

CCT Classifications in the Coal Product Cycle



Exploration, mining, safety and preparation

Crushing, transportation and storage

Processing, reforming and converting

Technologies for Coal Resources Development

- 1A1 Coal Resource Exploration Technology
- 1A2 Coal Production Technology
- 1A3 Mine Safety Technology
- 1A4 Environment-friendly Resource Development Technology

Physical properties of coal

	Anthracite	Bituminous coal	Brown coal
Specific gravity	1.5-1.8	1.2-1.7	0.8-1.5
Apparent specific gravity	-	0.75-0.80	0.55-0.75
Specific heat	0.22-0.24	0.24-0.26	0.26-0.28
Thermal conductivity (W/m-K)	-	1.26-1.65	-
Ignition point (°C)	400-450	300-400	250-300
Heating value (kcal/kg _(dry basis))	8,200-8,500	7,500-8,800	5,500-7,500

Coal classification by degree of carbonization

Classification	Heating value (kcal/kg _(dry basis))	Fuel ratio	Caking property
Anthracite	-	4.0 or greater	Non-caking
Bituminous coal	8,400 or greater	1.5 or greater	Strong-caking
		1.5 or less	
Subbituminous coal	8,100 or greater	1.0 or greater	Caking
		1.0 or less	Weak-caking
Brown coal	7,800 or greater	1.0 or greater	Weak-caking
		1.0 or less	Non-caking
Brown coal	7,300 or greater	-	Non-caking
	6,800 or greater	-	Non-caking
	5,800 or greater	-	Non-caking

Coal classification by utilization (expressed as coal)

Source: TEXT report		Source: Trade Statistics	
Anthracite		Anthracite	
Coking coal	Coking coal A	Strong-caking coal for coke	Ash content of 8% or less
	Coking coal B		Ash content exceeding 8%
	Coking coal C	Other coal for coke	Ash content of 8% or less
	Coking coal D		Ash content exceeding 8%
Steam coal	Steam coal A	Other	Ash content exceeding 8%
	Steam coal B	Other coal	Ash content of 8% or less
	Steam coal C		Ash content exceeding 8%

Multi-purpose Coal Utilization Technologies

- 2B1 Hydrogen-from-Coal Process (HYCOL)
- 2B3 Multi-purpose Coal Gasification Technology Development (EAGLE)
- 5A1 Hydrogen Production by Reaction Integrated Novel Gasification Process (HyPr-RING)

Coal Gasification and Hydrogenation Technologies

Liquefaction Technologies

- 4A1 Coal Liquefaction Technology Development in Japan
- 4A2 Bituminous Coal Liquefaction Technology (NEDOL)
- 4A3 Brown Coal Liquefaction Technology (BCL)
- 4A4 Dimethyl Ether Production Technology (DME)

Pyrolysis Technologies

- 4B1 Multi-purpose Coal Conversion Technology (CPX)
- 4B2 Efficient Co-production with Coal Flash Partial Hydrolysis Technology (ECOPRO)

Powdering, Fluidization and Co-utilization Technologies

- 4C1 Coal Cartridge System (CCS)
- 4C2 Coal Water Mixture Production Technology (CWM)
- 4C3 Briquette Production Technology
- 4C4 Coal and Woody Biomass Co-firing Technology

De-ashing and Reforming Technologies

- 4D1 Hyper-coal-based High-efficiency Combustion Technology (Hyper-coal)
- 4D2 Low-rank Coal Upgrading Technology (UBC Process)

Basic Technologies for Advanced Coal Utilization

- 6A1 Modeling and Simulation Technologies for Coal Gasification



Power plant



Cement plant



Iron works



Chemical plant

Flue gas treatment



Electrostatic precipitator

CO₂ reduction



Enhanced Oil Recovery (EOR) by CO₂

Effective coal ash use



Flue gas denitration facility



Flue gas desulfurization facility



Yokohama Landmark Tower

Utilization

Environmental countermeasures

