## **Clean Coal Technology Systems**

**Clean Coal Technologies in Japan** 

Coal cycle			Target
Mining		Conventional coal preparation techniques	
Crushing	Coal preparation	coal utilization (jig, flotation, heavy media separation)	
Preparation		Preparation process control technology	
			sources/expansion of
	Deashing, reforming	Bio-briquetting	application fields
	and processing	Hyper-coal	
Reforming		Coal cartridge system (CCS)	
	Handling	Coal liquid mixture (CWM, COM)	
		Desulfurized CWM	
			Ease of handling
	Liquefaction	Bituminous coal liquefaction technology (NEDOL)	
	Liquelaction	Lingrading of coal-derived liquids	
Conversion		Integrated coal gasification combined cycle power generation	
		technology (IGCC)	More efficient use of energy/
	Gasification	Hydrogen-from-coal process (HYCOL)	CO2 reduction
		Multi purpose coal assification technology development (EAGLE)	(global warming countermeasure)
		Multi-purpose coal conversion (CPX)	
	Pyrolysis	Efficient Co-production with coal flash partial	
		nyaropyroiysis technology (ECOPRO)	
		Topping combustion	Reduction in SOx. NOx.
		Pressurized fluidized- Fluidized-bed boiler	and waste
Combustion	High-efficiency	combustion	(acid rain and global
	combustion	Fluidized-bed boiler Fluidized-bed advanced cement kiln system (FAKS)	warming countermeasures)
		Direct iron ore smelting reduction process (DIOS)	
		Advanced flue gas Dry desulfurization Wet desulfurization	
	Flue gas	Denitration	
	treatment	Hot gas cleaning technology	
		Alkaline, etc. removal technology	
Pollutant reduction			
	Ash utilization	Coal ash utilization technologies	
		Degree of technological maturity	
•		Degree of technological maturity	

## Proven reserves and R/P (ratio of reserves to production) of major energy resources

		Coal	Oil	Natural gas	Uranium
World reserves		9.091 trillion tons	1,188.6 billion barrels	180 trillion m <sup>3</sup>	459 million tons
Local reserves	North America Latin America Europe Former Soviet Union Middle East Africa	27.8% 2.3% 7.1% 24.5% 0.0% 5.6% 32.7%	3.9% 9.7% 1.6% 10.0% 61.7% 9.4% 3.5%	3.9% 4.2% 2.9% 32.4% 40.6% 7.8% 7.8%	17.1% 3.6% 2.8% 28.7% 0.2% 20.5% 27.2%
		02.170	0.070	7.070	27.270
Annual production rate		5.54 billion tons	29.3 billion barrels (80.3 million B/D)	2.7 trillion m <sup>3</sup>	0.036 million tons
R/P		164 years	40.5 years	66.7 years	85 years

Oil, natural gas, and coal data source: BP Statistics 2005 Uranium: OECD/NEA, IAEA URANIUM 2003

## World reserves of coal, oil, and natural gas resources (Unit: 100 million tons oil equivalent) (Source: BP 2005)

