

EMD Coal Committee Annual Report

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June 9, 2016

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Coal Commodity Report

Executive Summary

Coal is the second-largest energy commodity worldwide in terms of energy use, exceeded only by oil. Production from the top twelve coal-producing countries in 2013 was ~8.2 bst (billion short tons [~7.4 billion metric tons]). The top 12 coal producing countries account for about 90% of the world's total coal production, with China being the top coal-producing and consuming country. The world's top twelve (12) coal producing countries in 2013, according to the Energy Information Administration, were: (1) China, (2) United States, (3) India, (4) Indonesia, (5) Australia, (6) Russia, (7) South Africa, (8) Germany, (9) Poland, (10) Kazakhstan, (11) Colombia, and (12) Canada.

A current global oversupply of coal has led to a downturn in coal prices. However, many of the leading coal-producing countries are planning to ramp up production in expectation of the oversupply being consumed by the end of 2016. Reduced global demand for coal imports in 2014 and 2015 resulted in declining coal-export sales from Indonesia and the United States. Coal exports in the United States have been reduced, mainly because of higher production costs relative to other coal exporting countries. Decline in Indonesian exports is mainly the result of China's reduced demand for imported coal, beginning in 2014.

Although natural gas continues to compete with coal as sources of electricity generation, coal still has a powerful influence on electricity prices, and coal plants are likely to remain price-setting power units for many countries. Consequently, future security of coal supply will be necessary to maintain stability in wholesale electricity prices. Metallurgical coal prices are also reduced in the global markets.

Recent declines in U.S. coal exports are related to a decrease in world coal demand, depressed international coal prices, and greater coal production in other coal-exporting countries. Decreased U.S. coal production has resulted from competition from lower natural gas prices, increasingly strict federal regulations, and coal-plant retirements because of implementation of new air-quality and emission standards. More than 400 U.S. mines have recently been closed and 26 coal companies have filed for bankruptcy. A forecast for U.S. coal production in 2016 from the Energy Information Administration indicates that coal production is expected to decrease by 143 million short tons (MMst [129.7 million metric tons]) in 2016, the largest annual percentage decline since 1958.

World Coal Production and Consumption

Production from the top twelve coal-producing countries in 2013 was ~8.2 bst (billion short tons [~7.4 billion metric tons]) (Energy Information Administration, 2016a) (Table 1). These top 12 coal producing countries account for about 90% of the world's total coal production, with China leading the list (Mining Technology, 2015). The world's top twelve (12) coal producing countries in 2013, according to the Energy Information Administration, were: (1) China, (2) United States, (3) India, (4) Indonesia, (5) Australia, (6) Russia, (7) South Africa, (8) Germany, (9) Poland, (10) Kazakhstan, (11) Colombia, and (12) Canada. (Table 1 and Fig. 1).

Rank	Country	2013 Production: bst (billion metric tons in parentheses)
1	China	4.375 (3.969)
2	United States	0.985 (0.894)
3	India	0.675 (0.612)
4	Indonesia	0.539 (0.489)
5	Australia	0.451 (0.409)
6	Russia	0.388 (0.352)
7	South Africa	0.283 (0.257)
8	Germany	0.210 (0.191)
9	Poland	0.157 (0.142)
10	Kazakhstan	0.132 (0.120)
11	Colombia	0.094 (0.086)
12	Canada	0.076 (0.069)

Table 1. Top twelve coal-producing countries in 2013. Units are in billion short tons (bst) and billions of metric tons in parentheses in table. From Energy Information Administration (2016a).

Primary Coal Production 2013

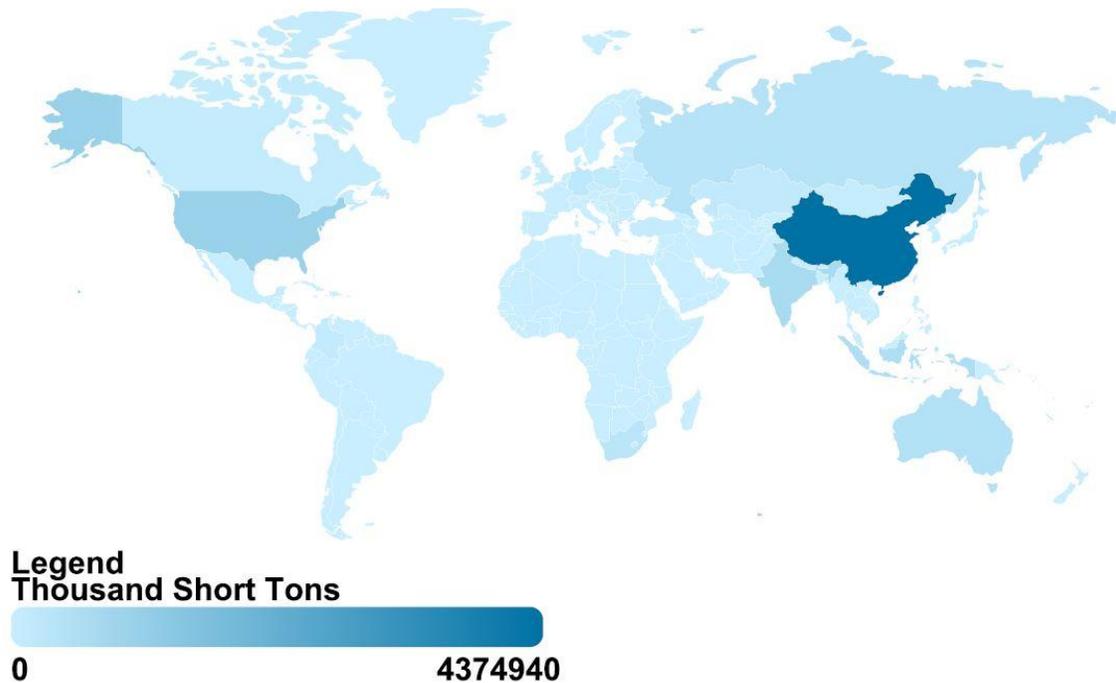


Fig 1. Global coal production in 2013. Units are in thousands of short tons (Mst). From Energy Information Administration (2016a).

Worldwide Electricity from Coal: Future Technology Issues

The International Energy Agency (2014) has issued a study of coal technology and the role of coal in CO₂-related issues in the 21st century, titled “21st Century Coal”, with the following primary conclusions:

- Over 30% of the world's total energy demand and >40% of generated electricity comes from coal.
- Benefits from electricity generated from coal are vital in improving the quality of human life, particularly in developing countries. The challenge for coal in the 21st century will be improving technology for electricity from coal to address increases in CO₂ emissions, while at the same time continuing to provide access to energy for developing countries.
- The IEA roadmap for technology involving electricity generated from coal with CCS (carbon capture and storage) currently envisages slightly less than 280 gigawatts (GW) of CCS-equipped power plants worldwide by 2030. Approximately 630 GW of coal-fueled power plants with CCS would be required by 2050.

World Coal Trade

Although global coal trade increased steeply from 2008 to 2013, it declined in 2014 for the first time in 21 years (Fig. 2 [Energy Information Administration, 2016b]). China and India were responsible for 98% of the previous increase in world coal trade because of rising coal imports from 2008 to 2013. Approximately 75% of China's coal imports and 90% of India's coal imports were steam coal for electricity generation. Coking coal for steel manufacture accounted for remaining import volumes.

China introduced several measures in late 2014 and early 2015 that impacted its coal industry, including reenacting taxes on coal imports, placing caps on allowable sulfur and ash for imported coal, and issuing a directive to major utilities to reduce their annual coal imports by ~55 million short tons (MMst [49.9 million metric tons]).

Increases in exports from Indonesia and Australia were an integral part of expansion in international coal trade between 2008 and 2013. Indonesia's exports increased by 247 MMst (224.1 million metric tons), comprising 56% of world coal export growth (Fig. 3). Australia's exports increased by 106 MMst (96.2 million metric tons), an additional 24% of the global increase in coal exports. Additional exports came from Eurasia (49 MMst [44.5 million metric tons]) and the United States (36 MMst [32.7 million metric tons]). In contrast, reduced global demand for coal imports in 2014 and 2015 resulted in declining coal-export sales from Indonesia and the United States. U.S. coal exports have been reduced, mainly because of higher production costs relative to other coal-exporting countries. Decline in Indonesian exports is mainly the result of China's reduced demand for imported coal, beginning in 2014.

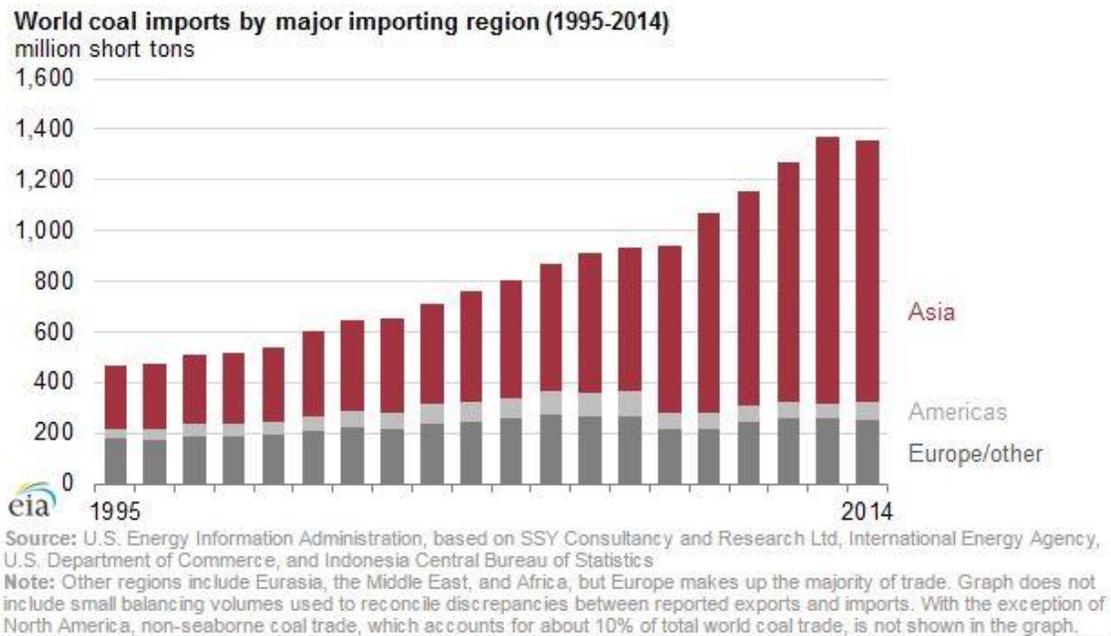


Fig 2. World coal imports by major importing region, 1995-2014. Units are in million short tons (MMst). From Energy Information Administration (2016b).

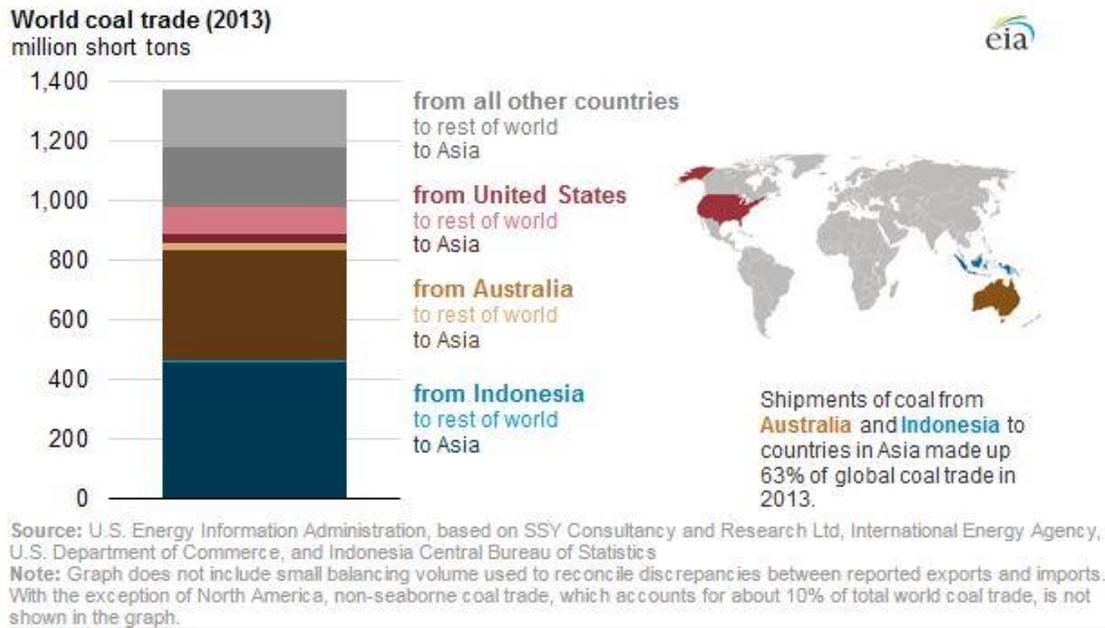


Fig 3. World coal trade in 2013. Units are in million short tons (MMst). From Energy Information Administration (2016b).

China

China continues to be the number one producer and consumer of coal in the world (World Coal Association, 2014), using more coal than the United States, Europe, and Japan combined (Moore, 2011; Vince, 2012; Sweet, 2013). China accounts for almost half of the world's coal consumption and is the world's largest power generator (Energy Information Administration, 2016c). China contained an estimated 126 bst (114.3 billion metric tons) of proved recoverable coal reserves in 2011, the third-largest in the world

behind the United States and Russia, and equivalent to about 13% of the world's total coal reserves. Of the 28 provinces in China that produce coal, Shanxi, Inner Mongolia, Shaanxi, and Xinjiang contain most of China's coal resources (Fig. 4).

Coal production in China increased 9% in 2013 from 2012 to 4.375 bst (3.969 billion metric tons) (Table 1). However, production and consumption fell by nearly 3% in 2014, the first decline in the coal industry in 14 years, mainly as the result of an economic downturn that has affected coal-consuming industries such as cement and steel (Reuters, 2015a). Other factors include slower electricity demand growth and increased use of hydroelectricity. China currently has ~12,000 coal mines producing primarily bituminous coal and lesser amounts of anthracite and lignite. More than 90% of coal produced by China is from underground mines (Meng et al., 2009).

Coal comprised nearly 66% of China's total energy consumption in 2012, with coal accounting for 63% of electricity generation in 2013 (Fig. 5). China's coal consumption in 2013 was almost three times higher than it was in 2000, when China's coal demand began swiftly increasing (Fig. 6). However, China's coal consumption in 2014 declined because of downturns in industrial production and imposition of stricter air-quality regulations in cities (Energy Information Administration, 2016d, last updated May 14, 2015). China plans to place a ceiling on coal consumption at 4.6 bst (4.17 billion metric tons) by 2020. Moreover, China has closed 2,000 small coal mines since 2013 to enhance overall efficiency and safety. Although China has experienced an oversupply of coal and rising inventories, some major coal producers in north-central and northwestern China have continued to increase production. These coal producers, especially those owned by the Chinese government, have been able to reduce their unit costs through higher output and economies of scale. Nevertheless, the majority of coal companies in China were unprofitable in 2014 because of low coal prices.

Electricity generation in China is operated by state-owned holding companies, although limited private and foreign investments have recently been made in the electricity sector. Improvements to power grids are also being made to deal with power shortages. China

has expanded the construction of natural gas-fired and renewable power plants to introduce power to remote population centers.

Shenhua Group and China National Coal Group, China's largest state-owned coal companies), produce ~50% of the coal in China. Local state-owned companies account for ~20%, with small mines producing 30%. Because of new government regulations and decreasing prices, many of the ~10,000 inefficient and small mines in the country are closing, with the result of large state-owned companies having a greater share in China's overall coal production. China is also welcoming foreign investment to modernize existing large-scale coal mines and to apply new technologies. In addition to coal, China is also becoming more open to foreign investment in coal-to-liquids (CTL), coalbed methane (CBM), coal-to-gas (CTG), and slurry pipeline transportation projects.

China's Energy Development Strategy Action Plan (2014-2020) has set caps on annual primary energy and coal consumption until 2020 (Energy Information Administration, 2016d). It calls for reducing primary energy consumption from coal to 62% and for increasing nonfossil energy use to 15% by 2020 and to 20% by 2030. Nevertheless, China has recently significantly increased its coal-import volumes because of higher demand (Fig. 6). China, which became a net coal importer in 2009, has seen imports rising to 360 MMst (326.6 million metric tons) in 2013, with Indonesia and Australia supplying 65% of China's imports. However, coal imports declined in 2014 because of excess domestic supply and slower economic and electricity consumption growth. China imported ~320 MMst (290.3 million metric tons) in 2014, an 11% decrease from 2013 (Energy Information Administration, 2016c).

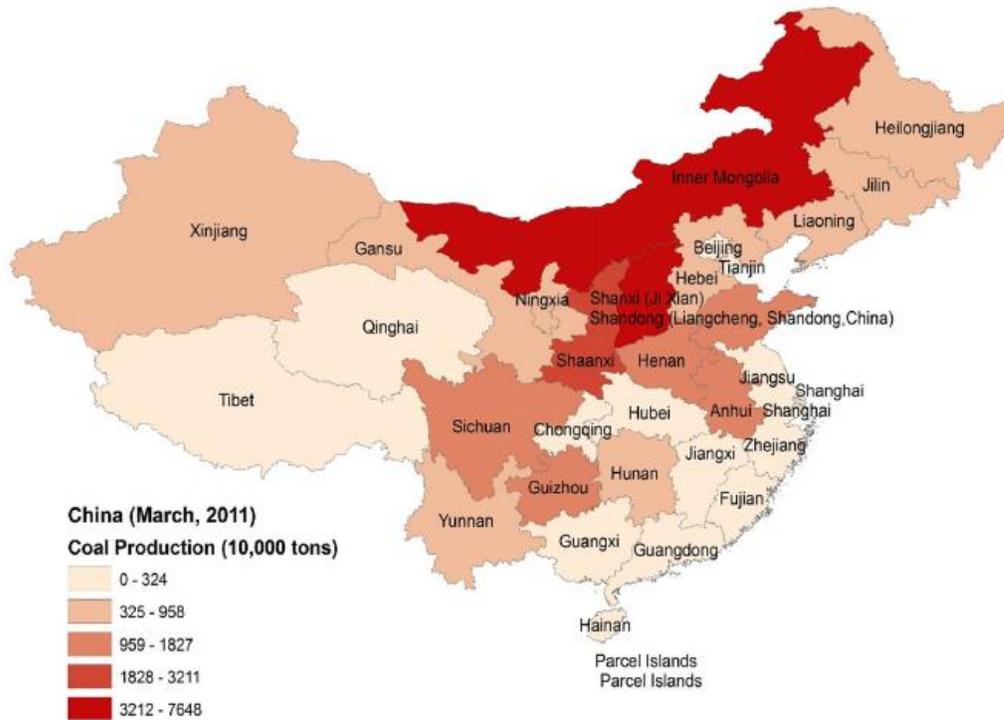
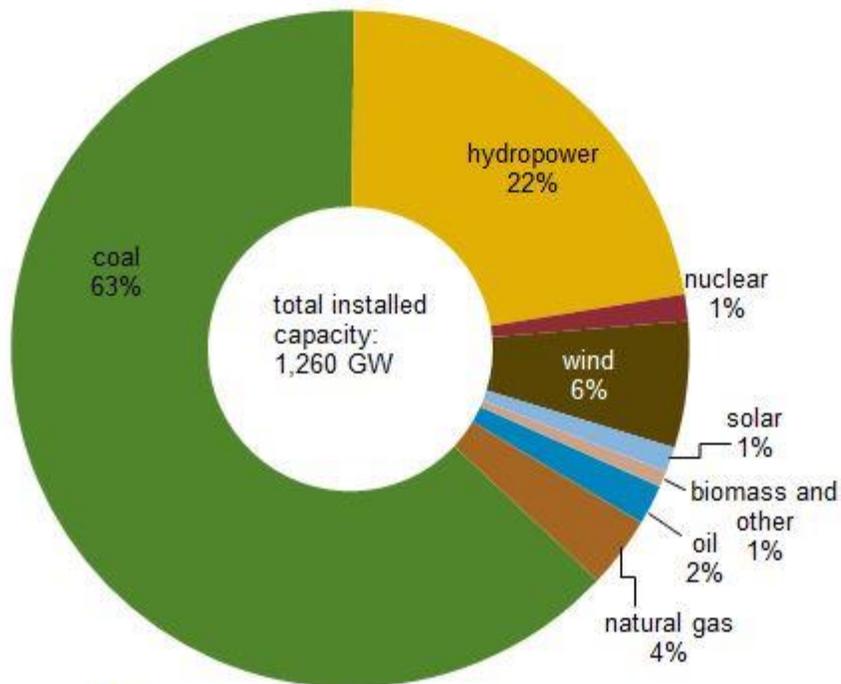


Figure 4. Distribution of recent coal production in China. These trends have changed little since 2011. From Michieka (2014).

China's installed electricity capacity share by fuel, end 2013



 Source: FACTS Global Energy.

Figure 5. Electricity capacity by fuel in China, end-of-year 2013. From Energy Information Administration (2016c).

China's coal supply and demand, 2000-2013

billion short tons

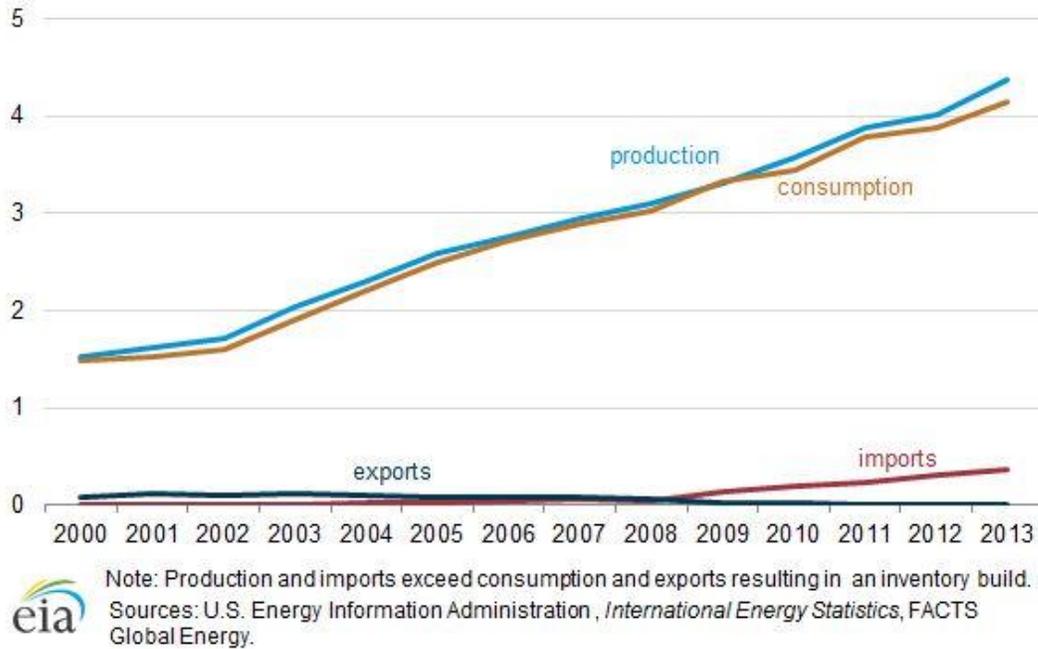


Figure 6. Coal supply and demand in China from 2000 to end-of-year 2013. Units are in billion short tons (bst). From Energy Information Administration (2016c).

United States

Production, Exports, and Imports

According to the October-December 2015 Quarterly Coal Report (Energy Information Administration, 2016e), released in April, 2016, U.S. coal production in 2015 was 895,936 Mst (0.896 bst [0.813 billion metric tons]), representing an 11.5% reduction from 2014 (Table 2). Wyoming continues to be the greatest coal-producing state in the U.S., having accounted for 375,773 Mst (0.376 bst [0.341 billion metric tons]) in 2015 (Table 3). Other states with significant coal production in 2015 include Kentucky with

61,331 Mst (0.061 bst [0.055 billion metric tons]), Illinois with 55,991 mst (0.056 bst [0.051 billion metric tons]), Pennsylvania with 50,472 Mst (0.050 bst [0.045 billion metric tons]), and Texas with 35,024 mst (0.035 bst [0.032 billion metric tons]) (Table 3). All states experienced decreased coal production in 2015 relative to 2014, with Kentucky having the largest net decrease of 20.7%.

U.S. coal exports have steadily declined since 2012, falling from 125,746 Mst (0.126 bst) in 2012 to 73,958 Mst (0.074 bst) in 2015 (Table 4). U.S. coal imports in 2015 were comparable to those in 2014, being only 11,318 Mst (0.011 bst). Average prices for exported coal from the U.S. in 2015 fell from \$82.31 per short ton to \$68.61 per short ton, although import prices increased slightly from \$69.95 to \$70.48 per short ton by the end of the year (Table 5). Europe accounted for ~54% of U.S. coal exports from October to December, 2015, with exports of 8,184,871 short tons (0.819 bst) (Table 6). Other important U.S. coal-export destinations in the same time period included Asia with 2,767,412 short tons (0.277 bst) and South America with 1,760,556 short tons (0.176 bst). The greatest volumes of coal imports to the U.S. in 2015 were from Colombia, which accounted for more than 2,133,033 short tons (0.213 bst) (Table 7).

Declining U.S. Coal Production

Recent declines in U.S. coal exports are related to a decrease in world coal demand, depressed international coal prices, greater coal production in other coal-exporting countries, and decreased domestic production as a result of competition from lower natural gas prices, increasingly strict federal regulations, and coal-plant retirements because of implementation of new air-quality and emission standards. Moreover, the U.S. has recently experienced closures of 411 mines, with 26 coal companies filing for bankruptcy (Humphries and Sherlock, 2013; World Coal, 2016; Institute for Energy Research, 2016).

A forecast for U.S. coal production in 2016 from the Energy Information Administration (2016f) indicates that coal production is expected to decrease by 143 million short tons (MMst [129.7 million metric tons]), the largest annual percentage decline since 1958 (Fig. 7). Coal production in the Appalachian and Western regions is projected to decline by 14% and 20%, respectively, whereas production in the Interior region is expected to fall by only 6%. The Interior region is more competitive than other U.S. coal-producing regions because its coal has a higher heat content and is closer to major markets. Other factors include the prevalence of sulfur dioxide scrubbers at coal-fired electric generating units and lower mining costs than Appalachian coal (Energy Information Administration, 2016f).

Electric power sector coal stockpiles, reflecting normal seasonal declines, decreased 4% from December 2015 to January 2016, reaching a level of 189 MMst (171.5 million metric tons) in January 2016 (Energy Information Administration, 2016f) (Fig. 8). However, overall U.S. coal stockpiles are still adequate even though electricity generation from coal had declined to 33% by 2015 (Energy Information Administration, 2016g).

Reuters (2012), based on data from NERC (2011), had previously estimated that market conditions and environmental regulations will contribute to between 59 and 77 GW of coal plant retirements by 2016 (Fig. 9). Greatest loss of coal-fired electricity generation is projected to occur in the southeastern U.S., with 27 to 30 GW of plant retirements, followed by the northeastern U.S. (18 to 26 GW). A more recent study by the Institute for Energy Research (2016) estimates the loss of 72 GW of coal-fired electricity generation.

Coal Data Sources

The Energy Information Administration has an interactive, online Coal Data Browser that provides detailed information on U.S. coal. Accessible at <http://www.eia.gov/beta/coal/data/browser/>, this data site integrates comprehensive information, statistics, and visualizations for U.S. coal, including electricity generation. The browser also allows users to access data from the Mine Safety and Health Administration and coal trade information from the U.S. Census Bureau.

The Coal Data Browser allows the user to:

- Map coal imports and exports by country and by U.S. ports handling coal.
- Map where mines send coal and where power plants obtain coal.
- Analyze coal receipts by sulfur, ash, and heat content, as well as per mine.
- Observe changes in coal prices.
- Cross-link mine-level data pages with EIA's U.S. Energy Mapping System to discover data on all active coal mines.
- Observe changes in coal-worker employment in specific states.

Year	January - March	April - June	July - September	October - December	Total
2009	282,772	263,017	269,339	259,796	1,074,923
2010	265,702	264,982	277,505	276,180	1,084,368
2011	273,478	264,291	275,006	282,853	1,095,628
2012	266,865	241,047	258,956	249,591	1,016,458
2013	244,867	243,211	257,595	239,169	984,842
2014	245,271	245,844	255,377	253,557	1,000,049
2015	240,189	211,130	237,263	207,355	895,936

Note: Total may not equal sum of components because of independent rounding.

Source: U.S. Department of Labor, Mine Safety and Health Administration, Form 7000-2, 'Quarterly Mine Employment and Coal Production Report.'

Table 2. U.S. coal production from 2009 to 2015. Units are in thousand short tons (Mst). From Energy Information Administration (2016e).

Coal-Producing Region and State	October - December 2015	July - September 2015	October - December 2014	Year to Date		Percent Change
				2015	2014	
Alabama	2,298	3,192	4,018	13,016	16,363	-20.5
Alaska	328	255	324	1,193	1,502	-20.5
Arizona	1,376	1,762	2,072	6,805	8,051	-15.5
Arkansas	18	26	36	91	94	-2.7
Colorado	3,258	5,123	5,640	18,722	24,007	-22.0
Illinois	11,886	13,967	15,394	55,991	57,969	-3.4
Indiana	7,264	9,124	9,939	34,429	39,267	-12.3
Kansas	55	42	50	199	66	200.2
Kentucky Total	12,954	15,781	18,191	61,331	77,335	-20.7
Eastern (Kentucky)	5,782	7,074	8,495	27,907	37,390	-25.4
Western (Kentucky)	7,172	8,707	9,696	33,424	39,945	-16.3
Louisiana	766	1,227	1,113	3,439	2,605	32.0
Maryland	662	439	482	2,149	1,978	8.7
Mississippi	621	924	729	3,143	3,737	-15.9
Missouri	16	42	67	138	363	-61.9
Montana	9,544	11,610	12,780	41,864	44,562	-6.1
New Mexico	4,914	5,603	4,870	19,341	21,963	-11.9
North Dakota	6,954	7,598	7,481	28,802	29,157	-1.2
Ohio	3,698	4,380	4,965	17,195	22,252	-22.7
Oklahoma	181	187	207	780	904	-13.7
Pennsylvania Total	10,797	14,346	15,137	50,472	60,910	-17.1
Anthracite (Pennsylvania)	497	558	487	1,993	1,833	8.7
Bituminous (Pennsylvania)	10,300	13,787	14,650	48,479	59,076	-17.9
Tennessee	213	204	244	850	839	1.2
Texas	9,441	10,926	11,026	35,024	43,654	-19.8
Utah	3,424	4,205	4,456	14,825	17,934	-17.3
Virginia	3,152	3,217	3,558	13,450	15,059	-10.7
West Virginia Total	21,450	23,318	26,514	95,523	112,187	-14.9
Northern (West Virginia)	11,988	11,410	12,282	47,648	48,858	-2.5
Southern (West Virginia)	9,462	11,907	14,233	47,875	63,329	-24.4
Wyoming	91,697	99,365	103,918	375,773	395,665	-5.0
Appalachia Total	48,053	56,170	63,414	220,562	266,979	-17.4
Appalachia Central	18,610	22,403	26,530	90,082	116,617	-22.8
Appalachia Northern	27,145	30,575	32,866	117,464	133,998	-12.3
Appalachia Southern	2,298	3,192	4,018	13,016	16,363	-20.5
Interior Region Total	37,419	45,171	48,258	166,660	188,604	-11.6
Illinois Basin	26,322	31,798	35,029	123,844	137,181	-9.7
Interior	11,097	13,374	13,229	42,816	51,423	-16.7
Western Region Total	121,494	135,523	141,540	507,324	542,842	-6.5
Powder River Basin	96,441	106,064	110,478	398,577	418,156	-4.7
Uinta Region	6,452	9,068	9,641	32,168	40,122	-19.8
Western	18,601	20,391	21,422	76,579	84,563	-9.4
East of Mississippi River	74,995	88,891	99,172	347,549	407,897	-14.8
West of Mississippi River	131,970	147,973	154,041	546,996	590,528	-7.4
U.S. Subtotal	206,966	236,865	253,212	894,545	998,425	-10.4
Refuse Recovery	389	398	345	1,390	1,624	-14.4
U.S. Total	207,355	237,263	253,557	895,936	1,000,049	-10.4

Note: Total may not equal sum of components because of independent rounding.

Source: U.S. Department of Labor, Mine Safety and Health Administration, Form 7000-2, "Quarterly Mine Employment and Coal Production Report."

Table 3. U.S. coal production by state in 2014 and 2015. Units are in thousand short tons (Mst). From Energy Information Administration (2016e).

Year	January - March		April - June		July - September		October - December		Total	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
2009	13,335	6,325	12,951	5,426	15,159	5,441	17,653	5,447	59,097	22,639
2010	17,807	4,803	21,965	5,058	21,074	4,680	20,870	4,811	81,716	19,353
2011	26,617	3,381	26,987	3,419	25,976	3,588	27,679	2,700	107,259	13,088
2012	28,642	2,022	37,534	2,329	31,563	2,415	28,006	2,394	125,746	9,159
2013	31,835	1,429	29,427	2,756	28,589	2,398	27,809	2,323	117,659	8,906
2014	27,584	2,450	24,674	3,574	22,723	3,151	22,276	2,174	97,257	11,350
2015	21,979	3,009	19,766	2,640	16,914	2,965	15,299	2,705	73,958	11,318

Note: Total may not equal sum of components because of independent rounding.

Source: Exports: U.S. Department of Commerce, Bureau of the Census, 'Monthly Report EM 545,' and Imports: U.S. Department of Commerce, Bureau of the Census, 'Monthly Report IM 145.'

Table 4. U.S. coal exports and imports from 2009 to 2015. Units are in thousand short tons (Mst). From Energy Information Administration (2016e).

Year	January - March		April - June		July - September		October - December		Total	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
2009	113.08	61.03	93.28	65.44	98.70	64.93	100.98	64.72	101.44	63.91
2010	106.52	62.02	121.36	71.91	125.45	77.12	126.16	76.18	120.41	71.77
2011	139.34	86.00	153.00	105.86	155.88	112.06	147.38	110.19	148.86	103.32
2012	134.88	103.82	118.95	100.89	115.12	93.25	104.64	90.39	118.43	96.78
2013	99.68	86.87	96.77	83.18	91.64	81.66	91.46	83.12	95.06	83.35
2014	90.72	78.15	86.24	80.46	85.69	80.60	84.94	85.48	87.08	80.96
2015	82.31	69.95	80.14	74.40	73.52	71.85	68.61	70.48	76.89	71.61

Note: Exports: Average price is based on the free alongside ship (f.a.s.) value. Imports: Average price is based on the customs import value. Customs import value is the price paid for merchandise when sold for exportation to the United States, excluding U.S. import duties, freight, insurance, and other charges incurred in bringing the merchandise to the United States. Total may not equal sum of components because of independent rounding.

Source: Exports: U.S. Department of Commerce, Bureau of the Census, 'Monthly Report EM 545,' and Imports: U.S. Department of Commerce, Bureau of the Census, 'Monthly Report IM 145.'

Table 5. Average prices for U.S. coal exports and imports from 2009 to 2015. Units are in U.S. dollars per short tons. From Energy Information Administration (2016e).

Continent and Country of Destination	October - December 2015	July - September 2015	October - December 2014	Year to Date		Percent Change
				2015	2014	
North America Total	2,359,203	2,956,261	3,377,704	10,312,347	12,262,862	-15.9
Canada*	1,671,121	1,778,488	1,991,540	5,957,584	6,723,804	-11.4
Dominican Republic	-	50,863	109,178	107,531	449,473	-76.1
Guatemala	39,683	36,375	-	82,458	88,162	-6.5
Honduras	34,337	73,357	34,739	178,182	176,929	0.7
Jamaica	36,410	45,406	34,865	155,396	103,984	49.4
Mexico	576,651	970,321	1,206,714	3,764,873	4,707,812	-20.0
Other**	1,001	1,451	668	66,323	12,698	422.3
South America Total	1,760,556	2,026,409	2,065,282	7,451,330	9,774,844	-23.8
Argentina	-	54,875	93,317	248,079	455,461	-45.5
Brazil	1,530,256	1,619,708	1,777,703	6,339,173	8,081,948	-21.1
Chile	229,838	350,039	193,653	860,304	1,229,950	-30.1
Peru	148	4	219	470	55,896	-99.2
Other**	314	1,783	390	3,304	1,589	107.9
Europe Total	8,184,871	8,411,274	12,470,239	37,893,521	52,468,724	-27.8
Austria	277	115,006	150,509	417,800	469,213	-11.0
Belgium	187,352	285,880	223,083	1,196,003	1,012,758	18.1
Bosnia and Herzegovina	-	77,639	80,275	77,639	160,963	-51.8
Croatia	246,117	274,156	217,896	1,554,843	1,580,835	-1.6
Finland	60,539	120,481	214,039	388,423	738,153	-47.4
France	171,118	335,578	655,840	1,331,643	2,373,012	-43.9
Germany, Federal Republic of	956,538	895,531	1,158,463	4,018,214	4,814,780	-16.5
Iceland	10,565	8,504	24,054	44,825	62,067	-27.8
Italy	857,415	886,312	1,106,898	3,430,999	5,780,980	-40.7
Netherlands	3,826,382	2,707,402	2,827,502	12,907,947	12,478,881	3.4
Norway	18,947	11,775	15,348	71,206	90,650	-21.4
Poland	116,569	44,092	69,342	565,403	719,715	-21.4
Portugal	-	138,480	221,300	138,480	221,300	-37.4
Romania	22,912	79,319	160,396	271,730	407,715	-33.4
Slovakia	73,304	-	-	231,503	500,479	-53.7
Slovenia	88,446	-	38,879	218,259	205,708	6.1
Spain	320,780	259,761	461,059	1,272,141	1,400,356	-9.2
Sweden	146,984	253,817	171,138	644,561	717,683	-10.2
Switzerland	-	-	687,451	-	1,628,025	-
Turkey	267	543,813	1,067,351	2,054,513	4,459,914	-53.9
Ukraine	664,361	509,972	800,627	2,810,178	2,836,709	-0.9
United Kingdom	415,741	863,342	2,118,620	4,201,497	9,808,032	-57.2
Other**	257	414	169	45,714	796	NM
Asia Total	2,767,412	3,382,606	3,802,611	17,544,313	19,450,461	-9.8
China	291	652	76,004	229,891	1,776,973	-87.1
India	945,602	597,089	870,405	6,388,014	4,586,673	39.3
Japan	1,148,777	1,271,571	1,445,677	4,656,683	4,898,388	-4.9
Singapore	-	-	40	127,400	180,688	-29.5
South Korea (Republic of Korea)	669,512	1,510,646	1,409,028	6,132,522	7,900,066	-22.4
Taiwan	86	154	154	605	100,273	-99.4
Other**	3,144	2,494	1,303	9,198	7,400	24.3
Australia and Oceania Total	163	365	182	645	1,052	-38.7
Other**	163	365	182	645	1,052	-38.7
Africa Total	226,529	137,387	559,715	755,732	3,298,803	-77.1
Egypt	76	54	84,875	163,544	414,093	-60.5
Morocco	142,658	-	318,426	212,611	2,445,185	-91.3
South Africa	83,650	84,975	156,405	327,016	385,558	-15.2
Togo	-	52,085	-	52,085	51,867	0.4
Other**	145	273	9	476	2,100	-77.3
Total	15,298,734	16,914,302	22,275,733	73,957,888	97,256,746	-24.0

* Based on the U.S. - Canada Free Trade Agreement; as of January 1990, the U.S. Department of Commerce began reporting statistics on U.S. exports to Canada based on information on imports provided monthly by the Canadian government.

** Includes countries with coal exports less than or equal to 50,000 short tons in 2014.

- = No data reported.

Table 6. Destinations of U.S. coal exports in 2014 and 2015. Units are in short tons. From Energy Information Administration (2016e).

Continent and Country of Origin	October - December 2015	July - September 2015	October - December 2014	Year to Date		Percent Change
				2015	2014	
North America Total	341,205	349,630	323,977	1,187,738	1,026,540	15.7
Canada	341,189	349,630	323,971	1,187,655	1,026,523	15.7
Mexico	16	-	6	83	17	388.2
South America Total	2,163,485	2,430,723	1,582,518	9,052,412	8,608,334	5.2
Colombia	2,133,033	2,392,245	1,528,701	8,936,034	8,295,286	7.7
Peru	30,452	-	12,183	42,203	24,310	73.6
Venezuela	-	38,478	41,634	74,175	288,738	-74.3
Europe Total	28,996	-	-	59,465	145,770	-59.2
Germany, Federal Republic of	61	-	-	73	-	-
Netherlands	20	-	-	20	-	-
Russia	-	-	-	-	42,439	-
Ukraine	28,488	-	-	58,802	103,167	-43.0
United Kingdom	427	-	-	570	164	247.6
Asia Total	120,272	123,504	267,422	906,629	1,568,727	-42.2
China	2,578	3,846	6,471	16,099	39,776	-59.5
Hong Kong	-	-	530	-	617	-
India	-	-	10	406	1,536	-73.6
Indonesia	117,694	119,658	260,411	890,124	1,526,611	-41.7
United Arab Emirates	-	-	-	-	187	-
Australia and Oceania Total	-	60,657	75	60,994	532	NM
Australia	-	60,657	75	60,994	532	NM
Africa Total	50,764	-	-	50,773	23	NM
South Africa	50,764	-	-	50,773	23	NM
Total	2,704,722	2,964,514	2,173,992	11,318,011	11,349,926	-0.3

- = No data reported.

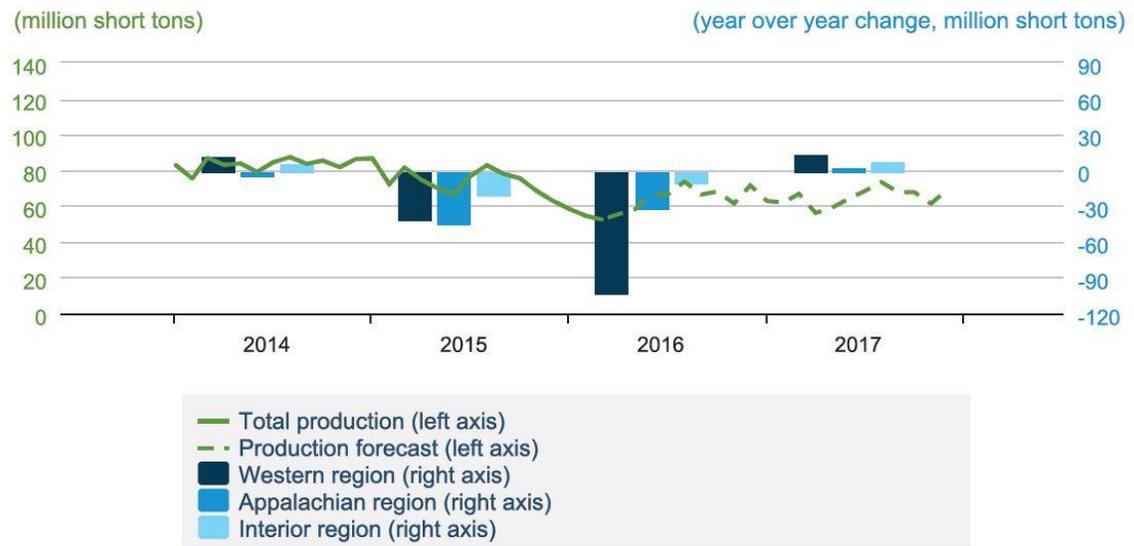
NM = Not meaningful due to changes of 500 percent or more.

Note: Coal imports include coal to Puerto Rico and the Virgin Islands. Total may not equal sum of components because of independent rounding.

Source: U.S. Department of Commerce, Bureau of the Census, 'Monthly Report IM 145.'

Table 7. Origin of U.S. coal imports in 2014 and 2015. Units are in short tons. From Energy Information Administration (2016e).

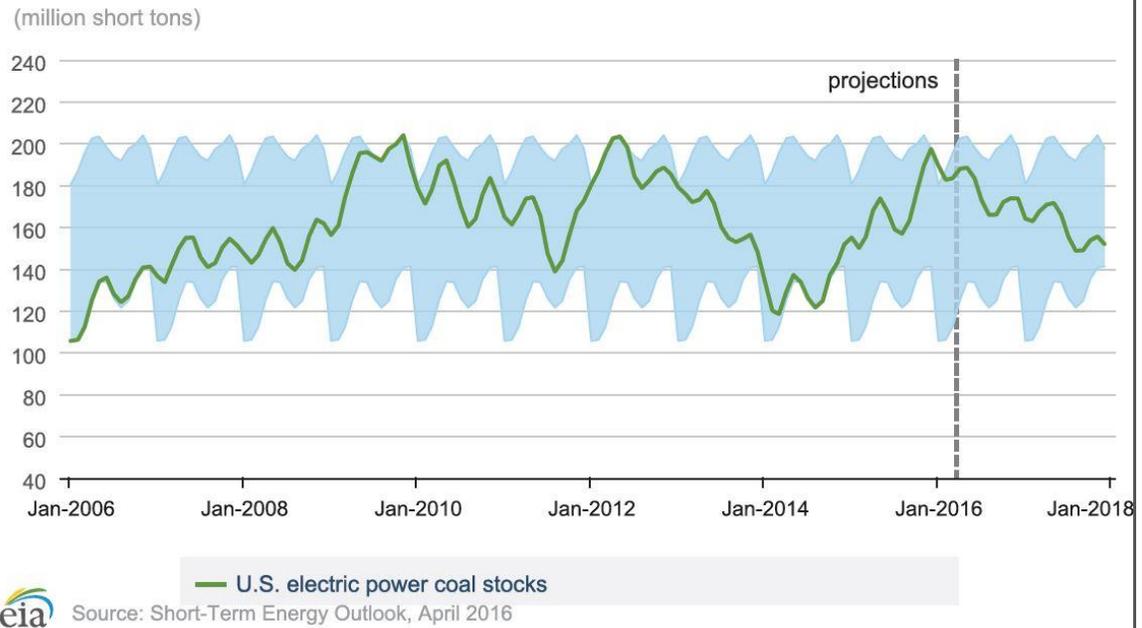
U.S. Coal Production



eia Source: Short-Term Energy Outlook, April 2016

Figure 7. Forecasted U.S. coal production to end of 2017. Units are in million short tons (MMst). From Energy Information Administration (2016f).

U.S. Electric Power Sector Coal Stocks



Note: Colored band around stock levels represents the range between the minimum and maximum from Jan. 2006 - Dec. 2013.

Figure 8. U.S. electric power sector coal stocks to January, 2018. Units are in million short tons (MMst). From Energy Information Administration (2016f).

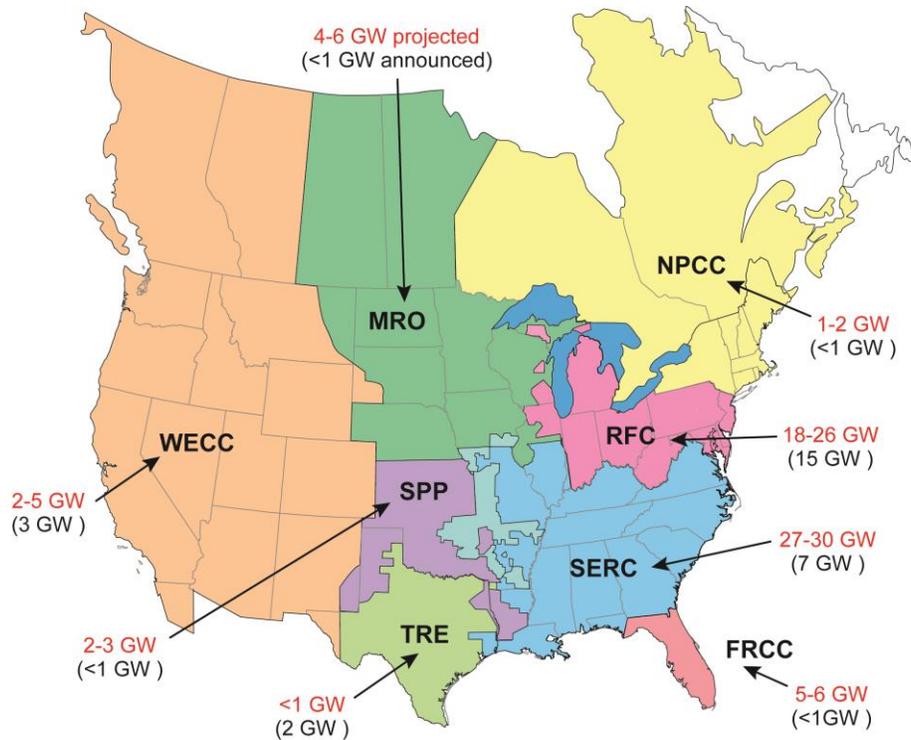


Figure 9. Distribution of anticipated U.S. coal plant retirements in terms of power-generation losses expressed in gigawatts (GW). Modified from Reuters (2012), based on data from NERC (2011). Florida Reliability Coordinating Council (FRCC); Midwest Reliability Organization (MRO); Northeast Power Coordinating Council (NPCC); ReliabilityFirst Corporation (RFC); SERC Reliability Corporation (SERC); Southwest Power Pool, RE (SPP); Texas Reliability Entity (TRE); Western Electricity Coordinating Council (WECC).

India

Coal is India's primary source of energy. India has the world's fifth-largest coal reserves, and ranks third both in coal production and consumption (Table 1). India's government has a near-monopoly on coal production and distribution (Energy Information Administration, 2016h). Most of India's coal reserves occur in the eastern part of the country. Jharkhand, Chhattisgarh, and Odisha states together comprise 64% of the country's coal reserves. Other significant coal-producing states include West Bengal, Andhra Pradesh, Madhya Pradesh, and Maharashtra (Fig. 10). Coal India Limited (CIL) is India's largest coal producer; having produced >80% of the country's coal in 2012. Singareni Collieries Company Limited (SCCL) accounted for almost 10% of India's coal production in 2012, primarily in the southern part of the country.

India nearly doubled its coal production between 2000 and 2012, reaching 650 MMst (0.65 bst [0.59 billion metric tons]) of production. However, India continues to experience an ever-widening gap between demand and supply, with coal producers in the country failing to reach production targets set by the state, thereby forcing India to rely on imported coal for both power generation and steel manufacture. Even though coal is the greatest provider of electricity generation in India, accounting for 59% of installed power capacity in 2014 (Fig. 11), coal shortages continue to cause shortfalls in electricity generation, resulting in frequent blackouts. Approximately 90% of the country's coal mines are opencast mines, which although being cost-effective, cause environmental damage. India lacks advanced technology for large-scale, underground mining operations with the result that overall productivity levels in the country are low. Low levels of competition in the coal sector inhibit private and foreign investment and state regulations continue to cause delays for mining companies in receiving mining permits. Additional delays are caused by limited railway capacity, delays in new railroad projects, and high transport costs. However, India has recently completed three major rail transportation projects for increased shipments of coal from major producing regions in northeastern India to other parts of the country. Although India's coal producers have already increased domestic production since 2014, a fourth major rail project called the

Jharsuguda-Barpali railway link is not scheduled for completion until 2017 (Energy Information Administration, 2016b). The Indian coal ministry plans to scale down its production target of 876 MMst (0.88 bst [0.80 billion metric tons]) in the period from 2016 to 2017, owing to perceived problems in rail transport and compliance with environmental regulations (Thakkar, 2014). India possessed 249 GW of installed electricity generation capacity in 2014. However, owing to fuel shortages and limited transmission capacity, many regions in India still experience electricity shortages and blackouts typically lasting from several hours to days.

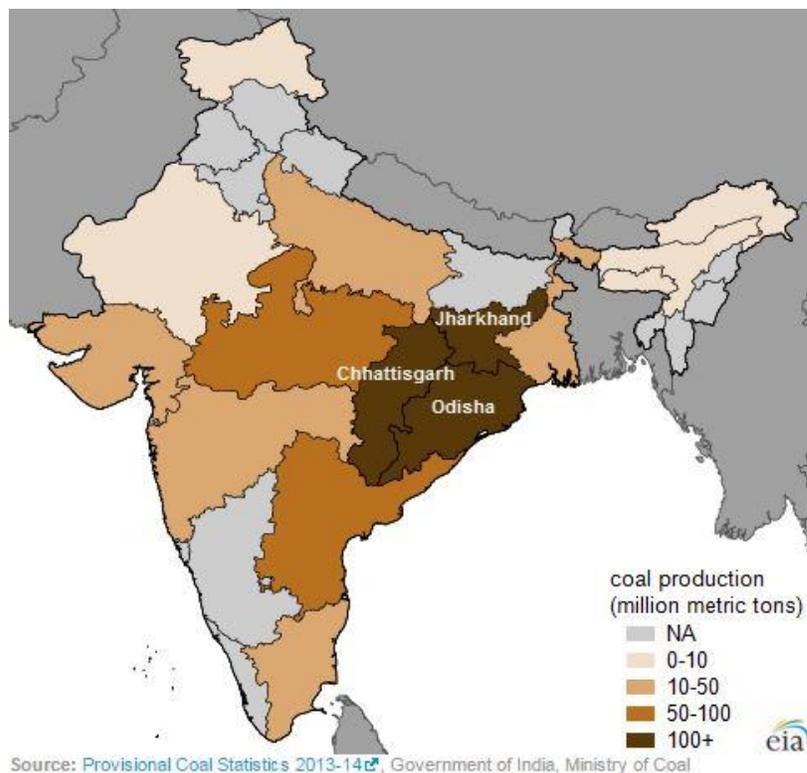
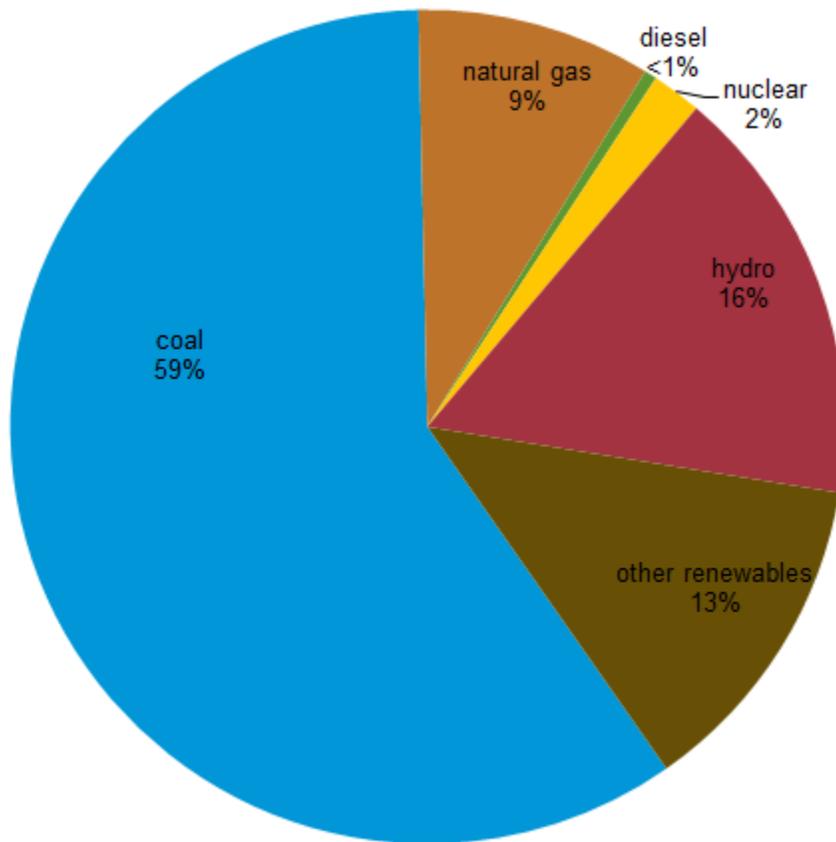


Figure 10. Coal production in India by state, 2014. Units are in million metric tons. From Energy Information Administration (2015i).

India installed power capacity, May 2014



Note: Includes utility-based power facilities, not captive power plants.
Source: U.S. Energy Information Administration, India's Central Electricity Authority.

Figure 11. Installed power capacity in India by source, May 2014. From Energy Information Administration (2015h).

Indonesia

Indonesia exports almost 80% of its produced coal and is the world's largest exporter of coal by weight (Energy Information Administration, 2015j). In 2014, Indonesia was the world's number one exporter of thermal coal for power plants, with 450 MMst (408.2 million metric tons) of both thermal and steam coal exported, resulting in production greatly exceeding consumption (Fig. 12). Indonesia has recently become important as a source for Chinese coal imports. Indonesia's coal exports are primarily destined for Asian markets, with 85% of total coal exports going to China, Japan, South Korea, India, and Taiwan. In 2014, India was the largest importer of Indonesian coal, exceeding China (Fig. 13).

Declining coal prices since 2011 have impacted Indonesia's coal revenues since 2013. In an effort to obtain greater revenues from its coal mining industry, Indonesia recently stipulated that all foreign investors must sell a majority of their own mine equity to local investors by the 10th year of production. In addition, the Indonesian government has been reviewing plans for raising royalty from one-third of Indonesia's mining operation permit holders, although this rate increase was postponed in mid-2015 because many small-mine operators have suffered cash losses and mine closures. In addition, ~77 MMst (~70 million metric tons) of coal were produced illegally from small mining operations in 2013, and the Indonesian government has responded by attempting to limit exports from 14 ports.

Indonesia is fostering the use of coal in the power sector because of its abundant domestic supply and the use of coal lessens the need to use expensive diesel and fuel oil. Because of an increasing demand for domestic coal, Indonesia has imposed a domestic market obligation on large coal producers. The 2013 domestic market obligation was set at 82 MMst (74.4 million metric tons), ~18% of total coal production. The main beneficiary of this program is the electric power sector, of which slightly more than 50%

is based on coal (Fig. 14). Power plants accounted for ~70% of recent total coal sales, with the remainder for industrial use. Electricity sector demand for coal is expected to increase because of additions to coal-fired generation capacity.

PT Bumi Resources is Indonesia's largest mining company and coal producer, with 88 MMst (79.8 million metric tons) produced in 2013. PT Adaro is the second-largest coal producer, accounting for almost 60 MMst (54.4 million metric tons) of coal in 2013. Other major producers include PT Kideco Jaya, PT Indotambang Raya Megah, and PT Berau. The top five producers in Indonesia accounted for more than 45% of coal production in 2013, with coal being produced in three principal areas in the country (South Sumatra, East Kalimantan, and South Kalimantan) (Fig. 15).

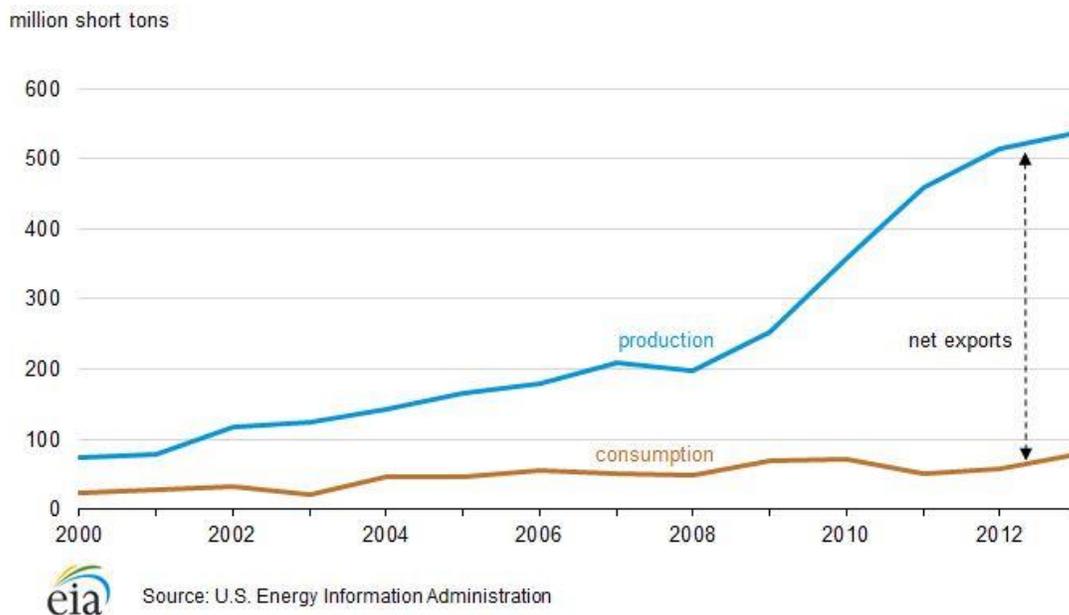
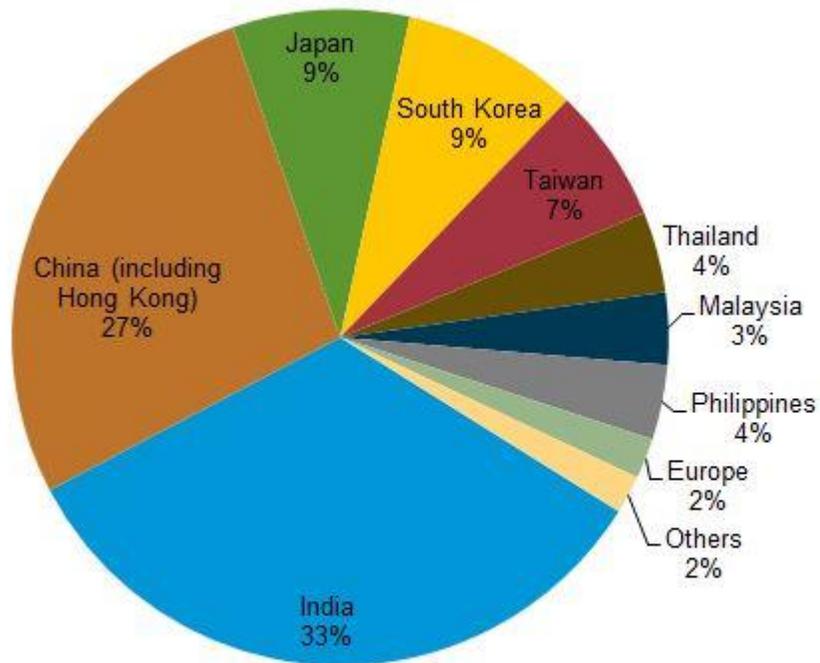
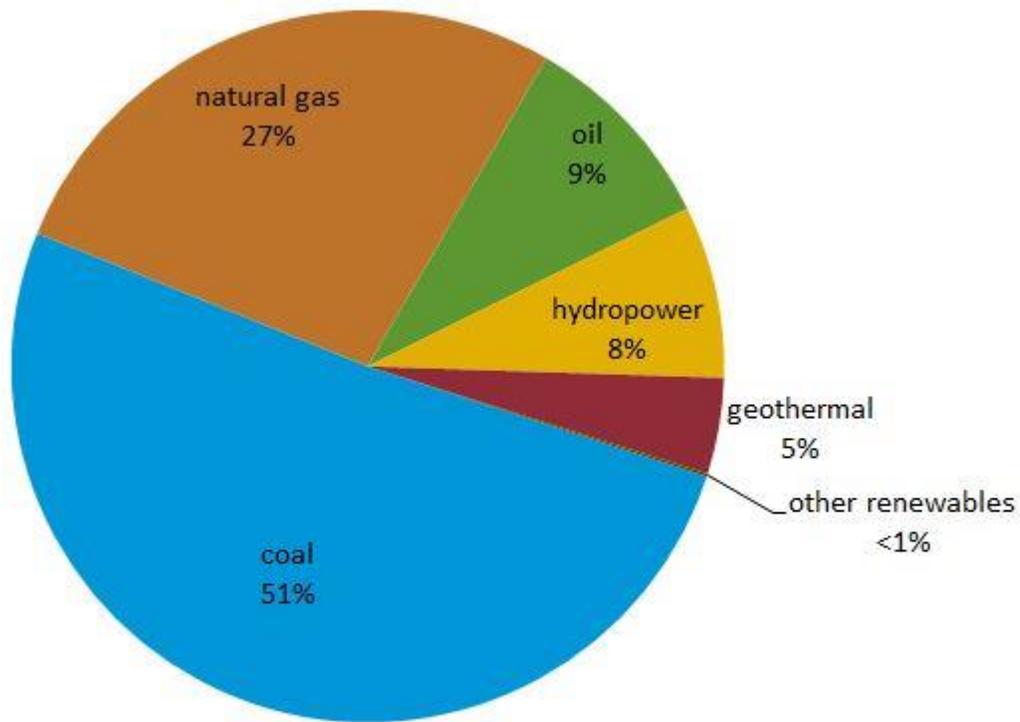


Figure 12. Coal production and consumption in Indonesia. Units are in million short tons (MMst). From Energy Information Administration (2016j).



Source: United Nations/World Trade Organization International Trade Center

Figure 13. Indonesia coal exports by destination. From Energy Information Administration (2016j).



Source: Indonesia's Ministry of Energy and Mineral Resources

Figure 14. Indonesia electric power generation by source, 2013. From Energy Information Administration (2016j).

(map) Major Coal Production Sites of Indonesia

1. South Sumatra
2. South Kalimantan
3. East Kalimantan



Figure 15. Principal coal-mining areas in Indonesia. From Indonesia Investments (2013).

Australia

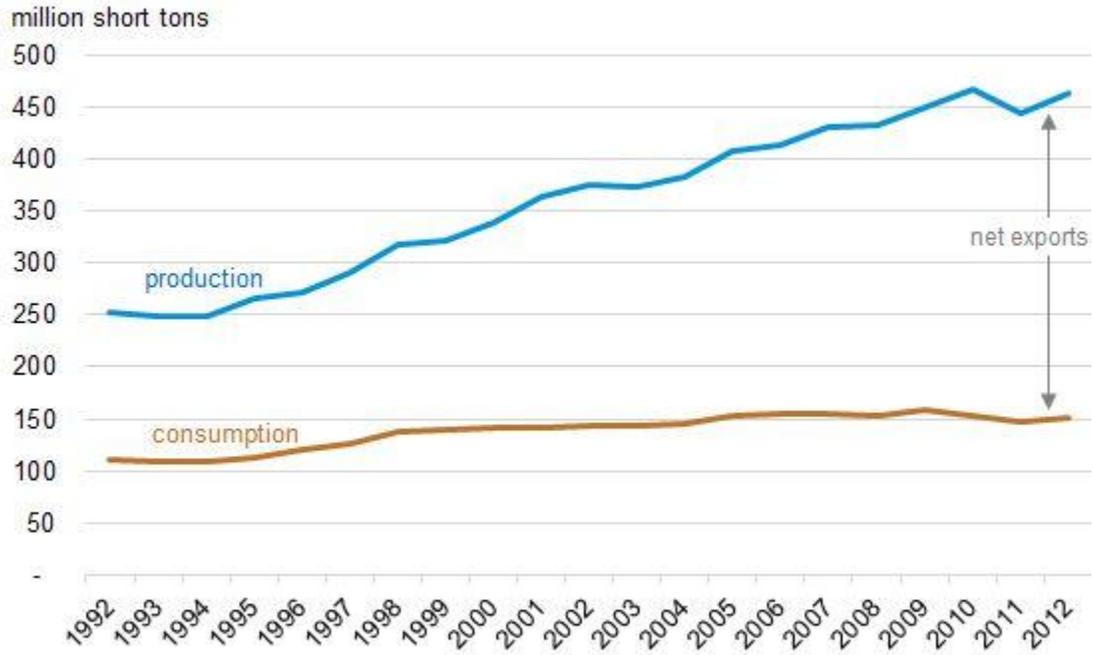
Australia is the world's second-largest exporter of coal by weight (Energy Information Administration (2016k)). Coal production in Australia far outstrips coal consumption (Fig. 16). Coal accounts for 64% of Australia's electricity generation capacity, with natural gas providing 20% (Fig. 17). Recently, Australia has been substituting coal-fired generation with natural gas and renewable power, with the result that overall coal use declined from a peak of 158 MMst (143.3 million metric tons) in 2009. However, coal still serves as a baseload source for power in Australia because of abundant resources and well-developed infrastructure.

Australia has >80 bst (>72.6 billion metric tons) of recoverable coal reserves, the fourth-largest in the world behind the United States, Russia, and China, according to the World Energy Council 2013 Survey. Proved and probable commercial reserves were estimated to be 116 bst (105.2 billion metric tons) in 2012, with 58% represented by black coal and 42% from brown coal. Australia exported ~\$40 billion worth of coal in 2012, according to the Minerals Council of Australia. Queensland and New South Wales represented 98% of Australia's black coal production in 2012, and Victoria accounted for almost all of brown coal reserves and production.

Australia has ~120 privately-owned coal mines country (Energy Information Administration (2016k)). Most of Australia's coal production is from open pit operations. BHP Billiton, Anglo American (UK), Xstrata (Switzerland), and Rio Tinto (Australia-UK), are major players in Australia's coal industry. Australia has invested \$11.2 billion in advanced infrastructure projects to add nearly 80 MMst to production capacity by 2017.

Australia exported ~72% of its coal production (332 MMst [301.2 million metric tons]) in 2012. Japan was the destination for almost 35% of Australia's coal exports in 2013. China, is Australia's second-largest market for exported coal. Other export destinations include South Korea (14%), India (11%), and Taiwan (9%). Most exports are from the Queensland and New South Wales states, although Western Australia has been exporting coal since 2007. Queensland saw a record amount of coal exports in 2014, with exports of ~238 MMst (~215.9 million metric tons) (Latimer, 2015). However, many coal operators in Australia are cutting costs in an effort to adjust to the recent global fall in coal prices (Paton, 2014). Coal exports are supported by nine major coal ports and export terminals in Queensland and New South Wales. These terminals have a combined capacity of >510 MMst (>462.7 million metric tons). New port projects are being developed and are projected to add >50 MMst (>45.4 million metric tons) to annual coal loading capacity by 2016.

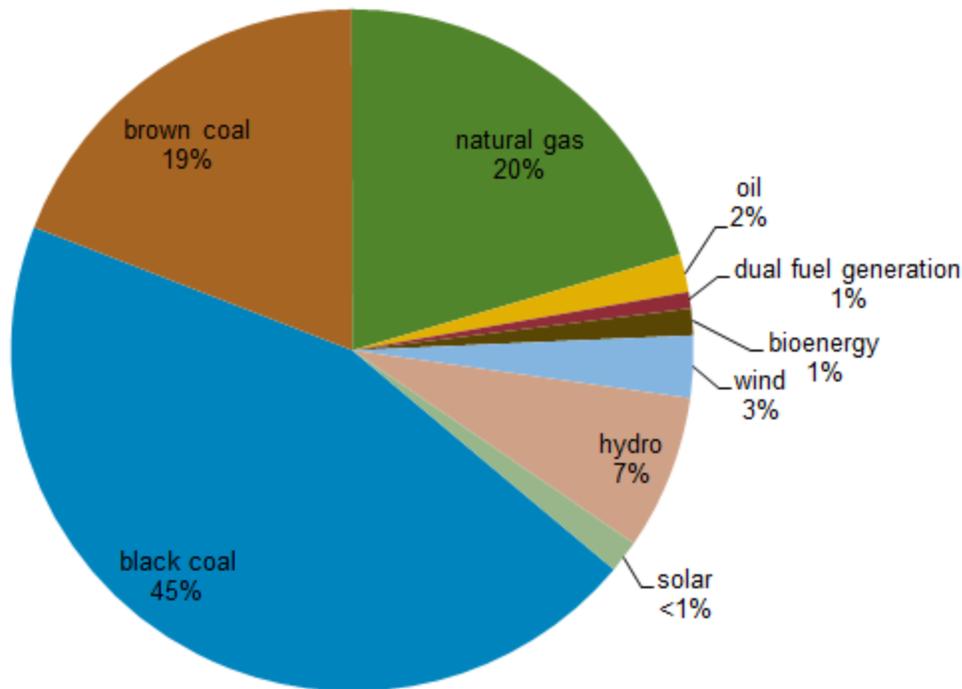
Australia's coal production and consumption, 1992-2012



 Source: U.S. Energy Information Administration

Figure 16. Australia's coal production and consumption 1992-2012. Units are in million short tons (MMst). From Energy Information Administration (2016k).

Australia's electricity generation by source, 2013



 Note: Fiscal Year 2013 is July 2012 to June 2013.
Source: Australian Bureau of Resources and Energy Economics

Figure 17. Electricity generation by source in Australia, 2013. From Energy Information Administration (2016k).

Russia

Russia is the world's third-largest exporter of coal (Energy Information Administration, 2016l). Russia is the sixth-largest coal producer in the world, behind China, United States, India, Indonesia, and Australia (Table 1). Approximately 80% of Russia's coal production is thermal (steam) coal and, and 20% is metallurgical (coking) coal. Russia's coal reserves account for almost 18% of the world's total coal reserves, although Russia's share of coal production is <5% (Fig. 18) (Slivyak, 2015). More than half of Russia's

coal exports, which have risen significantly since 2002, go to Europe. China accounts for 16% of Asian exports, whereas the United Kingdom receives 10% (Fig. 18).

The majority of Russia’s coal production and reserves are located in the Kansk-Achinskiy and Kuznetskiy Basins in central Russia (Fig. 19). Coal in these regions requires long-distance transport to reach markets, placing Russian coal at an economic disadvantage with respect to other competing sources. However, some economists believe that the weaker ruble, resulting from sanctions and low oil prices, should make Russian coal exports more price-competitive. Russia has plans to expand its port capacity for increased Asian exports. Moreover, in Russia delivered two test shipments of coal in late 2014 and early 2015 to the port of Rajin in North Korea after improvements to its rail facilities. These shipments were destined for new markets in South Korea.

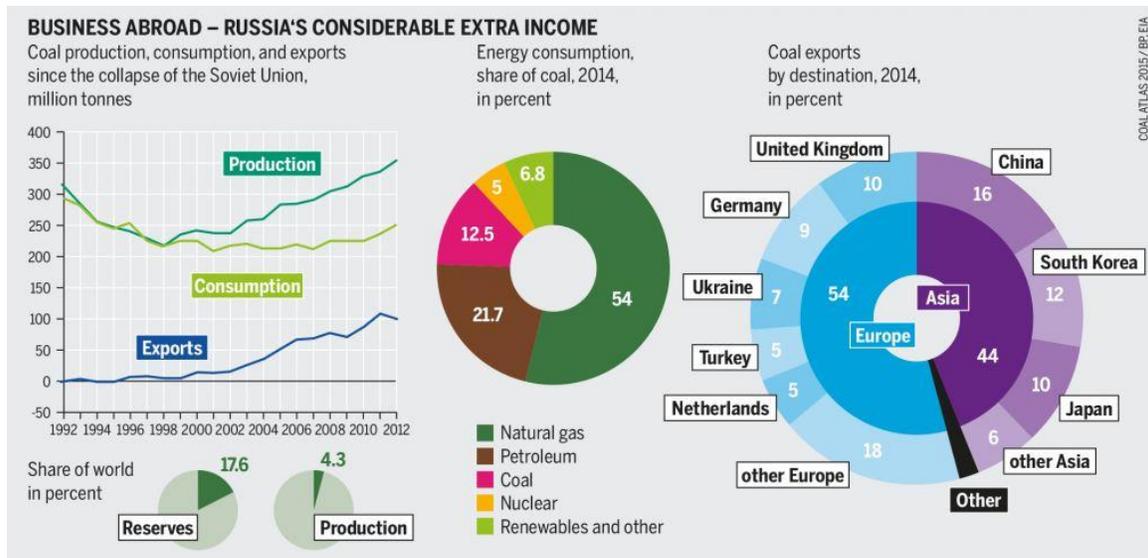


Figure 18. Summary of Russia’s coal production, consumption, reserves, and exports. From Slivyak (2015).

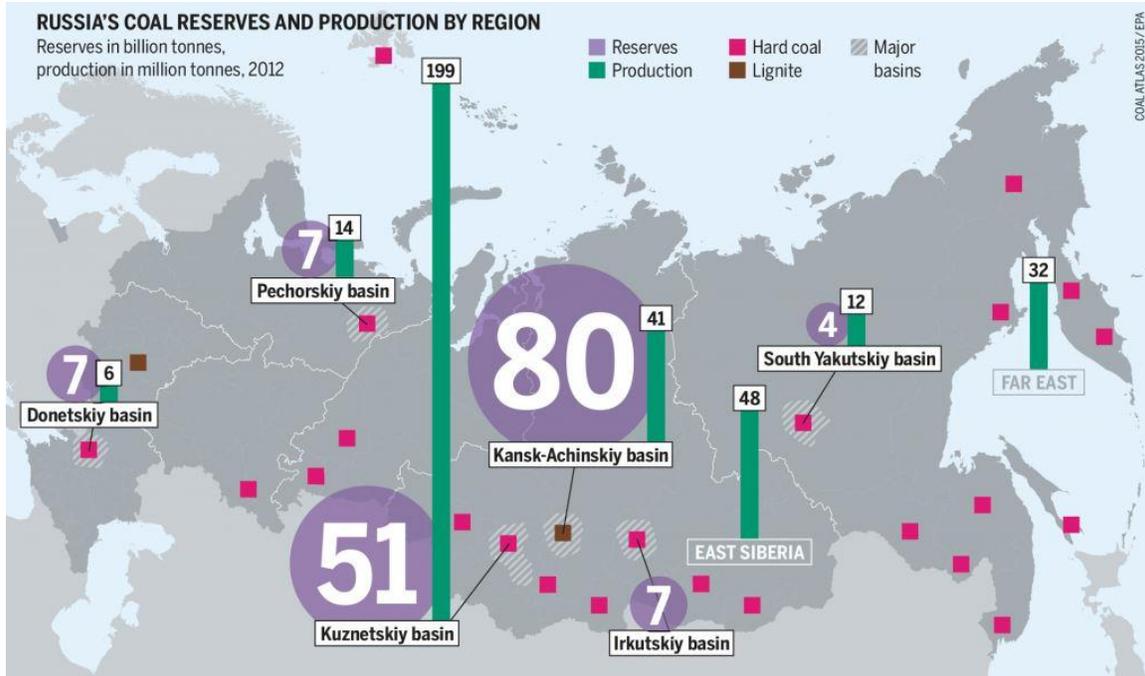


Figure 19. Russia's coal reserves and production by region. Production is in million metric tons and reserves are in billion metric tons. From Slivyak (2015).

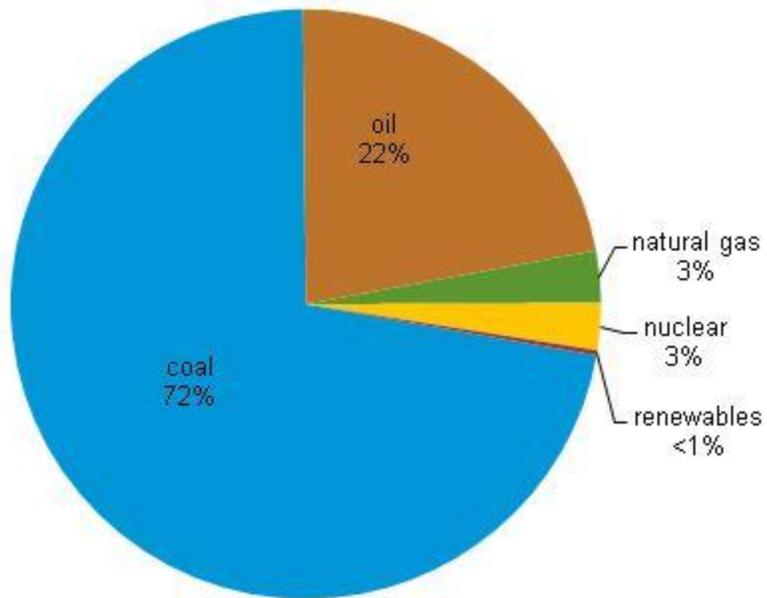
South Africa

South Africa contains 95% of Africa's total coal reserves (Energy Information Administration, 2016m), and relies heavily on its large-scale, coal mining industry. The country also has a well-developed synthetic fuels (synfuels) industry, manufacturing gasoline and diesel fuel from the Secunda CTL plant and Mossel Bay GTL plant. The synfuels industry represents nearly all of South Africa's oil, as its domestic production is small. More than 37 MMst (>33.6 million metric tons) of coal are processed yearly and converted into liquid fuels and a range of chemical feedstock at the Sasol synfuels plant in Secunda. The plant has a capacity of 160,000 barrels per day (bbl/d) of oil equivalent. Sasol has plans for expanding Secunda's capacity by 30,000 bbl/d.

South Africa produced an estimated 286 million short tons (MMst [259.5 million metric tons]) and consumed 202 MMst (183.3 million metric tons) of coal in 2013. Coal accounts for 72% of the country's total primary energy consumption (Fig. 20). The electricity sector accounts for >50% of the coal consumed in South Africa, with lesser amounts represented by petrochemical and metallurgical industries followed by domestic heating and cooking.

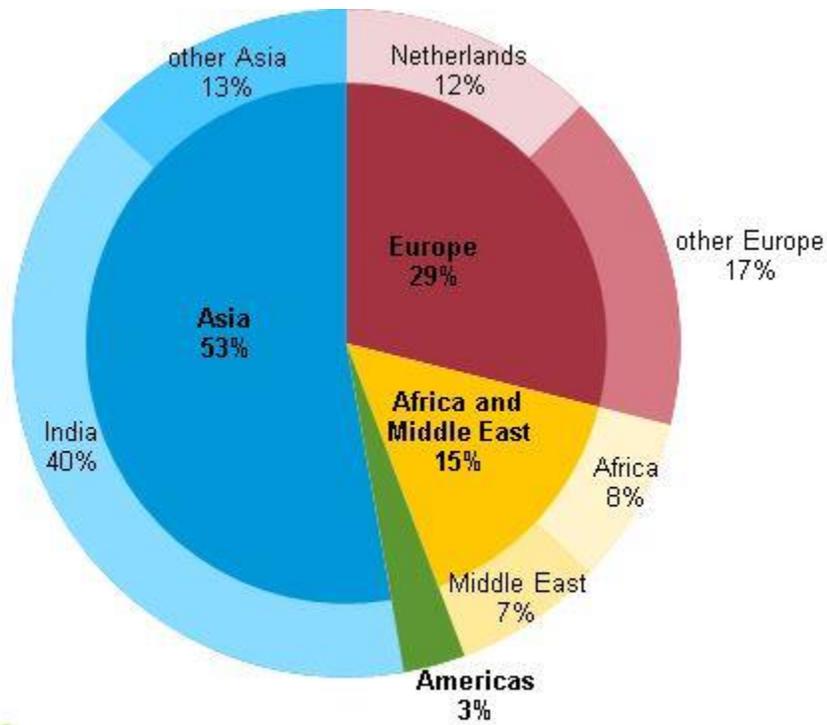
Most of South Africa's coal production is from the northeastern part of the country (Fig. 22). Coal use in South Africa is expected to increase in the next several few years. Eskom plans to expand coal-fired electricity capacity to keep pace with increased demand with the coal-fired Medupi power station (4,764 megawatts [MW]) and the coal-fired Kusile plant (4,800 MW).

South Africa exports approximately 25% of its coal production. More than 90% of South Africa's coal is exported at the Richards Bay Coal Terminal (RBCT), with other export terminals located at Maputo and Durban. At least 53% of South Africa's exports are to Asia, with India representing 40% of the total export weight of 86 MMst (78 million metric tons) in 2014 (Fig. 21). Of the 29% of the export market in Europe, the Netherlands accounts for 12%.



Note: Traditional solid biomass and waste is not included in the total.
Source: BP Statistical Review of World Energy 2014

Figure 20. Total primary energy consumption in South Africa in 2014. From Energy Information Administration (2016m).



Note: Total coal exports were almost 78 million metric tons (or 86 million short tons).
 Source: Global Trade Information Services, South African Revenue Service

Figure 21. Coal-export destinations from South Africa in 2014. From Energy Information Administration (2016m).

LOCATION AND GEOLOGY

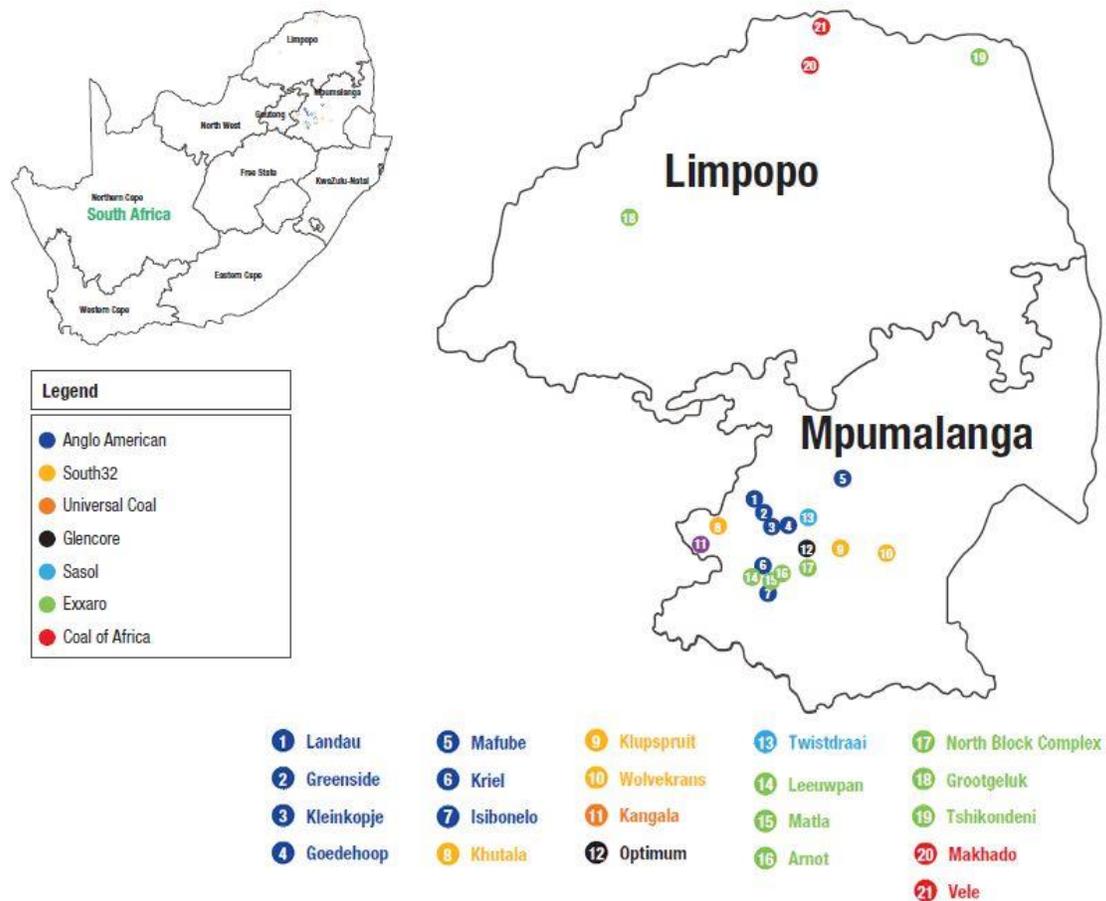


Figure 22. Principal coal mines and companies in South Africa. From Chamber of Mines of South Africa (2016).

Germany

Coal is Germany's most abundant indigenous energy resource, and it accounted for about 25% of Germany's total primary energy consumption in 2014 (Energy Information Administration, 2016n). In 2013, Germany was the eighth largest coal producer in the world, producing 210 MMst (190.5 million metric tons) of coal. Power and industrial sectors consume most of the coal in Germany, with lignite-fired generation providing ~44% of total electric generation in 2014 (Le Blond, 2015). Although Germany plans to reduce greenhouse gas emissions by 40% (from 1990 levels) by 2020 (Destatis, 2015), coal continues to be the dominant source of electricity in Germany in 2014, even though there is increased energy production from renewables (Fig. 23).

Plans are underway to expand Germany's reliance on lignite for electricity generation to make up for shortfalls resulting from phase outs in nuclear energy in light of the 2011 Fukushima incident. According to the Federal Network Agency in Germany, only slightly more than 20 GW of lignite-fired electric generating capacity existed in early 2015. However, nine new coal-fired power plants are planned for construction in the first half of the upcoming decade (Carboncounter Wordpress, 2015), with the result of new coal- and lignite-fired power outstripping new solar and wind power generation.

Germany exported a record amount of about 5% of its total electricity production to neighboring countries in 2013 (The Guardian, 2015). This surplus electricity was the result of increased production of both lignite and green energy (wind and solar). Electricity from lignite in Germany has become cheaper because of weakening economies in Europe, where companies reduced energy production and therefore purchased fewer EU certificates for emitting CO₂. This in turn caused a reduction in the price that utility companies had to pay for CO₂ emissions, falling from an historic high of nearly 30 euros per ton of CO₂ in 2008 to approximately 3 euros per ton in 2013, which in turn has increased the attractiveness of using lignite.

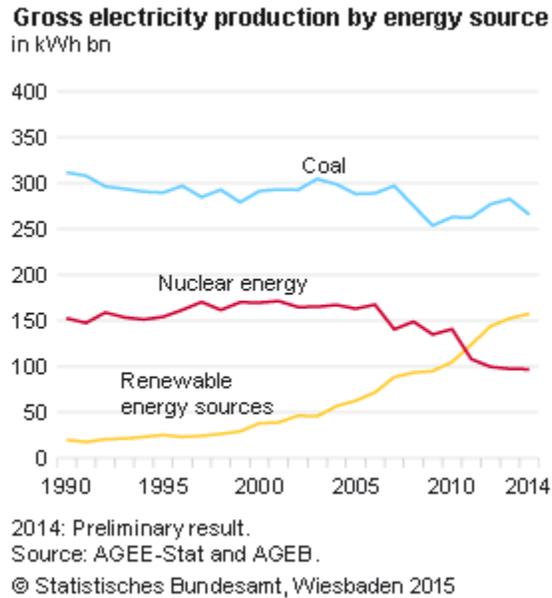


Figure 23. Gross electricity generation by energy source in Germany, 1990 to 2014. Units are in kilowatt-hours. From Destatis (2015).

Poland

Poland is the second largest coal producer in Europe, with Germany in first rank (Energy Information Administration, 2016o). Poland's total primary energy consumption in 2012 was 3.9 quadrillion British thermal units (Btu), or 4.115 quintillion joules. Coal accounted for 55% of energy consumption, with oil representing 26%, natural gas being 15%, and renewable energy sources comprising 4%. Poland produced 0.157 bst of coal in 2013 (Table 1), which amounts to ~20% of Europe's total coal production. Poland consumes virtually all its domestic coal production, with minor coal exports to the Czech Republic, Germany, and Ukraine (Platts, 2015). Poland's coal-fired power plants represent >75% of installed electric generating capacity.

Abundant coal in Poland is seen as a means of lessening dependence on Russian natural gas, with climate objectives as being secondary (Bauerova, 2015). Poland has the lowest reliance on natural gas among the EU's 10 largest economies. Polish industry spent 23% less for power than German industry in 2012, as well as having provided jobs for >100,000 people. Nevertheless, coal's future in Poland could be negatively impacted by European Union (EU) policies on the environment and the development of alternative and renewable energy sources (Ministry of the Treasury, Republic of Poland, 2015). Polish coal mines in 2013 produced less than in 2012, a 4.5% decline (Fig. 24). This was followed by a 2.5% decline in Polish hard-coal production in the first half of 2015, with a net loss of revenues of Zloty 1.445 billion (\$388.7 million USD) (Platts, 2015). Polish coal mines have lost >\$859 million USD since 2014 as coal prices fell to decade lows (Reuters, 2015b).

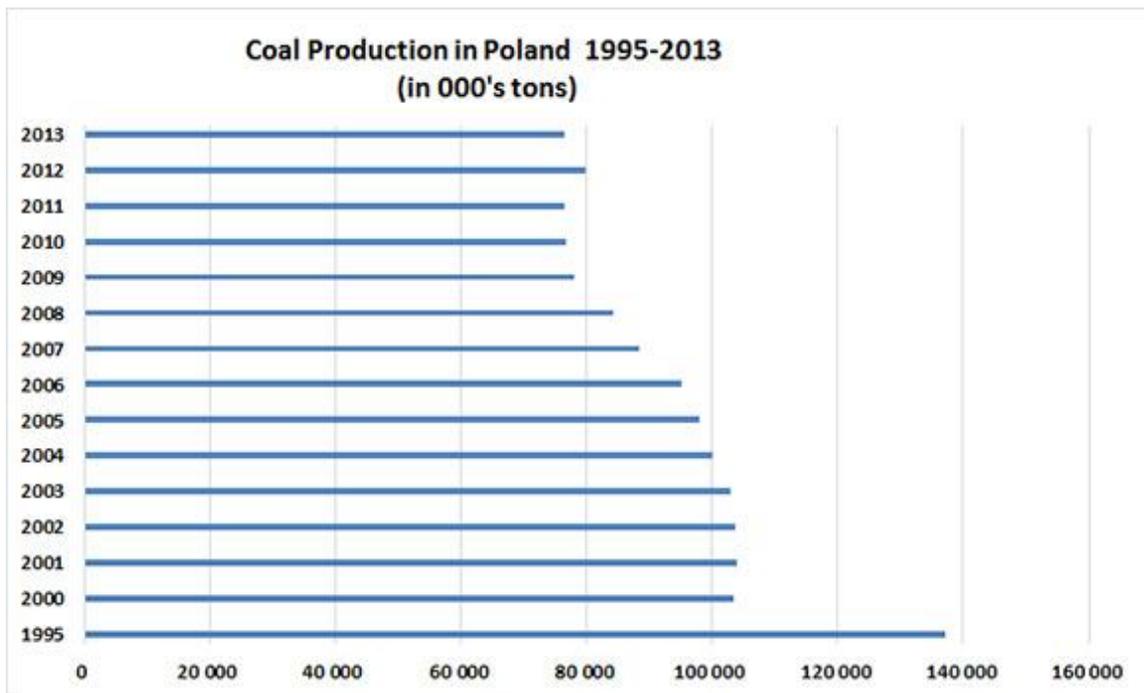
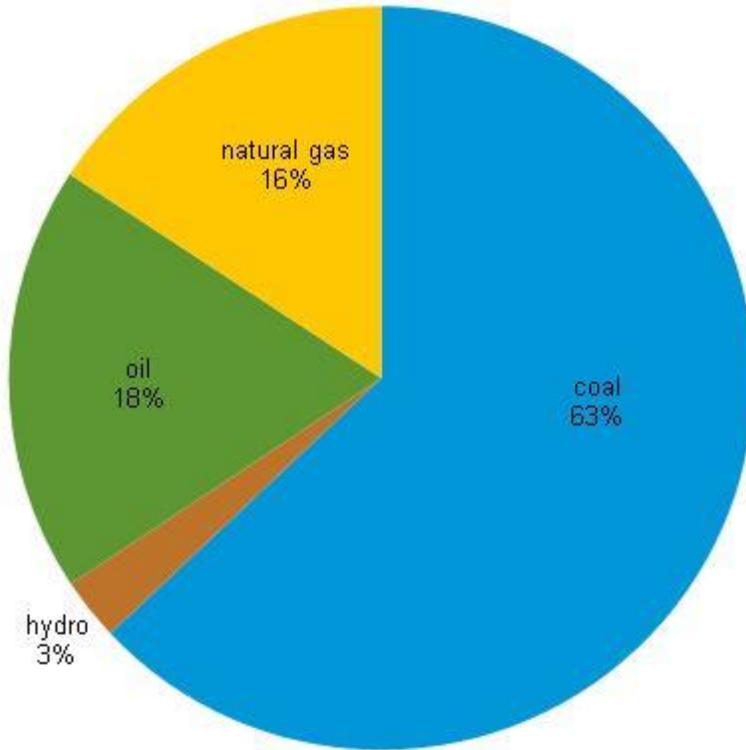


Figure 24. Coal production in Poland, 1995-2013. Units are in thousands of short tons (Mst). From Ministry of the Treasury, Republic of Poland (2015).

Kazakhstan

Coal accounts for >60% of Kazakhstan's total energy consumption (Fig. 25) (Energy Information Administration, 2016p). Coal production in Kazakhstan has declined slightly since peak production in 2013 (Fig. 26). Despite Kazakhstan being ranked among the top-ten coal-producing countries (Table 1), it contributes comparatively little to global coal volumes (<4%). Kazakhstan exports ~25% of its own coal production (virtually all steam coal), with most destined for Russia. Kazakhstan's coal exports fell by 3% year in 2014 (Fig. 26). The primary reason for these declining exports is Russia, which plans to phase out imports from Kazakhstan, replacing these imports from domestically produced coal from Russia (The Economist, 2015). Kazakhstan plans to offset export losses to Russia with new markets in Finland, Greece Italy, Kyrgyzstan, the United Kingdom, and China, despite recent reductions in coal production in China.

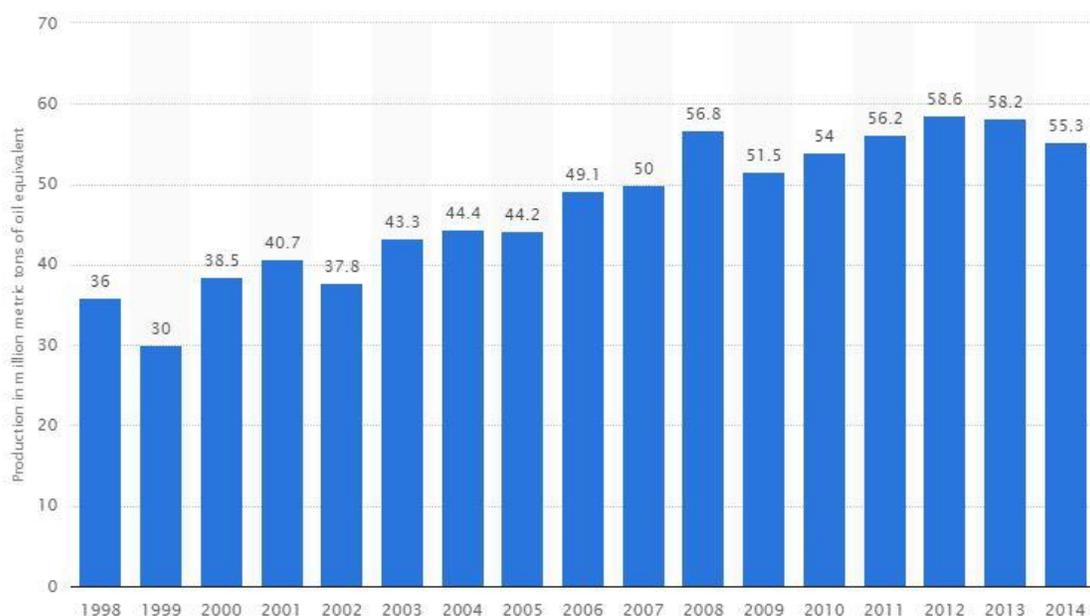
Kazakhstan also produces minor volumes of metallurgical coal for domestic consumption. Coal provides most of Kazakhstan's power generation, with most coal-fired plants being located in the north part of the country. Kazakhstan's total installed generating capacity is ~18 GW, of which 87% comes from fossil fuels. A CTL facility has been under development in Kazakhstan (Urazova, 2015). It is an experimental complex for transformation of brown coal into gasoline and diesel fuel. The facility is located in Akmola Oblast and is designed for a capacity of 7.3 metric tons, or 8 short tons per day.



Source: U.S. Energy Information Administration

Figure 25. Energy consumption by fuel type in Kazakhstan in 2013. From Energy Information Administration (2016p).

Coal production in Kazakhstan from 1998 to 2014 (in million metric tons of oil equivalent)



© Statista 2016

Figure 26. Coal production in Kazakhstan from 1998 to 2014. Units are in million metric tons of oil equivalent. From Statista (2016).

Colombia

Colombia was the fifth-largest coal exporter in the world and eleventh-largest coal producer in 2013 (Table 1) (Energy Information Administration, 2016q). Colombia had 6.75 bst (6.1 billion metric tons) of probable coal reserves, consisting mostly of bituminous coal, in 2013, the greatest in South America. The country exports most of its coal production and was the fifth-largest coal exporter in the world in 2012. Colombia consumed only 0.007 bst (0.006 billion metric tons) of its produced coal of 0.094 bst

(0.085 billion metric tons) in 2013 (Fig. 27). Europe is the primary export market for Colombian coal, followed by other South American countries, and the United States (Fig. 28). Colombian coal represented 73% of U.S. coal imports in 2014.

Carbones del Cerrejon (Cerrejon) consortium, consisting of Anglo-American, BHP Billiton, and Xstrata is the number-one coal producing consortium in Colombia. It operates the Cerrejon Zona Norte (CZN) project, the largest coal mine in Latin America. Drummond Company, which has entered into an 80%-20% partnership with Itochu, the second-largest coal producer in Colombia, operates two mines near La Loma.

Coal production in Colombia fell by 3.5% in 2015 to 0.091 bst (0.083 billion metric tons) (Reuters, 2015c). Various factors led to this decline, including a global glut in coal (Porzecanski and Willis, 2016) and transport restrictions such as a ban on night shipments via rail, although this ban was lifted in November, 2015. Another factor was mine closures along the border between Colombia and Venezuela because of border closings over contraband issues by Venezuela, forcing small producers to use more expensive transport to Colombian parts than closer Venezuelan ports.

In spite of operational difficulties and the global glut in coal production, Colombia plans to boost production in 2016 to >90 bst (>81.6 billion metric tons) and even more if possible. Coal-mine operators in Colombia are trying to reduce costs as prices continue to be depressed. The price for thermal coal for delivery to Europe was as low as \$43.20 per ton in January, 2016 (Porzecanski and Willis, 2016).

Colombia coal production and consumption

million short tons

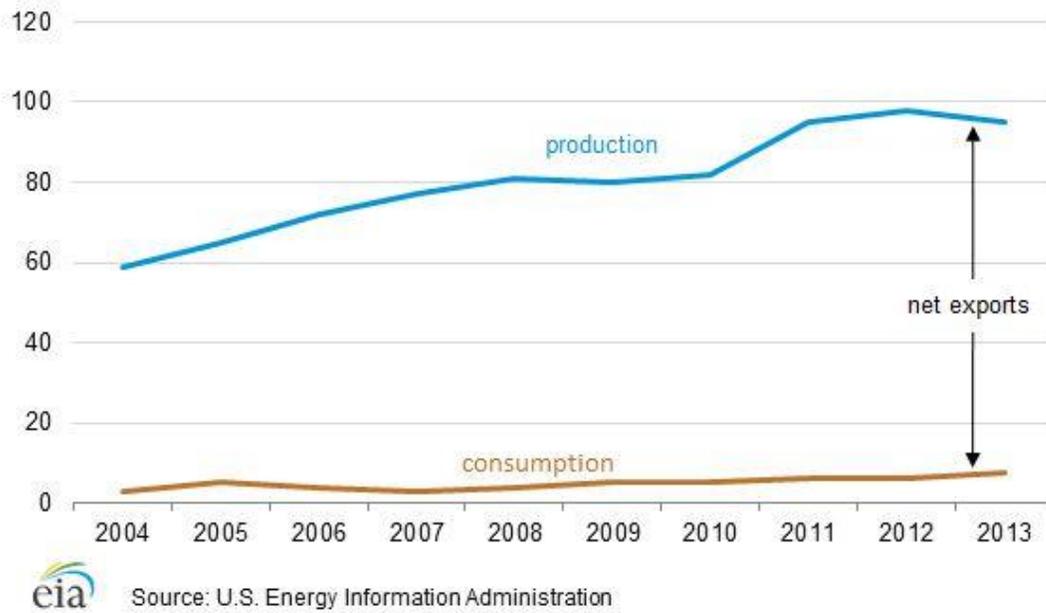
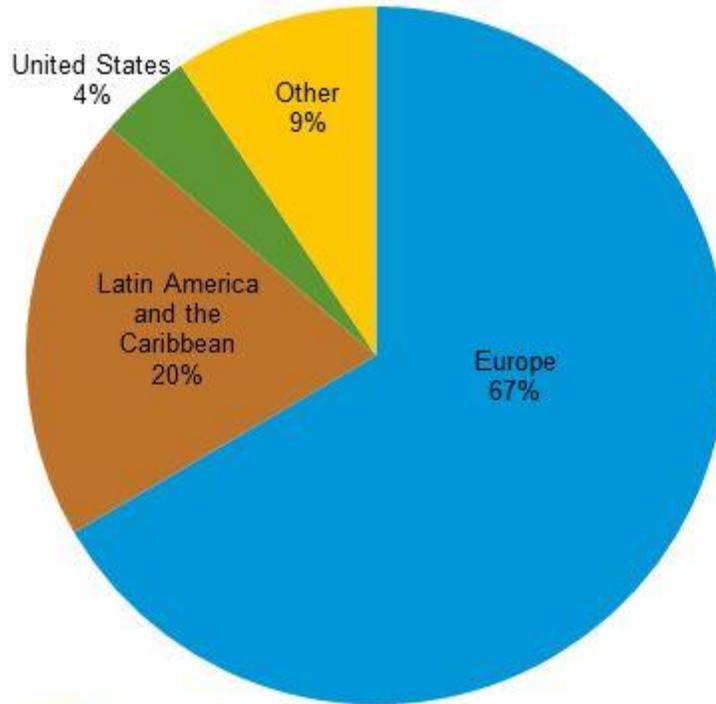


Figure 27. Coal production and consumption in Colombia from 2004 to 2013. Units are in million short tons (MMst). From Energy Information Administration (2016q).

Colombia's coal exports by destination, 2013



Source: U.S. Energy Information Administration, Global Trade Information System

Figure 28. Destinations of coal exports from Colombia in 2013. From Energy Information Administration (2016q).

Canada

The Canadian government has been recently trying to lower domestic coal consumption in Canada, with the result that up to 50% of Canada's coal production is being exported (Energy Information Administration, 2016r). Less than 10% of Canada's total energy consumption is from coal (Fig. 29).

Canada's total coal reserves were ~6.6 bst (~6 billion metric tons) in 2014, with >50% of these reserves consisting of anthracite and bituminous coal. Although Canada's coal resources are distributed throughout the country, active mining and production is limited to British Columbia, Alberta, and Saskatchewan. In 2014, Canada produced almost 0.069 bst (0.063 billion metric tons) of coal, down from 0.076 bst (0.069 billion metric tons) in 2013 (Table 1) (Energy Information Administration, 2016a, r). Canada, a net exporter of electricity to the United States, generates >600 billion kilowatt hours (kWh) (>600 GW), of which ~60% is from hydropower. However, >60% of Canada's electricity is provided from fossil fuels (Fig. 29).

Provincial governments are responsible for regulating the development of the energy resources within each province, but the federal government has overarching environmental control. The federal government issued regulations starting in 2011 that new coal plants would need very strong emissions controls as detailed at: <http://laws.justice.gc.ca/eng/regulations/sor-2012-167/index.html>.

Provinces

Coal production varies greatly in each Canadian province (Quigley, 2016):

Alberta

Alberta has 70% of Canada's coal reserves and has extensive production of coal for three different markets: domestic thermal coal (sub-bituminous coal usually for mine-mouth power plants), export domestic thermal coal (bituminous coal with higher heating value),

and export metallurgical coal (bituminous coal with coking character). Alberta is also a large producer of CBM, discussed in another EMD commodity report. Reserves of coal are >36 bst (>32.6 billion metric tons), but only a small portion is currently permitted for mining. Two permitted mines for metallurgical coal exist in the Mountains region, but production at one mine was suspended in 2014 and the other was on reduced production. In 2015 Canada GCC Advisors reported produced 0.4 bst (0.36 billion metric tons), although from tailings and miscellaneous cleanup.

Three mines for export thermal coal are permitted in the Foothills region, but one was closed and had a catastrophic tailings release, one has had initial construction stopped, and the other one is on reduced production. Four mines in the Plains supply five mine-mouth power plants with sub-bituminous coal and they are independent of world coal prices, so their production remains continuous at this time. There are also 2 small mines that supply the domestic heating market. The government of Alberta has tabled legislation to reduce greenhouse gas emissions with a carbon levy starting in 2017. According to the Legislative Assembly of Alberta, charges will be between \$35 and \$66 Canadian dollars per metric ton (The Legislative Assembly of Alberta, 2016).

According to the Alberta Utilities Commission, 55% of Alberta's electricity was derived from coal in 2014 and 30.1 MMst (27.3 million metric tons) of coal were produced in 2015 (Alberta Energy Regulator, 2016), of which 93% was thermal and 07% metallurgical coal. This accounted for 44% of Canada's coal production (Energy Alberta, 2016).

British Columbia

British Columbia has extensive resources of thermal coal that were previously mined or explored in the intermontane basins, but currently there is only one thermal coal mine that suspended operations due to low prices in early 2016 on the west coast of the province and no coal-fired power plants. A small mine in the interior was suspended in 2015 (British Columbia Geological Survey, 2015). The province has legislation requiring

coal-fired power plants to have zero emissions and there is an emphasis on renewable energy. Some intermontane basins also contain metallurgical coal resources with extensive exploration, but there is no current production. One proposed mine has had the coal leases put into stasis until the contentious issues of opening a mine are resolved. All of the current coal mines in eastern areas of the province exist for the production of export metallurgical coal (bituminous coal with coking character). Many of these mines are in similar strata to that seen in the Alberta foothills, either along structural strike or in the next structural domain within the tectonic thrust belt of the eastern Cordillera. There are five mines currently in production in the southeastern area of the province and they are continuing reduced production from Jurassic-Cretaceous coals, but the four mines in the northeastern area that were mining Lower Cretaceous coals were suspended in 2014 due to the low market prices. British Columbia produced an estimated 27.7 MMst (25.1 million metric tons) of coal in 2015 (British Columbia Geological Survey, 2015), which comprises ~41 per cent of Canada's total coal production. British Columbia does not rely on coal for generation of electricity, but almost all of its coal production is dedicated to the coking coal industry.

Manitoba

Coal accounts for <0.1% of Manitoba's total energy production and the government of Manitoba plans to discontinue coal for home space heating by mid-2017. Manitoba has a combination power plant at Brandon with a 110 MW coal-fired unit using lignite imported from Saskatchewan, but the use of this unit was restricted by legislation to only "emergency use" in 2010. There is no plan for coal combustion in Manitoba.

New Brunswick

NBPower (previously New Brunswick Power Corporation) in 2014 generated some of the electricity in New Brunswick from a coal-fired power plant at Belledune (450 megawatts [MW]) fuelled by coal imported into Canada. The Belledune coal-fired plant

supplied approximately 13% of New Brunswick's power in 2014. Canada's federal government plans to have Belledune close by 2043, although no specific plan has yet been formulated. The power plant at Dalhousie (165 MW) had one burner designed for coal, but it was switched to bitumen fuel (from Venezuela) in 1994, but when that fuel supply was closed in 2004, it was announced on September 27, 2012 that it would be closed. Coal had been mined near Minto since 1986, but the last mine closed in 2009 and the corresponding power plant at Grand Lake was demolished in 2012.

Nova Scotia

Nova Scotia has some of the oldest mining activity in Canada, with large resources and many years of mining in three main structural basins (Cumberland, Sydney, and Stellarton) and a number of smaller sub-basins. Currently, there is no mining activity in Nova Scotia since the provincial corporation DevCo closed the last of its mines on November 23, 2001 in the Sydney coal basin following the Westray explosion and fire on May 9, 1992 in the Stellarton coal basin. Some interest has been shown in extending some rock tunnels at Donkin (Sydney coal basin) for access to otherwise stranded resources offshore of older collieries. Nova Scotia Power Inc. in 2014 generated 60% of the electricity in Nova Scotia from coal-fired power plants at Trenton (310 MW), Lingan (620 MW), Tupper (150 MW), and Point Aconi (165 MW), all of which are fuelled by coal imported from outside Canada.

Ontario

Ontario does not have large coal resources or coal mining activity, but has imported thermal coal from eastern provinces for fuel at the Nanticoke power plant. When these provinces ceased production, Nanticoke imported coal from the northern U.S. The 3,964 MW Nanticoke facility was decommissioned from coal combustion between 2010 and December 31, 2013. The next largest power plant was the Lakeview facility, but it ceased burning coal in 2005. The third largest coal facility was Lambton, but it was

decommissioned from coal combustion between 2010 and December 31, 2013. The power plant at Atikokan is a small facility of 230 MW that imported lignite from Saskatchewan, but it was converted to biomass fuel in 2014. There are no plans for future coal-fired power generation in Ontario.

Saskatchewan

Saskatchewan produces ~11 MMst (10 million metric tons) of coal per year. Coal provided ~44% of Saskatchewan's energy in 2014, according to SaskPower. There are three coal mines in Saskatchewan producing lignite primarily for mine-mouth power plants with some minor export of fuel to power plants in other provinces. No other mineable coal resources occur in the province. As described in the other provinces above, the lignite export has been seriously reduced. The coal mines and corresponding power plants are at Poplar River, Boundary Dam, and Shand and all are operated by SaskPower Inc. which generates 37% of the electricity in Saskatchewan. Announcements in 2013 and 2014 have focussed on the carbon capture project at the Boundary Dam facility where about 90% of CO₂ emissions are to be captured and used for tertiary recovery of oil reservoirs. Although Saskatchewan is not planning to completely phase out coal, it has embarked on a goal to retrofit existing coal-fired power plants with clean-coal technology.

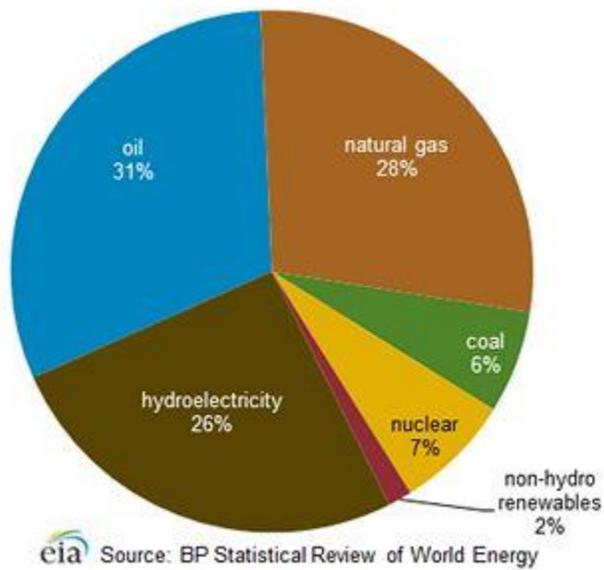


Figure 29. Types of energy sources consumed in Canada in 2014. From Energy Information Administration (2016r).

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