OVERVIEW

The Importance of Coal

■ IEA Annual Coal Questionnaire

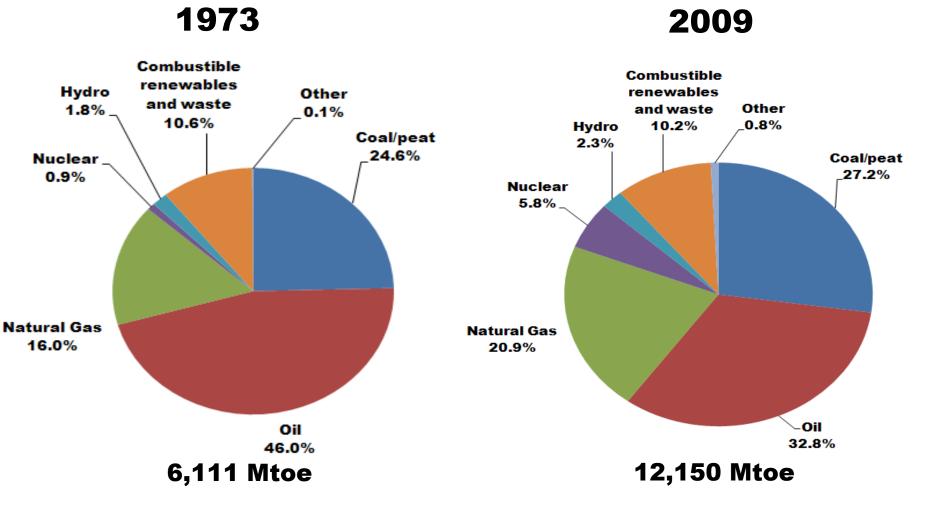
- Data Consistency Checks
- Uses of the Data

- Coal provides a large share of the world energy supply
- Potential to contribute even more

Must address environmental challenges



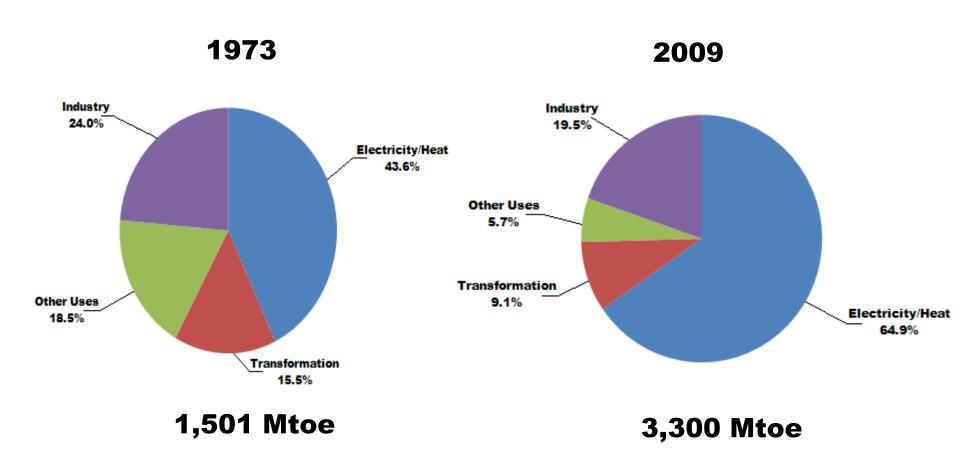
WORLD PRIMARY ENERGY SUPPLY



TPES doubled and coal more than doubled



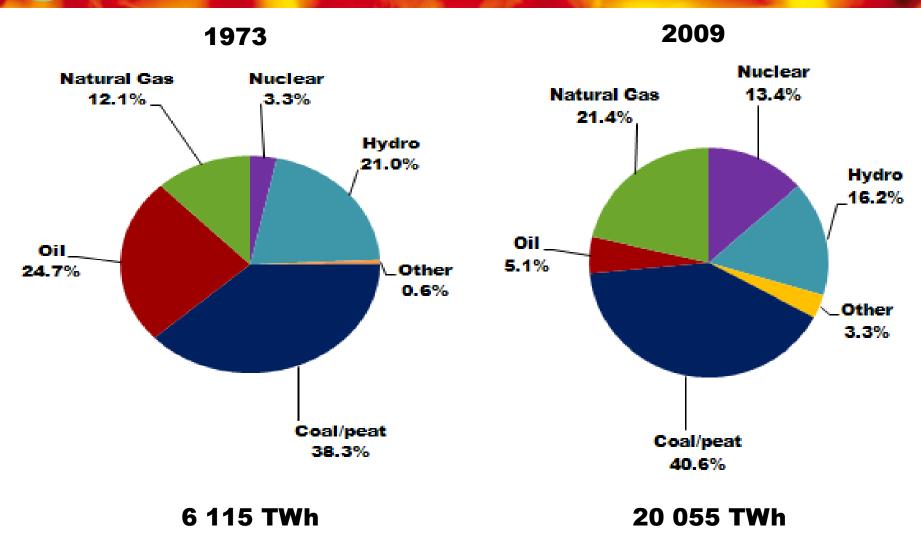
WORLD USES OF COAL



Coal and coal products increasingly used for electricity generation

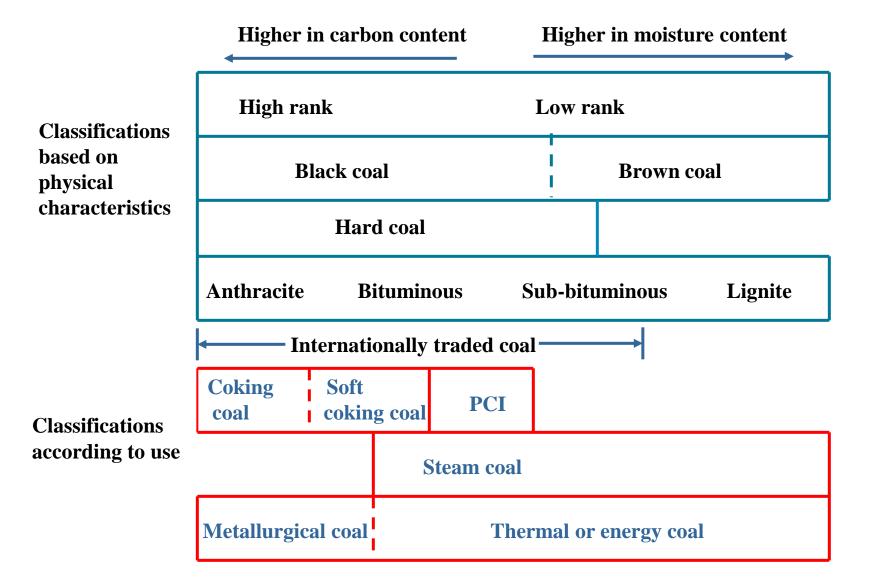


WORLD FUEL SHARES OF ELECTRICITY



Electricity generation more than triple, with coal holding its own

COMMON COAL CLASSIFICATIONS



Broadly equivalent terms

- Ash, volatile matter, sulphur, nitrogen, trace elements
- Blended to produce different performance characteristics
- Soft coking coal and steam coal prices have been related



PRIMARY AND DERIVED COAL AND PEAT PRODUCTS

	Anthracite	
	Coking Coal	
PRIMARY FUELS	Other Bituminous Coal	
	Sub-bituminous Coal	
	Lignite/Brown Coal	SOLID
	Peat	FOSSIL
	Patent Fuels	FUELS
	Coke Oven Coke	
_	Gas Coke	
DERIVED	Coal Tar	
and MANUFACTURED PRODUCTS	BKB/Peat Briquettes	
	Gas Works Gas	
	Coke Oven Gas	MANUFACTURED
	Blast Furnace Gas	GASES
	Oxygen Steel Furnace Gas	

PRIMARY COAL DEFINITIONS

Hard Coal

- Gross calorific value greater than 23,865 kJ/kg
- Mean random reflectance of vitrinite of at least 0.6
- Anthracite
- Bituminous
 - Coking coal

Sub-Bituminous Coal

- Gross calorific value 17,435 23,865 kJ/kg
- Mean random reflectance of vitrinite less than 0.6

Lignite/Brown Coal

- Gross calorific value less than 17,435 kJ/kg
- Mean random reflectance of vitrinite less than 0.6

Anthracite

- Gross calorific value is greater than 23,865 kJ/kg
- Less than 10% volatile matter
- High carbon content (about 90% fixed carbon)
- Mean random reflectance of vitrinite at least 2.0%
- Non-agglomerating

Coking Coal

- Bituminous coal that allows its use to produce coke
- Gross calorific value is greater than 23,865 kJ/kg
- Mean random reflectance of vitrinite of at least 0.6

Other Bituminous Coal

- Coal used for steam raising purposes
- Higher volatile matter (more than 10%)
- Lower carbon content (less than 90% fixed carbon)
- Gross calorific value is greater than 23,865 kJ/kg
- Mean random reflectance of vitrinite of at least 0.6



UPGRADED COALS

- Patent Fuels
 - Manufactured from hard coal fines
 - With the addition of a binding agent
 - Patent fuel produced may be higher than the amount of coal used
- BKB (Brown Coal Briquettes)
 - A composite fuel manufactured from lignite/brown coal
 - Produced under high pressure without a binding agent
 - Includes peat briquettes, dried lignite fines and dust



UPGRADED COALS

Coal Tar

- Liquid result of distillation of bituminous coal during the coke oven process or of the low-temperature carbonisation of brown coal
- Coal tar can be further distilled into different organic products (as benzene, toluene, naphthalene), which normally would be reported as a feedstock to the petrochemical industry



COKE OVEN COKE

- A solid product
 - From carbonized coal, principally coking coal
 - At high temperature
 - Low in moisture and volatile matter
 - Used mainly in the iron and steel industry
- Requires inputs of coking coal to coke ovens in the Transformation sector
- Inputs of other fuels may also be reported on the other questionnaires



COAL DERIVED GASES

Gas Work Gas

Produced in plants whose main purpose is to manufacture, transport and distribute gas.

Blast Furnace Gas

Produced during combustion of coke in blast furnaces in iron and steel industry

Oxygen Steel Furnace Gas

- By-product of the production of steel in an oxygen furnace
- Also known as converter gas, LD gas or BOS gas



TRANSFORMATION VS. ENERGY SECTORS

- Transformation Sector
 - Fuel used for the primary or secondary conversion of energy
 - Transformed to make derived energy products
- Energy Sector
 - Fuels consumed by the energy industry to support
 - fuel extraction
 - plant operations of transformation activities



TYPES OF ELECTRIC AND HEAT PLANTS

	Electricity Only	СНР	Heat Only
Main Activity Producer	Report all	Report all electricity and heat produced and all fuel used	Report all heat produced and all fuel used
Autoproducer	production and all fuel used	Report all electricity produced and heat sold with corresponding fuel used	Report heat <u>sold</u> and corresponding fuel used



STRUCTURE OF THE COAL QUESTIONNAIRE

- Table 1. Supply, Transformation, Energy and Final Consumption
- Table 2. Imports by Origin
- Table 3. Exports by Destination
- Table 4. Calorific Values



SUMMARY FLOWS FROM TABLE 1

Domestic Supply

Production

- +Import
- Export
- International

Marine

Bunkers

+Stock Changes

Gross Consumption

```
Transformation Sector (14 subsectors)
```

- **+Energy Sector** (10 sub-sectors)
- Distribution Losses
- **+Final Consumption**
 - +Industry Sector (13 sub-

sectors)

- +Transport (3 sub-sectors)
- +Other Sectors (5 sub-

sectors)

+Non Energy Uses

Domestic Supply (Inland Consumption)

Gross Consumption

Statistical Difference



TABLE 1. SUPPLY AND TRANSFORMATION SECTOR

		Coking Coal	Other Bituminous Coal	Sub- bituminous Coal
SUPPLY AND TRANSFORMATION SECTOR		10° t	10° t	10° t
The state of the s		В	С	D
Indigenous Production	1	0	667	0
Underground Production	2	0	667	0
Surface Production	3	0	0	0
From Other Sources	4	0	0	0
Total Imports (Balance)	5	718	6,384	0
Total Exports (Balance)	6	0	0	0
International Marine Bunkers	7	0	0	0
Stock Changes (National Territory)	8	-43	0	0
Inland Consumption (Calculated)	9	675	7,051	0
Statistical Differences	10	0	456	0
MEMO ITEM: From other sources From Other Sources - Oil	11			
From Other Sources - Natural Gas	12			
From Other Sources - Renewables	13			
Transformation Sector	14	675	5,972	0
Main Activity Producer Electricity Plants	15	0	5,965	0
Main Activity Producer CHP Plants	16	0	0	0
Main Activity Producer Heat Plants	17	0	0	0
Autoproducer Electricity Plants	18	0	7	0
Autoproducer CHP Plants	19	0	0	0
Autoproducer Heat Plants	20	0	0	0
Patent Fuel Plants (Transformation)	21	0	0	0
Coke Ovens (Transformation)	22	675	0	0
BKB Plants (Transformation)	23	0	0	0
Gas Works (Transformation)	24	0	0	0
Blast Furnaces (Transformation)	25	0	0	0
Coal Liquefaction Plants (Transformation)	26	0	0	0
For Blended Natural Gas	27		C C	
Non-specified (Transformation)	28	0	0	0



TABLE 1. ENERGY SECTOR AND FINAL CONSUMPTION

SUPPLY AND TRANSFORMATION SECTOR	ř	Coking Coal	Other Bituminous Coal 10 ⁸ t	Sub- bituminous Coal 10 ³ t
		В	Bituminous Coal 10° t 10° t B C 0 0 0 0 0 0 0 0 0 0 0 0	D
ENERGY SECTOR AND FINAL CONSUMPTION				
Energy Sector	29			0
Own Use in Electricity, CHP and Heat Plants	30	0	0	0
Coal Mines	31		0	0
Patent Fuel Plants (Energy)	32	0	0	0
Coke Ovens (Energy)	33	0	0	0
BKB Plants (Energy)	34	0	0	0
Gas Works (Energy)	35	0	0	0
Blast Furnaces (Energy)	36	0	0	0
Petroleum Refineries	37	0	0	0
Coal Liquefaction Plants (Energy)	38	0	0	0
Non-specified (Energy)	39	0	0	0
Distribution Losses	40	0	0	0
Total Final Consumption	41	0	623	0
Total Non-Energy Use	42	0	0	0
Non-Energy Use Industry/Transformation/Energy	43	0	0	0
Of which: Non-Energy Use-	44	0	0	0
Non-Energy Use in Transport	45	0	0	0
Non-Energy Use in Other Sectors	46	0	0	0



TABLE 1. ENERGY END USE SPECIFICATION

SUPPLIA AND TRANSFORMATION SECTOR		Coking Coal	Other Bituminous Coal	Sub- bituminous Coal
SUPPLY AND TRANSFORMATION SECTOR	_	10° t	10° t	10° t
Final Energy Consumption	47	0	623	0
Industry Sector	48	0	599	0
Iron and Steel	49	0	0	0
Chemical (including Petrochemical)	50	0	0	0
Non-Ferrous Metals	51	0		0
Non-Metallic Minerals	52	0	322	0
Transport Equipment	53	0	V	0
Machinery	54	0	0	0
Mining and Quarrying	55	0	81	0
Food, Beverages and Tobacco	56	0	0	0
Paper, Pulp and Printing	57	0	12	0
Wood and Wood Products	58	0	0	0
Construction	59	0	0	0
Textiles and Leather	60	0	0	0
Non-specified (Industry)	61	0	174	0
T				
Transport Sector	62	0	0	0
Rail	63	0	0	0
Domestic Navigation	64	0	0	0
Non-specified (Transport)	65	0	0	0
Other Sectors	66	0	24	0
Commercial and Public Services	67	0	6	0
Residential	68	0	0	0
Agriculture/Forestry	69	0	0	0
Fishing	70	0	18	0
Non-specified (Other)	71	0	0	0



COKE OVEN DATA

		Coking Coal	Other Bituminous Coal	Coke Oven Coke	Coal Tar	Gas Vorks Gas	Coke Oven Gas	Blast Furnace Gas
SUPPLY AND TRANSFORMATION SECTO	R	10° t	10° t	10° t	10" t	TJ (gross)	TJ (gross)	TJ (gross)
		В	С	H		L	M	N
Indigenous Production	1	0	667	(497)	(18)	1,185	4,568	5,230
Underground Production	2	0	667				.,	
Surface Production	3	0	0					
From Other Sources	4	0	0	0	0	0	0	0
Total Imports (Balance)	5	718	6,384	0	0	0	0	0
Total Exports (Balance)	6	0	0	12	0	0	0	0
International Marine Bunkers	7	0	0	0	0	0	0	0
Stock Changes (National Territory)	8	-43	0	29	-1	-119	0	0
Inland Consumption (Calculated)	9	675	7,051	514	17	1,066	4,568	5,230
Statistical Differences	10	0	456	0	0	0	0	0
MEMO ITEM: From other sources								
From Other Sources - Oil	11			0	0	0	0	0
From Other Sources - Natural Gas	12			0	0	0	0	0
From Other Sources - Renewables	13			0	0	0	0	0
Transformation Sector	14	675	5,972	491	0	0	959	0
Main Activity Producer Electricity Plants	15	0	5,965	0	0	0	0	0
Main Activity Producer CHP Plants	16	0	0	0	0	0	0	0
Main Activity Producer Heat Plants	17	0	0	0	0	0	0	0
Autoproducer Electricity Plants	18	0	7	0	0	0	0	0
Autoproducer CHP Plants	19	0	0	0	0	0	0	0
Autoproducer Heat Plants	20	0	0	0	0	0	0	0
Patent Evel Diante (Transformation)	21	0	0	0	0	0	0	0
Coke Ovens (transformation	22	675	0	0	0	0	0	0
DND Plants (Transformation)	23		0	0	0	0	0	0
Gas Works (Transformation)	24	0	0	0	0	0	0	0
Blast Furnaces (Transformation)	25	0	0	491	0	0	959	0
Coal Liquefaction Plants (Transformation)	26	0	0	0	0	0	0	0
For Blended Natural Gas	27					0	0	0
Non-specified (Transformation)	28	0	0	0	0	0	0	0



COKE OVEN DATA

		Coking Coal	Other Bituminous Coal	Coke Oven Coke	Coal Tar	Gas Works Gas	Coke Oven Gas	Blast Furnace Gas
SUPPLY AND TRANSFORMATION SECT	OR	10 ³ t	10 ³ t	10 ³ t	10 ³ t	TJ (gross)	TJ (gross)	TJ (gross)
		В	С	Н	J	L	M	N
ENERGY SECTOR AND FINAL CONSUMI	PTION			1/2				
Energy Sector	29	0	0	0	17	0	476	3,454
Own Use in Electricity, CHP and Heat Pla	30	0	0	0	0	0	0	0
Coal Mines	31	0	0	0	0	0	0	0
Patent Fuel Plants (Energy)	32	0	0	0	0	0		0
Coke Ovens (Energy)	33	0	0	0	0	0	476	3,454
BKB Plants (Energy)	34	0	0	0	0	0		0
Gas Works (Energy)	35	0	0	0	-	0	0	0
Blast Furnaces (Energy)	36	0	0	0	17	0	0	0
Petroleum Refineries	37	0	0	0	7	0	0	0
Coal Liquefaction Plants (Energy)	38	0	0	0	0	0	0	0
Non-specified (Energy)	39	0	0	0	0	0	0	0
Distribution Losses	40	0	0	0	0	0	0	1,044
Total Final Consumption	41	0	623	23	0	1,066	3,133	732
Total Non-Energy Use	42	0	0	0	0	0	0	0
Non-Energy Use Industry/Transformation/	43	0	0	0	0	0	0	0
Of which: Non-Energy Use- Chemical/Petrochem	44	0	0	0	0	0	0	0
Non-Energy Use in Transport	45	0	0	0	0	0	0	0
Non-Energy Use in Other Sectors	46	0	0	0	0	0	0	0



COKE OVEN DATA

		Coking Coal	Other Bituminous Coal	Coke Oven Coke	Coal Tar	Gas Works Gas	Coke Oven Gas	Blast Furnace Gas	
SUPPLY AND TRANSFORMATION SECT	OR	10° t	10° t	10 ² t	10° t	TJ (gross)	TJ (gross)	TJ (gross)	
		В	C	Н	J	L	M	N	
ENERGY END USE SPECIFICATION									
Final Energy Consumption	47	0	623	23	0	1,066	3,133	732	
Industry Sector	48	0	599	23	0	0	3,183	732	
Iron and Steel	49	0	0	0	0	6	3,133	732	
Chemical (including Petrochemical)	50	0	0	0	0	No.	3,133	0	
Non-Ferrous Metals	51	0	0	0	0	0	0	0	
Non-Metallic Minerals	52	0	332	0	0	0	0	0	
Transport Equipment	53	0	0	0	0	0	0	0	
Machinery	54	0	0		0	0	0	0	
Mining and Quarrying	55	0	81	(19	0	0	0	0	
Food, Beverages and Tobacco	56	0	0		0	0	0	0	
Paper, Pulp and Printing	57	0	12	0	0	0	0	0	
Wood and Wood Products	58	0	0	0	0	0	0	0	
Construction	59	0	0	0	0	0	0	0	
Textiles and Leather	60	0	0		0	0	0	0	
Non-specified (Industry)	61	0	174	4	0	0	0	0	
Transport Sector	62	0	0	0	0	0	0	0	
Rail	63	0	0	0	0	0	0	0	
Domestic Navigation	64	0	0	0	0	0	0	0	
Non-specified (Transport)	65	0	0	0	0	0	0	0	
Other Sectors	66	0	24	0	0	1,066	0	0	
Commercial and Public Services	67	0	6	0	0	575	0	0	
Residential	68	0	0	0	0	491	0	0	
Agriculture/Forestry	69	0	0	0	0	0	0	0	
Fishing	70	0	18	0	0	0	0	0	
Non-specified (Other)	71	0	0	0	0	0	0	0	



TABLES 2 & 3: ORIGIN/DESTINATION TRADE

Table 2
Imports

· 66
Countries
of Origin

Table 3 **Exports** · 73 **Countries** of **Destination** 5 'Other' Regions



TABLE 2. IMPORTS BY ORIGIN

		Anthracite	Coking Coal	Other	Sub-	Lignite/Brown	Patent Fuel	Coke Oven	Coal Tar	BKB/PB
				Bituminous	bituminous	Coal		Coke		
		- by .	- 26	Coal	Coal		- 18		- 191	1121
	9	10 ³ t								
		Α	В	С	D	E	F	G	Н	1
Albania	1	0	0	0	0	277	0	0		0
Armenia	2	0	0	0	0		0	0	0	0
Australia	3	0	421	196	0		0	0	0	0
Austria	4	0	0	0	0		0	0	0	0
Azerbaijan	5	0	0	0	0		0	0	0	0
Belarus	6	0	0	0	0		0	0	0	0
Belgium	7	0	0	0	0		0	0	0	0
Bosnia and Herzegovina	8	0	0	0	0	0	0	0	0	0
Bulgaria	9	0	0	0	0	0	0	0	0	0
Canada	10	0	297	122	0	0	0	0	0	0
China, People's Republic	11	0	0	0	0	0	0	0	0	0
Colombia	12	0	0	4,433	0	0	0	0	0	0
Croatia	13	0	0	0	0	0	0	0	0	0
Cyprus	14	0	0	0	0	0	0	0	0	0
Czech Republic	15	0	0	0	0	0	0	0	0	0
Denmark	16	0	0	0	0	0	0	0	0	0
Estonia	17	0	0	0	0	0	0	0	0	0
Finland	18	0	0	0	0	0	0	0	0	0
France	19	0	0	0	0	0	0	0	0	0
Georgia	20	0	0	0	0	0	0	0	0	0
Germany	21	0	0	0	0	0	0	0	0	0
Greece	22	0	0	0	0	0	0	0	0	0
Hungary	23	0	0	0	0	0	0	0	0	0
Iceland	24	0	0	0	0	0	0	0	0	0
Indonesia	25	0	0	528	0	0	0	0	0	0
Ireland	26	0	0	0	0	0	0	0	0	0
Israel	27	0	0	0	0	0	0	0	0	0
Italy	28	0	0	0	0		0	0	0	0



TABLE 3. EXPORTS BY DESTINATION

		Anthracite	Coking Coal	Other Bituminous Coal	Sub- bituminous Coal	Lignite/Brow n Coal	Patent Fuel	Coke Oven Coke	Coal Tar	BKB/PB
	1	10 ³ t	10 ³ t	10 ³ t	10 ³ t	10 ³ t	10 ³ t	10 ³ t	10 ³ t	10 ³ t
		A	В	С	D	Е	F	G	Н	1
Albania	1	0	0	0	0	0	0	0	0	C
Algeria	2	0	0	0	0	0	0	0	0	C
Argentina	3	0	0	0	0	0	0	0	0	C
Armenia	4	0	0	0	0	0	0	0	0	C
Australia	5	0	0	0	0	0	0	0	0	0
Austria	6	0	0	0	0	0	0	0	0	C
Azerbaijan	7	0	0	0	0	0	0	0	0	C
Belarus	8	0	0	0	0	0	0	0	0	C
Belgium	9	0	0	0	0	0	0	0	0	C
Bosnia and Herzegovina	10	0	0	0	0	0	0	0	0	C
Brazil	11	0		0	0			0	0	C
Bulgaria	12	0	0	0	0	0	0	0	0	C
Canada	13	0	0					0	0	C
Chile	14	0	0	0	0			0	0	C
China, People's Republic	15	0	0	0	0	0	0	0	0	C
Chinese Taipei	16	0	0	0	0	0	0	0	0	C
Croatia	17	0	0	0	0			0	0	C
Cyprus	18	0	0	0	0	0	0	0	0	(
Czech Republic	19	0	0	0	0	0	0	0	0	(
Denmark	20	0	0	0	0	0	0	0	0	(
Egypt	21	0	0	0	0	0	0	0	0	(
Estonia	22	0	0	0	0	0	0	0	0	(
Finland	23	0	0	0	0	0	0	0	0	
France	24	0	0	0	0	0	0	0	0	

© OECD/IEA 2010



TABLE 4. CALORIFIC VALUES

15 Primary and derived coal products

- Production
- ·Imports
- Exports
- Used in Coke Ovens
- Used in Blast Furnaces
- Used in main Activity Plants
- Used in Industry
- For Other Uses



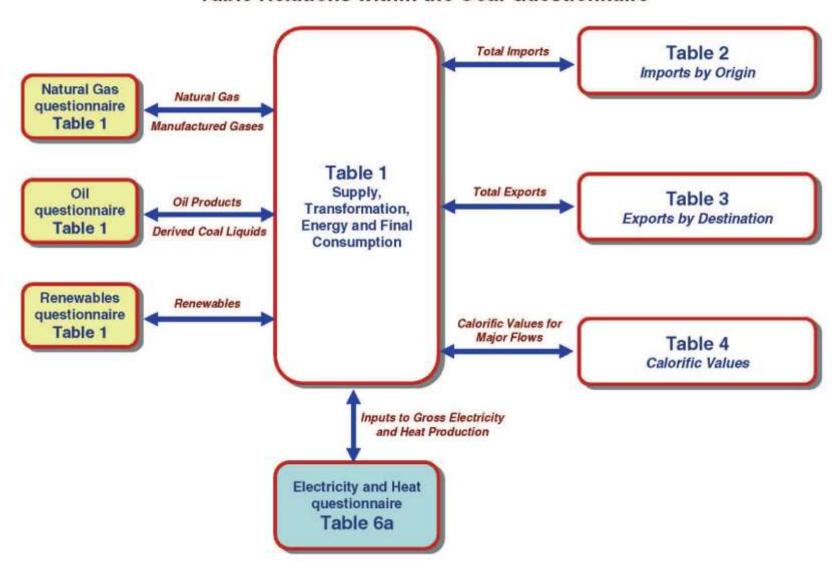
TABLE 4. CALORIFIC VALUES

		Anthracite MJ/tonne A	Coking Coal MJ/tonne	Other Bituminous Coal MJ/tonne	Sub- bituminous Coal MJ/tonne	Lignite/Brown Coal MJ/tonne	Peat MJ/tonne	Patent Fuel MJ/tonne G	Coke Oven Coke MJ/tonne	Gas Coke MJ/tonne	Coal Tar MJ/tonne	BKB/PB* MJ/tonne K
Production	gross 1	0		17,348		0	0	0	28,790		43,514	
7000001	net 2	0		16,481	(0	0	0	27,350		41,338	
mnorte	gross 3	0	30,125	25,054	(0	0	0	0	l l	0 0	
mports	net 4	0	28,619	23,801	(0	0	0	0		0 0	
XDOTS :	gross 5	0	0	0	(0	0		20,913		0 0	
	net 6	0	0	0	(0	0		19,867		0 0	
Jsed in coke ovens	gross 7	0	30,125	0	(0	0	0	0		0 0	
osed III coke ovells	net 8	0	28,619	0	(0	0	0	0			
Used in blast furnaces	gross 9	0	0	0	(0	0	0	28,790		43,514	
oseu III bidst iuilidees	net 10	0	0	0	(0	0	0	27,350		41,338	
Used in Main Activity Plants	gross 11	0	0	24,404	(0	0	0	0		0 0	
OSEC III Maiii Activity Flants	net 12	0	0	23,184	(0	0	0	0	-	0 0	
lead in industry	gross 13	0	0	26,748	(0	0	0	28,790		0 0	
lsed in industry	net 14	0	0	25,411	(0	0	0	27,350		0 0	
For Other Uses	gross 15	0	30,125	0	(0	0	0	0		0 0	
of Other Oses	net 16		28,619	0	(0	0	0	0		0 0	



RELATIONSHIPS

Table Relations within the Coal Questionnaire





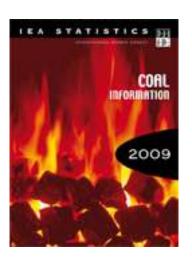
DATA QUALITY CHECKS

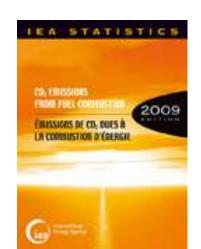
- Integers, negative numbers, sums
- Percentage differences with prior year
- Comparisons to other questionnaires
- Calorific values
- Net vs. gross calorific values
- Statistical difference
- Transformation efficiency rates
- Shares of coke oven outputs
- Shifts in product classification
- Breaks in series
- Trade data coincides with trade partners



USES OF THE DATA

- Coal Information book
- Electronic online files
- Energy balances
- Environmental issues
- Data support for other IEA divisions/other organizations
- Country reviews
- Assessing security of supply
- Making policy and business decisions







QUARTERLY COAL DATA

- The IEA also publishes quarterly coal production and trade data (volume)
 - Hard coal and brown coal production
 - Coal imports and exports by types and trade partners



- It is difficult to access timely data for some countries
- Your assistance in identifying appropriate sources and contacts would be appreciated
- IEA points of contact
 - Rachael Hackney
 - ces@iea.org



Thank you

COALAQ@iea.org