メカニズム
  - CDM defined in Art.12 of Kyoto Protocol provides for Annex 1 Parties to implement projects that reduce GHG in non-ANX 1 Parties in return for certified emission reductions(CERs) and assist the host Parties in achieving sustainable development.先進国と途上国が協力して事業を実施し、温室効果ガスの削減分を先進国がその目標達成に利用する制度
- Joint Implementation(JI);共同実施
  - JI under Art.6 provides for ANX 1 Parties to implement projects that reduce GHG in other ANX 1 Parties, in return for emission reduction units(ERUs).
- Emission Trading(ET);排出量取引
  - ET, as set out in Art.17, provides for ANX 1 Parties to acquire units from other ANX 1 Parties.

Number of Registered 386 CDM Projects
登録されたCDMﾌﾟﾛｼﾞｪｸﾄ数の増加



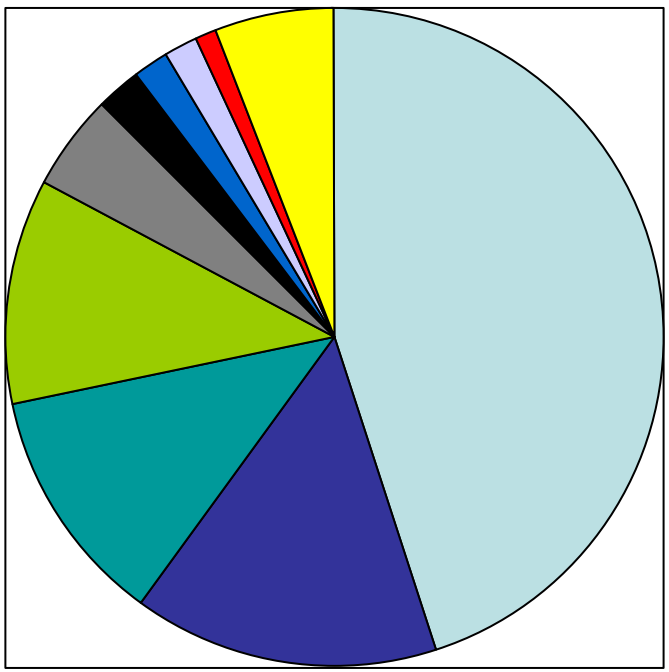
Annual GHG reduction of 386 projects
登録プロジェクトのGHG年間削減量

(Total；**100,339,000t-CO2/year** :as of 1 Nov. '06 by M. Fujitomi)



Expected Ave. Annual CERs from registered projects by Host party

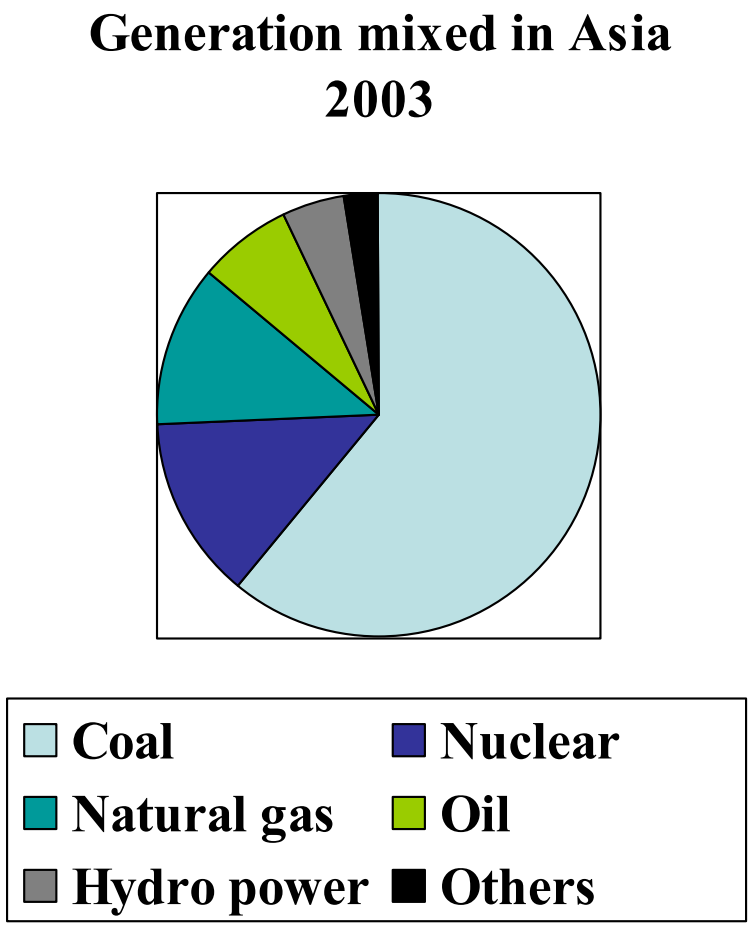
(As of 1 Nov. `06: Total 100,339,000t-CO2/year)



China Brazil India Korea Mexico
Chile Argentina Malaysia Egypt Others

Electricity generation mixed in Asia
アジアの電源構成

- Nuclear is the 2nd largest in Asia. 原子力発電は第2の電力エネルギー源.
- Enough operation experience on Nuclear units in the world; 11000 reactor-years
  世界の原子力発電経験は1万1千炉年
- Competition or cooperation ?
  エネルギー獲得競争か、協力か？



Options for the Future

- Enhancing Energy Efficiency Improvement
  - Supply Side
    - Clean Coal Technology (USC,IGCC,IGFC), Fuel Cells, CCGT
  - Demand Side
    - Electricity Appliances: Air Conditioner, Refrigerator, Washing Machine
    - Automobile: Fuel Efficient Automobile, Hybrid Vehicle
- Developing Alternative Energy Sources
  - Advance Nuclear,
  - Bio Fuels, Non-conventional Oil, LNG
  - Renewable Energy

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