

The Outlook for Coal Utilization in the United States



**Richard Bonskowski, Energy Information Administration
United States Department of Energy**

Presented at 2005 APEC Clean Fossil Energy Technical and Policy Seminar
Cebu, The Philippines, January 26 - 29, 2005

Discussion Topics

- What is EIA?
- EIA Projections of Coal Demand and Supply
 - Assumptions
- U.S. Energy Balance
 - Uncertainties
 - Potential Changes

What is EIA?

The Energy Information Administration (EIA), created by Congress in 1977, is a statistical agency of the U.S. Department of Energy. EIA provides policy-independent data, forecasts, and analyses to promote sound policy making, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment.

- EIA's role differs from U.S. DOE's in regard to policy and independence
- EIA's products are meant to be neutral of policy issues and consistent in derivation
- EIA collects primary data from producers, distributors, and consumers of energy

What is EIA?

- EIA compiles, interprets, and analyzes U.S. energy and related statistics.
- EIA performs short-term and long-term integrated energy forecasts
- EIA performs ad-hoc analyses of possible future scenarios.



Photo courtesy of Georgia Power, Plant Scherer

EIA Projections of Coal Demand and Supply

Short-Term Projections

- No significant changes in status quo
- U.S. coal demand principally from electricity generation sector
- Demand is supplied almost entirely from U.S. mines
- Prominent fluctuations are seasonal
- Trends in production and consumption are slowly rising

EIA Projections of Coal Demand and Supply

Short-Term Projections

U.S. Coal Demand Disposition

2004 - 2006, by Quarters



Source: Short Term Energy Outlook, January 2005

EIA Projections of Coal Demand and Supply

Short-Term Projections

U.S. Coal Supply Disposition
2004 - 2006, by Quarters



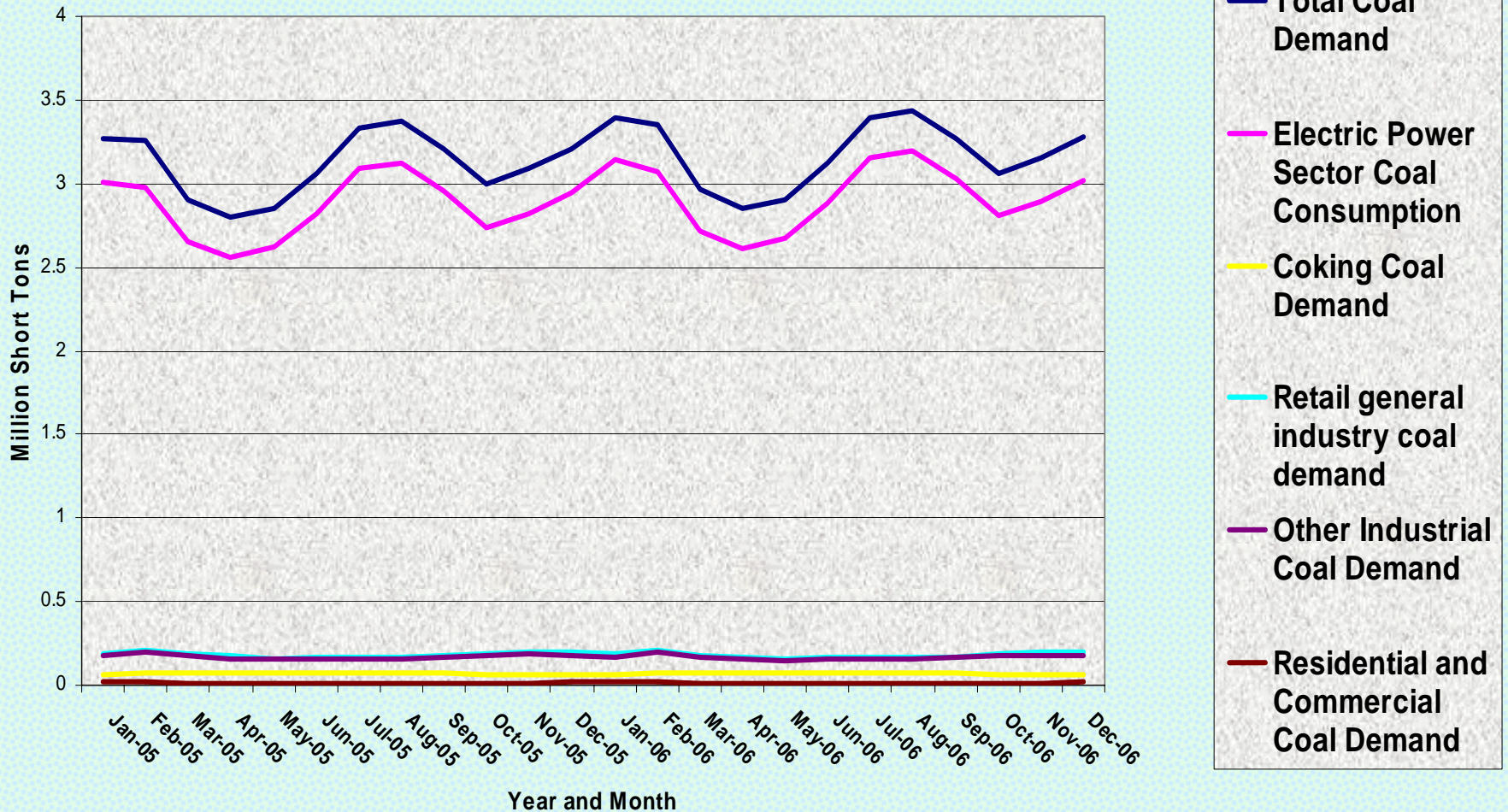
Source: Short Term Energy Outlook, January 2005

EIA Projections of Coal Demand and Supply

Short-Term Projections

U.S. Coal Demand, by Sector

2004 - 2006, by Month



Source: Short Term Energy Outlook, January 2005

EIA Projections of Coal Demand and Supply

Long-Term Projections

- Coal is projected to fuel roughly 50% of electricity generation through 2025
- Coal prices are projected to decline slightly in real dollars
- Domestic coal supplies continue to shift to western U.S. low-sulfur producers
- Trends in production and consumption continue to rise slowly

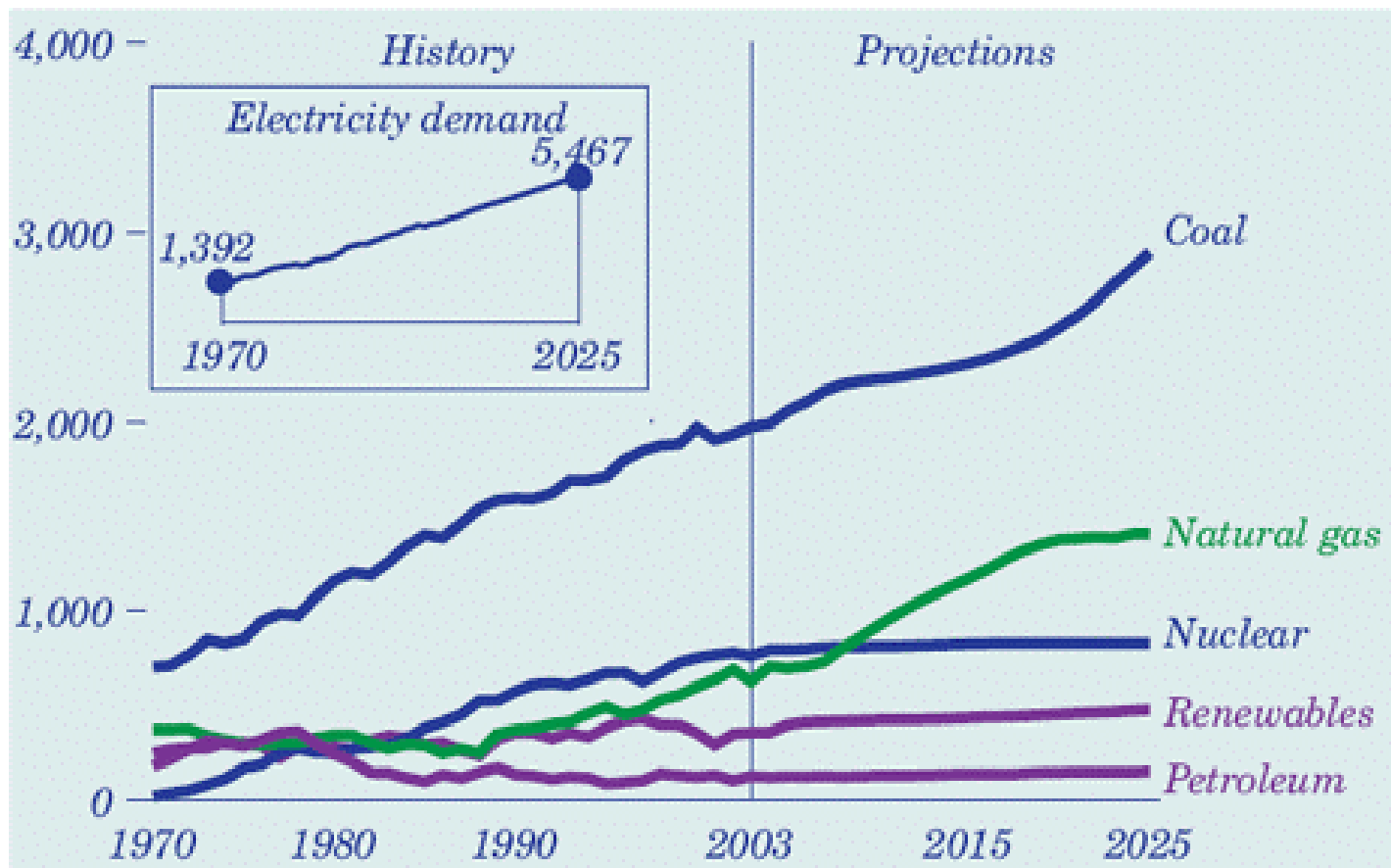
EIA Projections of Coal Demand and Supply

Long-Term Factors

- Costs of generating power or heat are substantially lower using coal, but capital requirements, planning and permitting times are high compared with natural gas.
- Sourcing of coal for U.S. consumption is influenced by regulatory policies and, eventually, by new technologies.
- Global competition for metallurgical coals and high-quality steam coals penetrated U.S. coal markets in past 2 years.

Long-Term EIA Projections for Coal Demand

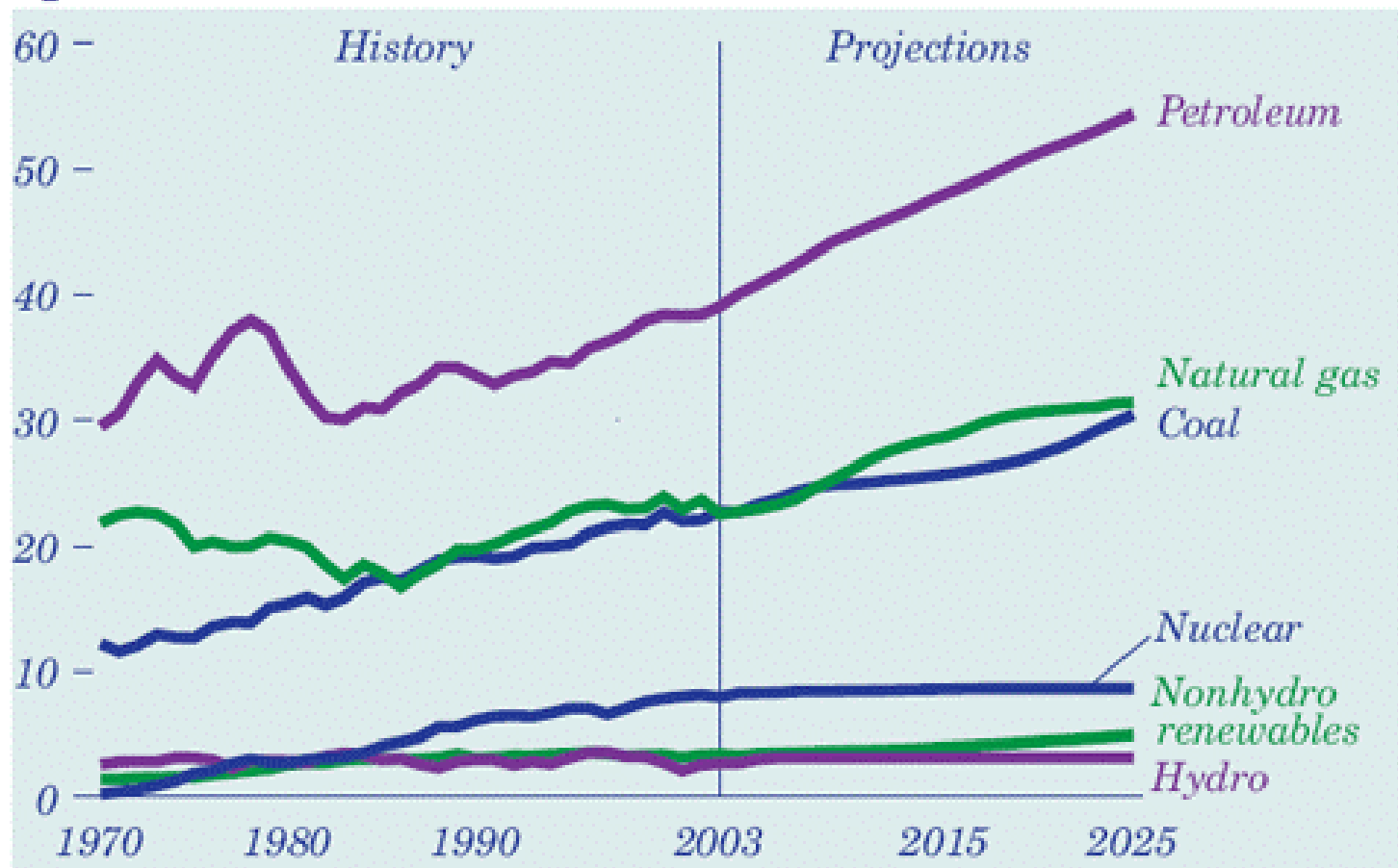
*Figure 5. Electricity generation by fuel, 1970-2025
(billion kilowatthours)*



Source: Annual Energy Outlook 2005 (Early Release), December 2004

Long-Term EIA Projections for Coal Demand

Figure 3. Energy consumption by fuel, 1970-2025 (quadrillion Btu)



Source: Annual Energy Outlook 2005 (Early Release), December 2004

Long-Term EIA Projections for Coal Demand

Underlying Assumptions, 2005 – 2025

- U.S. Economy (real gross domestic product) will grow at average rate of 3.1% per year
- Consumption of fossil fuel (petroleum products, natural gas, coal) will grow at 1.5%, 1.5%, and 1.3% per year, respectively
- World oil prices will grow by 0.4% per year, reaching \$30.31/barrel in 2025*, in year 2003 dollars
- Real U.S. coal prices will grow by 0.1% per year
- U.S. coal production in tons will grow at 1.5% per year, on average

* A higher oil price scenario, assuming that elevated oil prices current as of October 2004 do not recede in 2006, projects real prices in 2025 of US\$35.00 per barrel.

Long-Term EIA Projections for Coal Demand

Key Assumptions, 2005 – 2025

- Oil prices – EIA assumptions project using historic trends while recognizing changing in world supply and demand patterns, especially in developing economies.
- Domestic natural gas supplies – EIA projects 8.8 trillion cubic feet (tcf) of incremental gas between 2003 and 2025, including 5.4 tcf of imports, as world demand is growing.
- Growth in domestic natural gas supplies includes 6.0 tcf of projected new liquified natural gas (LNG) imports.
- EIA assumes expansion of LNG terminals plus new construction, increased production of unconventional gas, and completion of new North American supply pipelines.

Long-Term EIA Projections for Coal Demand

Key Uncertainties, 2005 – 2025

- U.S. public policies unsettled, differing proposed limits and implementation schedules for emissions of SO₂ , NO_x, fine particulate matter, and mercury.
- U.S. Government studying various inputs regarding greenhouse gases, CO₂ controls and sequestration strategies.
- Some major industrial producers of CO₂ are participating in voluntary reporting and mitigation measures.
- Changing weather patterns also add to uncertainty.

Long-Term Projections for Coal Demand

Differing Assumptions, 2005 – 2025

- In 2004, EIA forecast 105.5 gigawatts of new pulverized coal injection (PCI) conventional electricity generation by 2025.
- By contrast, DOE's Vision 21 program goal is 4.6 gigawatts of new PCI by 2025, all of it completed by 2010.
- EIA's 2004 forecast is for 6.3 gigawatts of new integrated gasification combined-cycle (IGCC) coal-fired generation by 2025.
- DOE's Vision 21 goal is for 89.8 gigawatt of coal-fired IGCC in 2025.

U.S. Energy Balance

Uncertainties and Potential Changes

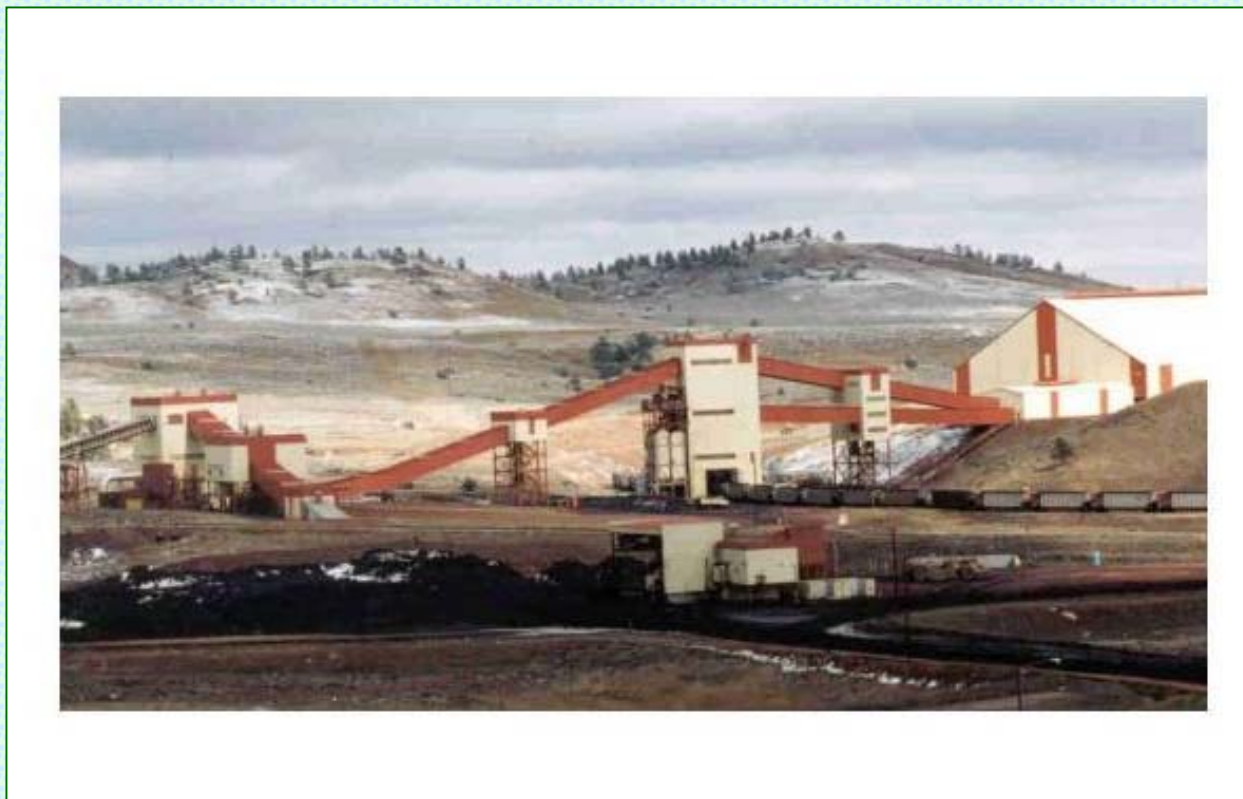
- IGCC coal-fired generation is proven but costs have deterred all but two commercial-scale projects.
- IGCC will enhance capture of SO₂ , NO_x , and even CO₂ ; may also allow generation of usable hydrogen.

U.S. Energy Balance

Uncertainties and Potential Changes

- Applications of hydrogen-based fuels and fuel cells to the major U.S. consuming sector (transportation) will require unprecedented infrastructure changes.
- DOE's Hydrogen from Coal Program is conducting research in coal gasification, hydrogen fuel generation, fuel cells, carbon sequestration, and DOE's FutureGen zero-emissions power generation concept, but implementation dates are uncertain.

Appendix



The following slides provide data tables related to graphics in the presentation.

Short-Term Coal Supply/Demand Projections

Table 9. U.S. Coal Supply and Demand: Base Case (Million Short Tons)
(Energy Information Administration/Short-Term Energy Outlook – January 2005)

Year Quarter	2004				2005				2006				Year		
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	2004	2005	2006
Supply															
Production	274.6	273.9	280.7	282.3	287.8	271.8	294.1	289.8	298.2	279.5	298.6	297.4	1111.4	1143.4	1173.6
Appalachia	98.3	97.6	94.9	99.9	101.6	92.5	95.9	97.3	105.3	95.2	97.4	99.8	390.7	387.3	397.6
Interior	36.2	36.1	38.1	37.0	33.6	34.8	36.2	34.9	34.9	35.8	36.8	35.8	147.5	139.6	143.2
Western	140.0	140.2	147.7	145.3	152.5	144.5	162.0	157.6	158.1	148.6	164.4	161.7	573.3	616.6	632.8
Primary Stock Levels															
Opening	38.3	36.6	35.3	31.9	34.4	34.9	35.9	33.6	34.6	35.1	35.3	33.2	38.3	34.4	34.6
Closing	36.6	35.3	31.9	34.4	34.9	35.9	33.6	34.6	35.1	35.3	33.2	35.1	34.4	34.6	35.1
Net Withdrawals	1.7	1.3	3.4	-2.4	-0.5	-1.1	2.3	-0.9	-0.5	-0.2	2.1	-1.9	3.9	-0.2	-0.5
Imports	5.3	6.9	7.8	7.1	6.1	7.2	8.6	8.3	6.5	8.5	9.8	8.2	27.0	30.1	33.0
Exports	9.7	15.3	12.2	10.1	12.8	10.5	11.8	12.3	12.4	12.5	12.3	12.0	47.2	47.3	49.3
Total Net Domestic Supply	271.9	266.9	279.6	276.8	280.6	267.4	293.2	284.8	291.7	275.3	298.2	291.6	1095.2	1126.0	1156.9
Secondary Stock Levels															
Opening	127.0	118.5	122.7	113.0	109.6	111.5	118.3	111.5	115.1	118.7	127.5	118.7	127.0	109.6	115.1
Closing	118.5	122.7	113.0	109.6	111.5	118.3	111.5	115.1	118.7	127.5	118.7	122.2	109.6	115.1	122.2
Net Withdrawals	8.5	-4.2	9.7	3.3	-1.9	-6.8	6.8	-3.6	-3.6	-8.8	8.8	-3.5	17.3	-5.4	-7.1
Waste Coal Supplied to IPPs	2.9	2.9	2.9	3.8	3.8	3.8	3.7	3.8	2.9	2.9	2.9	2.9	12.5	15.1	11.6
Total Supply	283.3	265.6	292.2	283.9	282.5	264.4	303.8	285.0	291.0	269.4	309.9	291.0	1125.0	1135.6	1161.4
Demand															
Coke Plants	5.9	5.9	5.9	6.4	6.2	6.5	6.7	6.1	6.2	6.3	6.6	5.9	24.2	25.5	25.0
Electric Power Sector	253.6	238.5	269.9	251.4	258.6	242.6	281.2	260.9	267.4	248.1	287.8	267.5	1013.5	1043.4	1070.8
Retail and General Industry	17.4	15.5	15.6	17.9	17.7	15.2	15.8	18.0	17.4	14.9	15.5	17.7	66.5	66.7	65.6
Total Demand	276.9	259.9	291.5	275.8	282.5	264.4	303.8	285.0	291.0	269.4	309.9	291.0	1104.1	1135.6	1161.4
Discrepancy	6.4	5.7	0.8	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.9	0.0	0.0

Notes: • Primary stocks are held at the mines, preparation plants, and distribution points. • Secondary stocks are held by users. It includes an estimate of stocks held at utility plants sold to nonutility generators. • Estimated independent power producers' (IPPs) consumption of waste coal. This item includes waste coal and coal slurry reprocessed into briquettes. • Coal used for electricity generation and (a limited amount of) useful thermal output by electric utilities and independent power producers.

Total Demand includes estimated IPP consumption. • The discrepancy reflects an unaccounted-for shipper and receiver reporting difference, assumed to be zero in the forecast period.

Totals may not add due to independent rounding. Minor discrepancies with other EIA published historical data are due to rounding. • Historical data are printed in bold; estimates and forecasts are in italics. • The forecasts were generated by simulation of the Short-Term Integrated Forecasting System.

Sources: Historical data: EIA: latest data available from EIA databases supporting the following reports: Quarterly Coal Report, DOE/EIA-0121, and Electric Power Monthly, DOE/EIA-0226. Projections: EIA, Short-Term Integrated Forecasting System database, and Office of Coal, Nuclear, Electric and Alternate Fuels (coal production).



EIA Data for Long-Term Fossil Fuel Technology Cases for the Electric Power Sector (a)

Table F7. Key Results for Electric Power Sector Fossil Technology Cases
(Gigawatts, Unless Otherwise Noted)

Net Summer Capacity, Generation Consumption, and Emissions	2002	2010				2025			
		Low Fossil	Reference Case	High Fossil	DOE Fossil Goals	Low Fossil	Reference Case	High Fossil	DOE Fossil Goals
Capacity									
Pulverized Coal	310.4	309.8	309.8	307.4	307.5	425.5	405.5	328.5	304.6
Coal Gasification Combined-Cycle	0.5	0.5	0.5	0.5	2.0	0.9	6.8	26.2	90.3
Conventional Natural Gas Combined-Cycle ..	110.5	154.4	153.6	153.4	153.4	191.9	154.6	153.4	153.2
Advanced Natural Gas Combined-Cycle	0.0	2.6	6.4	13.4	12.6	9.0	80.6	189.6	162.7
Conventional Combustion Turbine	128.8	134.4	133.4	130.7	131.3	185.5	153.3	128.2	129.2
Advanced Combustion Turbine	0.0	3.3	3.1	2.0	2.4	10.7	27.1	18.2	15.1
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nuclear	98.7	100.6	100.6	100.6	100.6	102.6	102.6	102.6	102.6
Oil and Gas Steam	133.6	108.0	106.1	104.2	104.3	98.9	96.5	92.4	85.2
Renewable Sources/Pumped Storage	111.9	119.4	117.7	117.8	117.9	135.7	130.5	125.6	121.0
Distributed Generation	0.0	0.5	0.5	0.4	0.4	15.6	12.4	5.6	4.4
Combined Heat and Power ¹	26.6	33.1	33.1	33.1	33.1	47.5	47.4	47.3	46.8
Total	921.1	966.5	964.7	963.5	965.4	1223.7	1217.3	1217.7	1215.4

¹Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors. Includes small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid. Excludes off-grid photovoltaics and other generators not connected to the distribution or transmission systems.

²Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Side cases were run without the fully integrated modeling system, so not all potential feedbacks were captured.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs LFOSS04.D101903A, AEO2004.D101703E, HFOSS10.D102103A, and HFOSS04.D101903A.

Note: “Reference Case” is EIA’s base forecast, assuming existing economic and regulatory conditions; “DOE Fossil Goals” assume capital costs and heat rates per DOE’s Vision 21 program.



EIA Data for Long-Term Fossil Fuel Technology Cases for the Electric Power Sector (b)

Table F7. Key Results for Electric Power Sector Fossil Technology Cases
(Gigawatts, Unless Otherwise Noted)

Net Summer Capacity, Generation Consumption, and Emissions	2002	2010				2025			
		Low Fossil	Reference Case	High Fossil	DOE Fossil Goals	Low Fossil	Reference Case	High Fossil	DOE Fossil Goals
Cumulative Additions									
Pulverized Coal	0.0	6.8	6.8	4.5	4.6	125.4	105.5	28.5	4.6
Coal Gasification Combined-Cycle	0.0	0.0	0.0	0.0	1.5	0.4	6.3	25.7	89.8
Conventional Natural Gas Combined-Cycle ..	0.0	44.5	43.7	43.5	43.5	82.0	44.7	43.5	43.5
Advanced Natural Gas Combined-Cycle	0.0	2.6	6.4	13.4	12.6	9.0	80.6	189.6	162.7
Conventional Combustion Turbine	0.0	16.4	15.5	13.1	13.6	72.6	40.0	16.7	18.3
Advanced Combustion Turbine	0.0	3.3	3.1	2.0	2.4	10.7	27.1	18.2	15.1
Fuel Cells	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oil and Gas Steam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renewable Sources	0.0	7.1	5.5	5.5	5.6	23.4	18.2	13.4	8.8
Distributed Generation	0.0	0.5	0.5	0.4	0.4	15.6	12.4	5.6	4.4
Combined Heat and Power ¹	0.0	6.5	6.5	6.5	6.5	20.9	20.9	20.7	20.3
Total	0.0	87.7	87.9	88.9	90.6	360.0	355.7	361.8	367.5
Cumulative Retirements									
	0.0	42.6	44.6	46.8	46.6	59.8	61.8	67.6	75.6

¹Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors. Includes small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid. Excludes off-grid photovoltaics and other generators not connected to the distribution or transmission systems.

²Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

Note: Totals may not equal sum of components due to independent rounding. Data for 2002 are model results and may differ slightly from official EIA data reports. Side cases were run without the fully integrated modeling system, so not all potential feedbacks were captured.

Source: Energy Information Administration, AEO2004 National Energy Modeling System runs LFOSS04.D101903A, AEO2004.D101703E, HFOSS10.D102103A, and HFOSS04.D101903A.

Contact EIA for further information:



- Richard F. Bonskowski,
+202-287-1725
- richard.bonskowski@eia.doe.gov
- EIA's National Energy Information
Center, +202-586-8800,
infoctr@eia.doe.gov
- EIA Website:
<http://www.eia.doe.gov/>