

Securing a Stable Supply of Coal Resources for Japan

March, 2011

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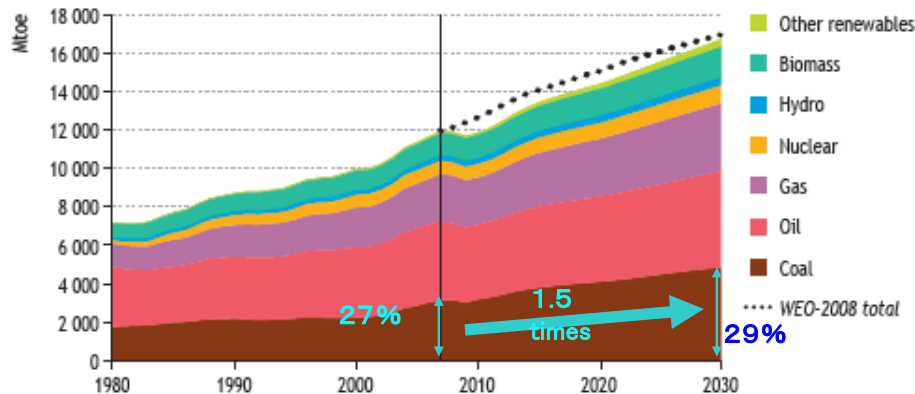
Ministry of Economy, Trade and Industry

Recent Trends in Coal Supply and Demand

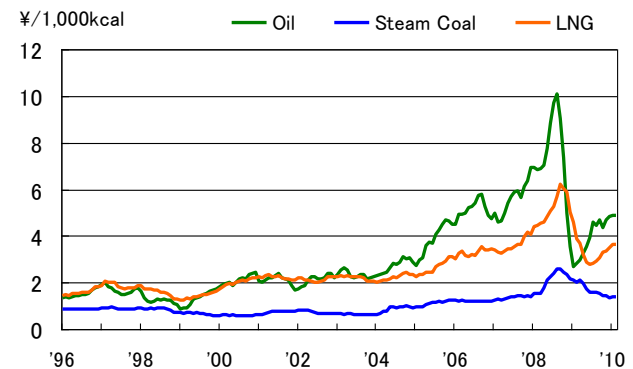
(1) Tight global conditions of coal supply and demand

- Worldwide expansion of coal demand due to expansion of electricity demand. In particular, China and India are importing rapidly growing volumes of coal.
- The coal price is soaring even though it is still lower than that of oil and natural gas in terms of calorific values.
- Japan, the world's largest coal-importing country, depends on Australia and Indonesia for 80% of its coal demand. It is essential to obtain new sources of coal supply in order to gain strong bargaining power in the global coal market against China and India, both of which are standing up as key players in international coal trading, while also raising the percentage of atomic power and natural gas in the national energy mix.

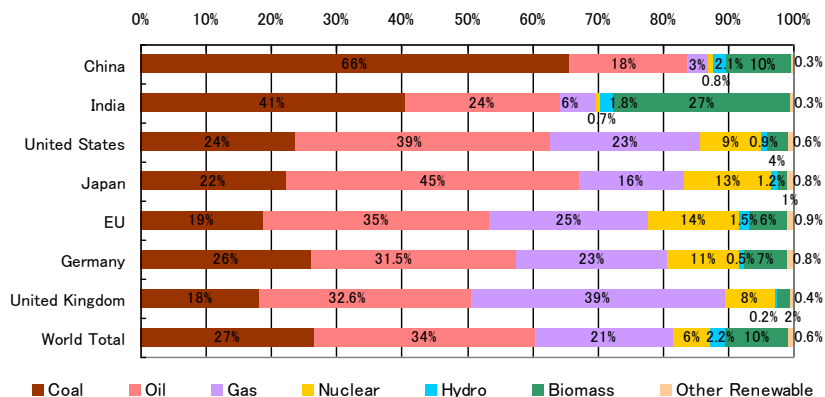
Primary Energy Demand by Fuel: World



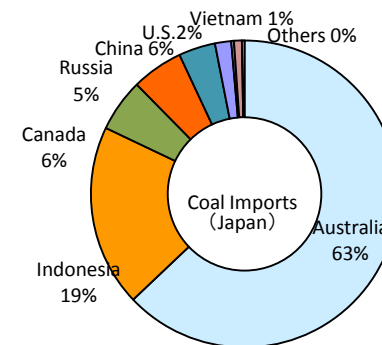
Trends in Fuel Prices (CIF Japan)



Composition of Primary Energy Consumption in Major Countries (2007)



Coal Import by Country in Japan (2009 actual)



The Position of Coal in the New Strategic Energy Plan

1. Shift to low-carbon systems in coal-burning power generation

- As global energy demand grows, coal-burning power generation worldwide will double by 2030.
- Coal-fired power generation emits about twice as much CO₂ per unit production as LNG-fired power generation. In order to respond to climate change, it is essential to achieve greater efficiency in coal-burning power generation.
- Japan has the world's most environmentally friendly coal-fired power generation systems.



1-1
Further shift to low-carbon systems in coal-fired power generation in Japan

1-2
Shift to low-carbon systems in overseas coal-fired power generation

2. Measures for ensuring stable supply of coal resources

- Japan is the world's largest importer of coal, depending on overseas countries for almost all the coal it consumes. Approximately 80% of coal imported by Japan comes from Australia and Indonesia.
- As the global demand for coal is expected to grow, China, India, and other emerging economies import increasing amounts of coal. Further initiatives for ensuring stable supply of coal are critical.



2-1
Frontier development and closer cooperation with coal-producing countries

2-2
Effective use of low-quality coal for developing new and clean energy sources

Coal Reserves, Consumption and Trade

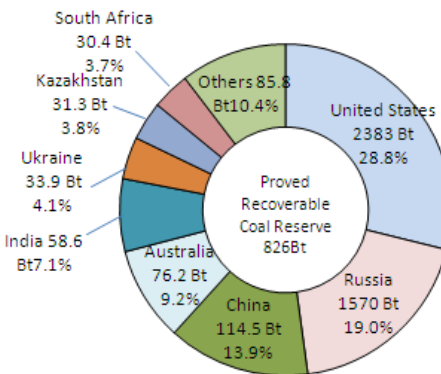
- Coal resources are more ubiquitous than oil and natural gas with reserves for the next 133 years against production, while oil has 42 years and natural gas 60 years.
- Japan is the largest coal importing country: 106 million tons of coal imported in 2009.
 - Japan's annual coal import accounts for 20% of 900 mill tons of total coal traded in the world.
 - The total volume of coal traded in the world accounts for 15% of the total production and the rest is locally consumed in each coal-producing country.
- Japan depends on Australia and Indonesia for 80% of its coal demand/import.
- Recent steep rise in global demand for steam coal, in particular, rapid expansion of coal demand/imports by China and India.

- **Coal Reserves World Top 5**
 1. U.S.A.
 2. Russia
 3. China
 4. Australia
 5. India

78% of the Total
- **Coal Consumption World Top 3**
 1. China 3.1 Bt
 2. U.S.A. 0.9 Bt
 3. India 0.6 Bt

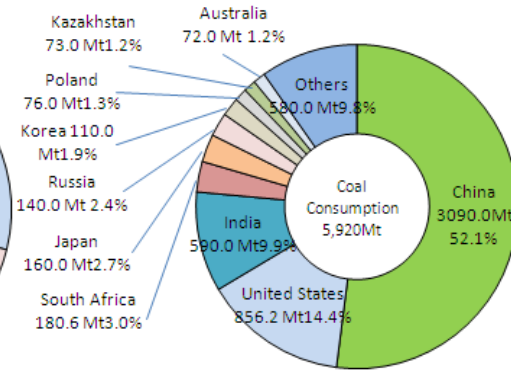
77% of the Total

Coal Reserves (2009)



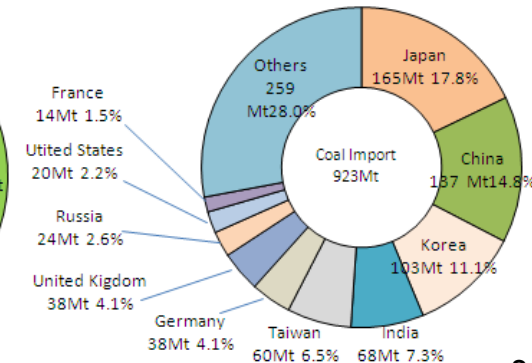
Source : BP Statistics

Coal Consumption (2009)

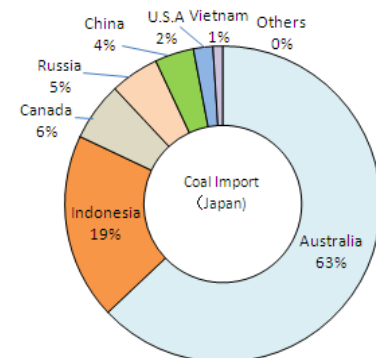


Source : IEA Coal Information

Global Coal Imports Volume (2009)



Japan's Coal Imports by Country (2009 actual)

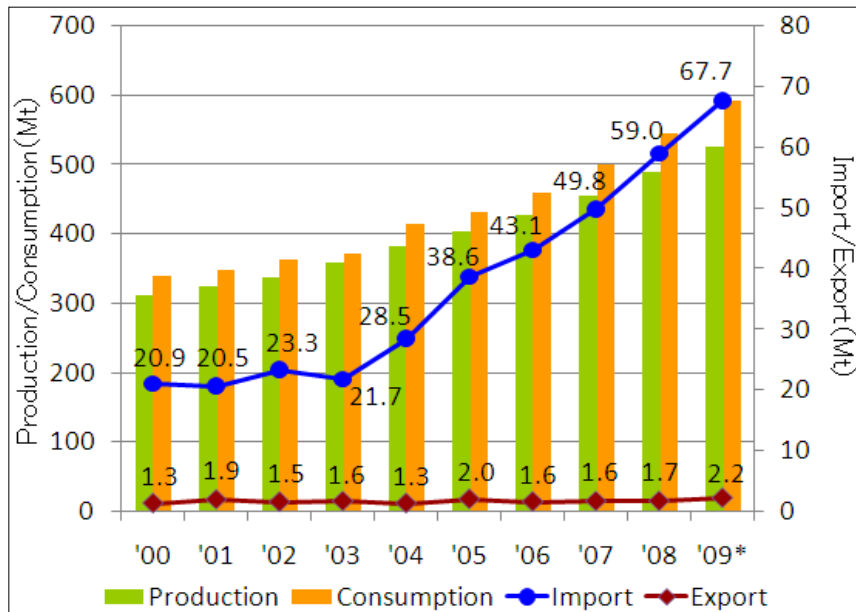


Source : Ministry of Finance, "Trade Statistics of Japan"

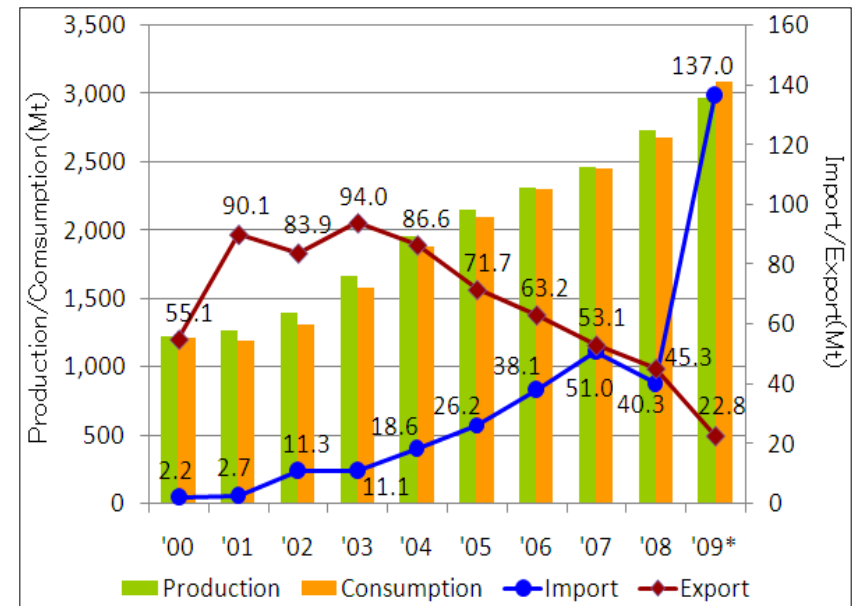
India's Rapid Expansion of Coal Imports while China Turns to a Coal - Importing Country

- India's annual coal import volume has increased 3.1 times during 6 years from 2003 to 2009.
- China's domestic coal consumption has exploded since 2003 thus its annual coal imports have also surged 12.5 times through the same period, while its coal exports decreased by 75% in comparison to the level of 2003.
- China became a net-importer of coal by about 100 million tons in 2009. This means China is the second largest coal importer following Japan.
- In the foreseeable future, both Japan and China will continue to import more coal due to their economic development and heavy dependence on coal-burning power plants.

India (not including Brown Coal)



China (not including Brown Coal)



Source: IEA Coal Information, 2009 is estimate.

Necessity of Overseas Coal Development and Infrastructure Improvement towards a Stable Supply of Coal Resources

- For coal development, it is important to improve infrastructure such as trains and ports in addition to coal mine development, and it is essential to work on the whole thing as a package.
- As a huge cost is required for infrastructure improvement, it is important to establish a comprehensive cooperative relationship including support from government organizations in both coal-producing countries and coal-consuming countries.

Coal Mine Development

- Cost needed to develop coal mines differs by mining (open-pit mining / underground mining).
- Since large machinery is useful for open-pit mining, stripping ratio has a huge influence on mining cost.
- Thickness and slope have a great influence on mining efficiency. Both primary cost of investment and cost of operating are huge. In addition, security management is essential.



Trains

- In general, coal is transported by train from coal mines to ports in Australia, North America, and South Africa. In Australia, This is supported by the government.
 - Approx. 8,000~10,000 tons of coal/car
 - 80~100 cars are connected (15m/car)
 - A train (1~2Km long) can carry around 500~1000 thousand tons of coal.
 - Distance between coal mines and ports affects the cost.



Ports

Coal transported from coal mines is stored at coal depots, then loaded on to ocean-going ships with loading equipment (belt conveyors, ship loaders).



Ships

- Huge ships, around 30 thousand tons, are often used for overseas transportation.
- They are divided into three groups depends on their carrying capacity.
 - Cape: 100~150 thousand tons
 - Panamax: 60~80 thousand tons
 - Handy: 20~50 thousand tons
- Japanese power companies own their ships or charter ships.

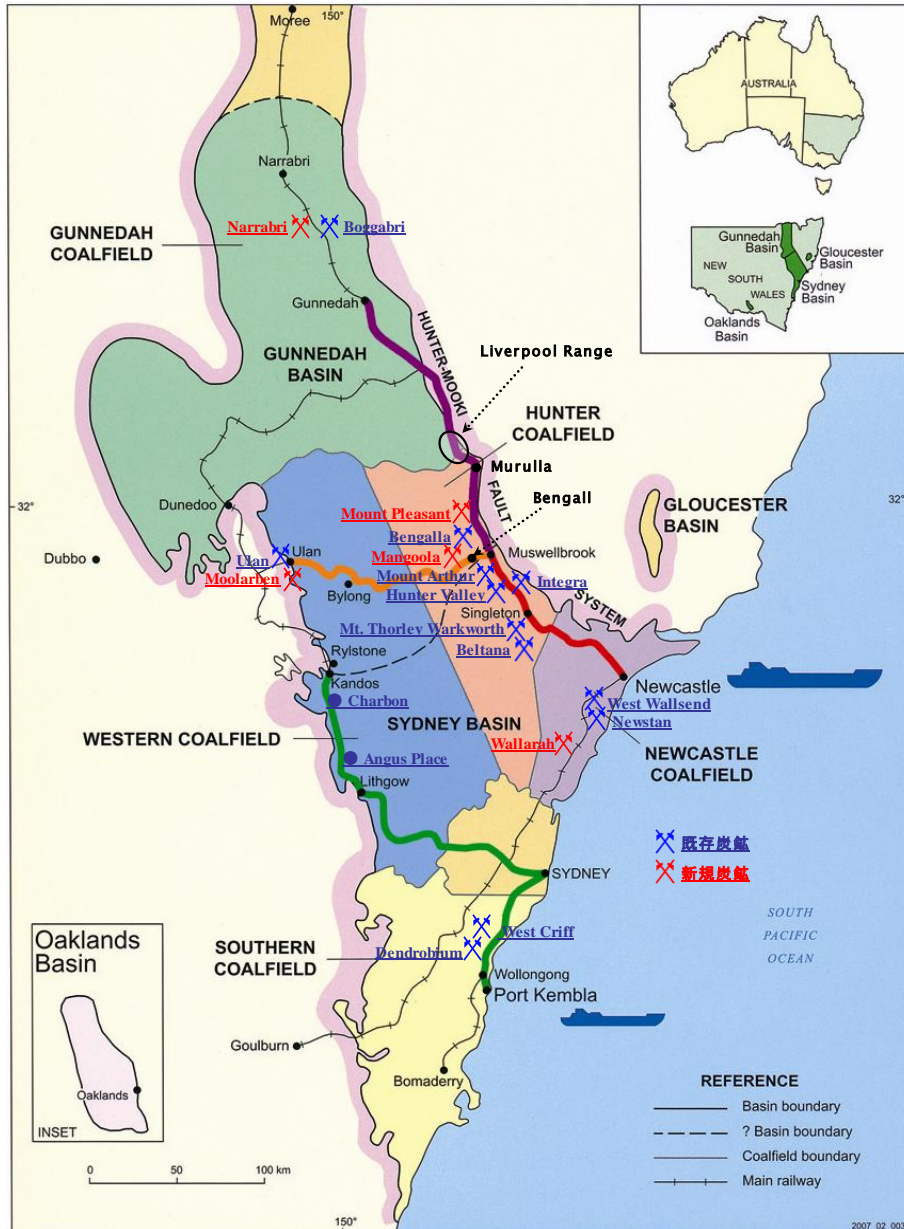


Barges

- Barges are often used in Indonesia and the Great Lakes in the U.S.
 - Approx. 5,000~8,000 tons of coal/barge
 - Primary Investment cost is smaller less than that for trains.



Coal Development and Transportation Infrastructure in NSW, Australia



Coal Mine Development Plan in Future
 According to information published by the Australian Government at the end of 2009, NSW plans increase coal production. The plan includes 10 projects for expansion of existing coal mines and 11 for new openings.

Railway Line Infrastructure
 Federal Government is responsible for its own railway tracks, and private companies for rolling stock.

Port Facilities
 State Government owns the site. Local supplier (such as Rio Tinto and Exrtrata) and PWCS (a joint venture invested by Japanese companies) operates and manages Port of Newcastle.

Coal Development and Transportation Infrastructure in QLD, Australia



Coal Mine Development Plan in Future

According to information publicized by the Australian Government at the end of 2009, QLD plans to increase coal production. The plan includes 14 projects for expansion of existing coal mines and 25 for new opening.

Railway Line Infrastructure

State Government (QR Limited; State-owned) operates and manages both railway tracks and rolling stock

Port Facilities

State Government owns the site and facilities and leaves their operation with private companies. BMA, a private company, owns Port of Hay Point.

Privatization of railway lines and ports

QLD Government announced following assets of coal-related infrastructure for sale in June, 2009.

Railway lines:

QR Network Access (QRNA); coal-related infrastructure including railway tracks and facilities

QR National Coal (QRNC): Train operation for coal transportation

Ports:

Port of Abbot Point, Port of Fisherman Islands (Brisbane)