

Ugljen

Ugljen predstavlja najstariji fosilni energent čije korištenje ima dugu tradiciju diljem svijeta. Mnoge zemlje, razvijene i one u razvoju oslanjale su se ili se još uvijek oslanjaju na njegovo korištenje u proizvodnji električne i toplinske energije. Prvenstvena prednost ugljena je njegova laka dostupnost, konkurentna cijena u odnosu na ostala fosilna goriva, velike rezerve i potpuna neovisnost o kriznim žarištima u svijetu. Postoje razne vrste ugljena koje se razlikuju po starosti i po kvaliteti kao je prikazano tablicom 1.

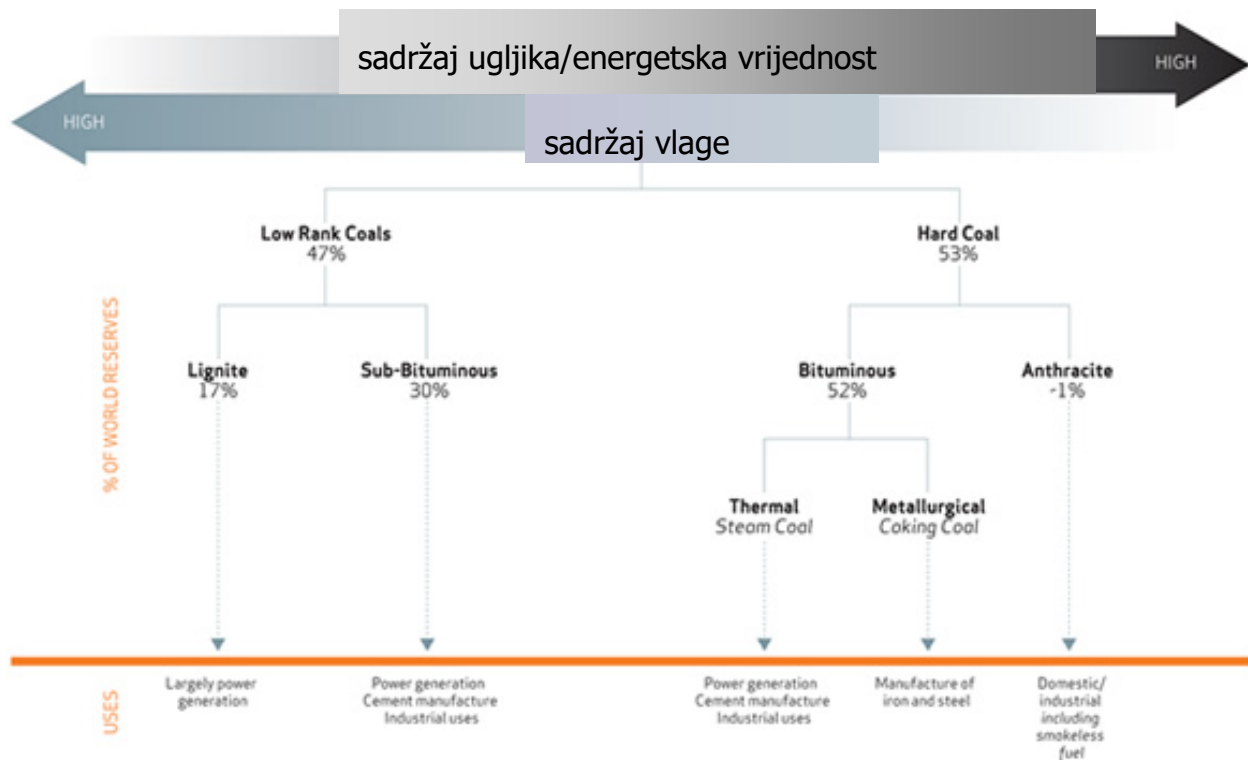
Tablica 1. Vrste ugljena i usporedba toplinske vrijednosti s drvom (H. Požar: Energetika)

	Gustoća, kg/m ³	Donja toplinska vrijednost, MJ/kg	Udio vlage,%	Hlapljivi sastojci, % suhe tvari	Udio ugljika, % suhe tvari
Drvo	0,2-1,3	14,7	Suho d.	80	50
Treset	1,0	6,3-8,4	60-90	65	55-65
Lignit	1,2	7,5-12,6	30-60	50-60	65-70
Mrki ugljen	1,25	16,7-29,3	10-30	45-50	70-80
Plameni kameni ugljen	1,3	29,3-33,5	3-10	17-45	80-90
Mršavi kameni ugljen	1,35	33,5-35,6	3-10	7-17	90-93
Antracit	1,4-1,6	35,6-37,7	1-2	4-7	93-98

Iz tablice je vidljivo da donja toplinska vrijednost ugljena raste s porastom udjela ugljika u suhoj tvari (isparen sav sadržaj vlage u ugljenu o čemu će biti više riječi u poglavlju izgaranje) i što je niži udio vlage.

Uobičajena je i podjela ugljena na lignite, pod bituminozne, bituminozne i antracit kako je prikazano na slici 1. preuzetoj od World Coal Institute. Ta terminologija je uobičajena i prilikom navođenja statističkih pokazatelja. Kako je vidljivo lošiji ugljeni (low rank coal) su lignit i podbituminozni ugljen i zauzimaju gotovo pola svjetskih zaliha, a primjena im je u energetici.

Kvalitetni ugljeni (hard coal) su bituminozni i antracit. Bituminozni se koristi u energetici i metalurgiji, ali tada mora imati posebna svojstva. antracit je najbolji od svih vrsta, ali i daleko najmanjih zaliha.



Slika 1 Uobičajena podjela ugljena obzirom na udio ugljika i vlage (World Coal Institute)

Tablica 2. prikazuje stanje svjetskih zaliha ugljena po državama i regijama a slika 3. udjele pojedinih regija u ukupnim svjetskim zalihama. Najveće zalihe mogu se uočiti u SAD-u, Rusiji, Kini, Njemačkoj, Indiji, JAR-u itd. Po regijama (slika 3.) dominiraju Europa i europski dio Azije, dijelovi Azije i Pacifika (Kina, Indija, Australija), te Bliski Istok (s dominacijom Afrike tj. JAR-a). Na dnu tablice 2. vidljivo je da zemlje koje nisu članice OECD imaju najveće zalihe ugljena, a povezano s njihovim ubrzanim razvojem i sve većim potrebama za energijom, dovodi do realno velike globalne opasnosti po okoliš jer će se povećavati emisija CO₂ kao glavnog stakleničkog plina. I do sada su mnoge zemlje temeljile svoju energetiku na korištenju ugljena (tablica 3.) a to će vjerojatno činiti i dalje bez obzira na povećanje emisija stakleničkih plinova.

U tablici 2. i na slici 3. moguće je uočiti da rezerve ugljena s godinama postaju sve manje, za razliku od onoga što je viđeno s rezervama nafte i prirodnog plina. To ukazuje na činjenicu da su rezerve ugljena, kao najstarijeg fosilnog energenta dobro istražene i da se ne mogu očekivati otkrića novih nalazišta.

Tablica 2. Zalihe ugljena po zemljama u milijunima tona (BP statistical review 2017.)

Million tonnes	Anthracite and bituminous	Sub-bituminous and lignite	Total	Share of total	R/P ratio
US	221400	30182	251582	22.1%	381
Canada	4346	2236	6582	0.6%	109
Mexico	1160	51	1211	0.1%	151
Total North America	226906	32469	259375	22.8%	356
Brazil	1547	5049	6596	0.6%	*
Colombia	4881	-	4881	0.4%	54
Venezuela	731	-	731	0.1%	*
Other S. & Cent. America	1784	24	1808	0.2%	*
Total S. & Cent. America	8943	5073	14016	1.2%	138
Bulgaria	192	2174	2366	0.2%	75
Czech Republic	1103	2573	3676	0.3%	80
Germany	12	36200	36212	3.2%	206
Greece	-	2876	2876	0.3%	87
Hungary	276	2633	2909	0.3%	311
Kazakhstan	25605	-	25605	2.2%	250
Poland	18700	5461	24161	2.1%	184
Romania	11	260	291	*	13
Russian Federation	69634	90730	160364	14.1%	417
Serbia	402	7112	7514	0.7%	196
Spain	868	319	1187	0.1%	*
Turkey	378	10975	11353	1.0%	163
Ukraine	32039	2336	34375	3.0%	*
United Kingdom	70	-	70	*	17
Uzbekistan	1375	-	1375	0.1%	355
Other Europe & Eurasia	2618	5172	7790	0.7%	201
Total Europe & Eurasia	153283	168841	322124	28.3%	284
South Africa	9893	-	9893	0.9%	39
Zimbabwe	502	-	502	*	186
Other Africa	2756	66	2822	0.2%	276
Middle East	1203	-	1203	0.1%	*
Total Middle East & Africa	14354	66	14420	1.3%	54
Australia	68310	76508	144818	12.7%	294
China	230004	14006	244010	21.4%	72
India	89782	4987	94769	8.3%	137
Indonesia	17326	8247	25573	2.2%	59
Japan	340	10	350	*	281
Mongolia	1170	1350	2520	0.2%	66
New Zealand	825	6750	7575	0.7%	*
Pakistan	207	2857	3064	0.3%	*
South Korea	326	-	326	*	189
Thailand	-	1063	1063	0.1%	63
Vietnam	3116	244	3360	0.3%	85
Other Asia Pacific	1322	646	1968	0.2%	29
Total Asia Pacific	412728	116668	529396	46.5%	102
Total World	816214	323117	1139331	100.0%	153
of which: OECD	319878	177264	497142	43.6%	291
Non-OECD	496336	145853	642189	56.4%	112
European Union	21813	53006	74819	6.6%	162
CIS	130162	93066	223228	19.6%	417

*More than 500 years.

*Less than 0.05%.

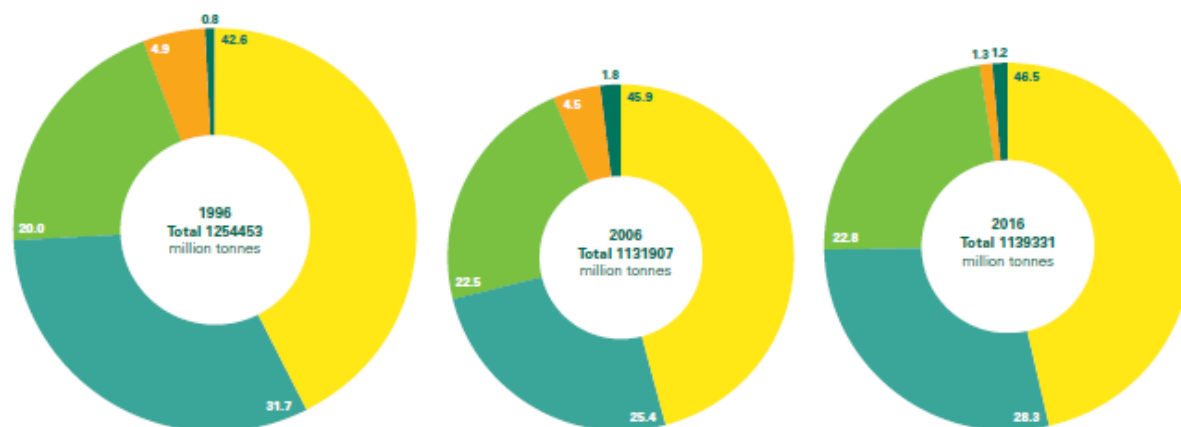
Source: Includes data from Federal Institute for Geosciences and Natural Resources (BGR) Energy Study 2016.

Notes: Total proved reserves of coal – Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved coal reserves does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at company level, for instance as published by the US Securities and Exchange Commission, nor does it necessarily represent BP's view of proved reserves by country. Reserves-to-production (R/P) ratio – If the reserves remaining at the end of any year are divided by the production in that year, the result is the length of time that those remaining reserves would last if production were to continue at that rate. Reserves-to-production (R/P) ratios are calculated excluding other solid fuels in reserves and production. Shares of total and R/P ratios are calculated using million tonnes figures.

Distribution of proved reserves in 1996, 2006 and 2016

Percentage

- Asia Pacific
- Europe & Eurasia
- North America
- Middle East & Africa
- S. & Cent. America



Slika 3. Raspored svjetskih zaliha ugljena po regijama (BP statistical review 2017.)

Tablica 3. Udio ugljena u proizvodnji električne energije u nekim državama

	Udio,%		Udio,%		Udio,%
Poljska	93	Izrael	71	Češka	59
JAR	93	Kazahstan	70	Grčka	58
Australija	80	Indija	69	SAD	50
Kina	78	Maroko	69	Njemačka	47

U tablici 4. navedeni su najveći svjetski proizvođači ugljena što se očekivano poklapa za stanjem zaliha ugljena prikazanim u tablici 2.

Tablica 4. Najveći svjetski proizvođači ugljena

Million tonnes oil equivalent											Growth rate per annum			Share 2016
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016	2005-15	
US	595.1	587.7	596.7	540.8	551.2	556.1	517.8	500.9	507.7	449.3	364.8	-19.0%	-2.5%	10.0%
Canada	34.8	35.7	35.6	33.1	35.4	35.5	35.6	36.4	35.6	31.9	31.4	-1.8%	-1.0%	0.9%
Mexico	6.8	7.3	6.9	6.1	7.3	9.4	7.4	7.2	7.3	6.9	4.5	-34.8%	1.2%	0.1%
Total North America	636.7	630.7	639.2	580.0	594.0	600.9	560.9	544.5	550.5	488.1	400.7	-18.1%	-2.4%	11.0%
Brazil	2.6	2.7	2.9	2.3	2.3	2.4	2.9	3.7	3.4	3.5	3.5	-	2.3%	0.1%
Colombia	45.7	48.2	50.7	50.2	51.3	59.2	61.5	59.0	61.1	59.0	62.5	5.5%	3.7%	1.7%
Venezuela	5.2	5.0	3.7	2.4	1.9	1.9	1.4	0.9	0.6	0.6	0.2	-66.4%	-19.7%	*
Other S. & Cent. America	0.4	0.3	0.4	0.4	0.4	0.4	0.5	1.7	2.4	1.9	1.5	-18.3%	16.3%	*
Total S. & Cent. America	53.9	56.2	57.7	55.3	55.9	63.9	66.3	65.3	67.5	64.9	67.6	3.9%	2.7%	1.8%
Bulgaria	4.3	4.7	4.8	4.6	4.9	6.2	5.6	4.8	5.1	5.8	5.1	-12.5%	3.4%	0.1%
Czech Republic	23.9	23.8	22.8	20.9	20.7	20.9	20.1	17.7	16.8	16.8	16.3	-3.4%	-3.3%	0.4%
Germany	53.3	54.4	50.1	46.4	45.9	46.7	47.8	45.1	44.1	42.9	39.9	-7.2%	-2.7%	1.1%
Greece	8.2	8.4	8.1	8.2	7.3	7.5	8.0	6.7	6.4	5.7	4.1	-28.7%	-4.0%	0.1%
Hungary	1.8	1.8	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	0.6%	-1.4%	*
Kazakhstan	41.4	42.2	47.9	43.4	47.5	49.8	51.6	51.4	48.9	46.2	44.1	-4.9%	2.2%	1.2%
Poland	68.0	62.5	60.9	56.4	55.4	55.7	57.8	57.2	54.0	53.0	52.3	-1.5%	-2.7%	1.4%
Romania	6.5	6.9	7.0	6.6	5.9	6.7	6.3	4.7	4.4	4.7	4.3	-9.2%	-2.0%	0.1%
Russian Federation	141.0	143.5	149.0	141.7	151.0	157.6	168.3	173.1	176.6	186.4	192.8	3.1%	3.2%	5.3%
Serbia	n/a	7.2	7.5	7.4	7.2	7.8	7.3	7.7	5.7	7.2	7.4	1.4%	-	0.2%
Spain	6.2	5.9	4.4	3.8	3.3	2.6	2.5	1.8	1.6	1.2	0.7	-43.3%	-15.7%	*
Turkey	13.2	14.8	16.7	17.4	17.5	17.9	17.0	15.5	16.4	12.8	15.2	18.7%	1.3%	0.4%
Ukraine	35.7	34.0	34.4	31.8	31.8	36.3	38.0	36.6	25.9	16.4	17.1	4.3%	-7.3%	0.5%
United Kingdom	11.4	10.7	11.3	11.0	11.4	11.5	10.6	8.0	7.3	5.4	2.6	-51.5%	-8.2%	0.1%
Uzbekistan	0.8	1.0	0.9	1.0	1.0	1.1	1.2	1.1	1.2	1.1	1.1	-1.8%	2.3%	*
Other Europe & Eurasia	24.8	16.3	16.5	16.6	16.9	17.1	15.6	18.0	17.0	15.3	14.9	-3.1%	-4.0%	0.4%
Total Europe & Eurasia	440.4	438.0	443.9	418.6	429.3	446.9	459.4	450.9	433.2	422.5	419.4	-1.0%	-0.2%	11.5%
Total Middle East	1.0	1.1	1.0	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	-	-3.3%	*
South Africa	138.3	138.4	141.0	139.7	144.1	143.2	146.6	145.3	148.2	142.9	142.4	-0.6%	0.3%	3.9%
Zimbabwe	1.4	1.3	1.0	1.1	1.7	1.7	1.0	2.0	3.7	2.8	1.7	-37.9%	2.6%	*
Other Africa	0.9	0.8	0.8	0.7	0.9	1.1	4.4	5.1	5.5	6.0	6.3	5.5%	20.6%	0.2%
Total Africa	140.5	140.5	142.7	141.5	146.8	146.0	152.0	152.3	157.5	151.7	150.5	-1.0%	0.7%	4.1%
Australia	220.4	227.0	234.2	242.5	250.6	245.1	265.9	285.8	305.7	305.8	299.3	-2.4%	3.6%	8.2%
China	1328.4	1439.3	1491.8	1537.9	1665.3	1851.7	1873.5	1894.6	1864.2	1825.6	1685.7	-7.9%	3.9%	48.1%
India	198.2	210.3	227.5	246.0	252.4	250.8	255.0	255.7	269.5	280.9	288.5	2.4%	4.0%	7.9%
Indonesia	114.2	127.8	141.6	151.0	162.1	208.2	227.4	279.7	269.9	272.0	255.7	-6.2%	11.7%	7.0%
Japan	0.7	0.8	0.7	0.7	0.5	0.7	0.7	0.7	0.7	0.6	0.7	14.2%	0.5%	*
Mongolia	4.1	4.8	5.2	8.2	15.2	19.9	18.1	18.0	14.8	14.5	22.8	57.0%	14.8%	0.6%
New Zealand	3.6	3.0	3.0	2.8	3.3	3.1	3.0	2.8	2.5	2.0	1.7	-15.4%	-4.8%	*
Pakistan	1.8	1.7	1.8	1.6	1.5	1.4	1.4	1.3	1.5	1.5	1.8	19.5%	-0.5%	*
South Korea	1.3	1.3	1.3	1.2	1.0	1.0	1.0	0.8	0.8	0.8	0.8	-2.4%	-4.4%	*
Thailand	5.4	5.0	5.0	4.8	5.0	6.0	4.8	4.9	4.8	3.9	4.3	10.6%	-4.5%	0.1%
Vietnam	21.7	23.8	22.3	24.7	25.1	26.1	23.6	23.0	23.0	23.2	22.0	-5.4%	2.0%	0.6%
Other Asia Pacific	22.4	20.6	22.0	23.5	24.7	24.9	25.3	25.1	25.7	28.6	33.9	18.3%	2.6%	0.9%
Total Asia Pacific	1922.2	2065.5	2156.2	2244.6	2406.7	2638.8	2699.7	2792.5	2783.1	2759.4	2617.4	-5.4%	4.4%	71.6%
Total World	3194.7	3321.9	3440.8	3441.1	3633.3	3897.3	3938.9	4006.1	3992.4	3887.3	3656.4	-6.2%	2.5%	100.0%
of which: OECD	1060.1	1055.8	1064.6	1003.4	1023.4	1025.5	1005.7	1000.7	1020.9	946.6	844.8	-11.0%	-1.0%	23.1%
Non-OECD	2134.6	2276.0	2376.3	2437.7	2609.9	2871.8	2933.1	3005.5	2971.4	2940.7	2811.6	-4.7%	3.9%	76.9%
European Union	193.2	187.0	178.9	167.9	165.7	168.5	168.1	157.3	150.6	144.6	133.6	-7.9%	-3.1%	3.7%
CIS	219.5	221.5	233.0	218.8	232.0	245.7	260.3	263.5	254.0	251.5	256.8	1.8%	1.9%	7.0%

* Commercial solid fuels only, i.e. bituminous coal and anthracite (hard coal), lignite and brown (sub-bituminous) coal, and other commercial solid fuels. Includes coal produced for Coal-to-Liquids and Coal-to-Gas transformations.

* Less than 0.05%.

n/a not available.

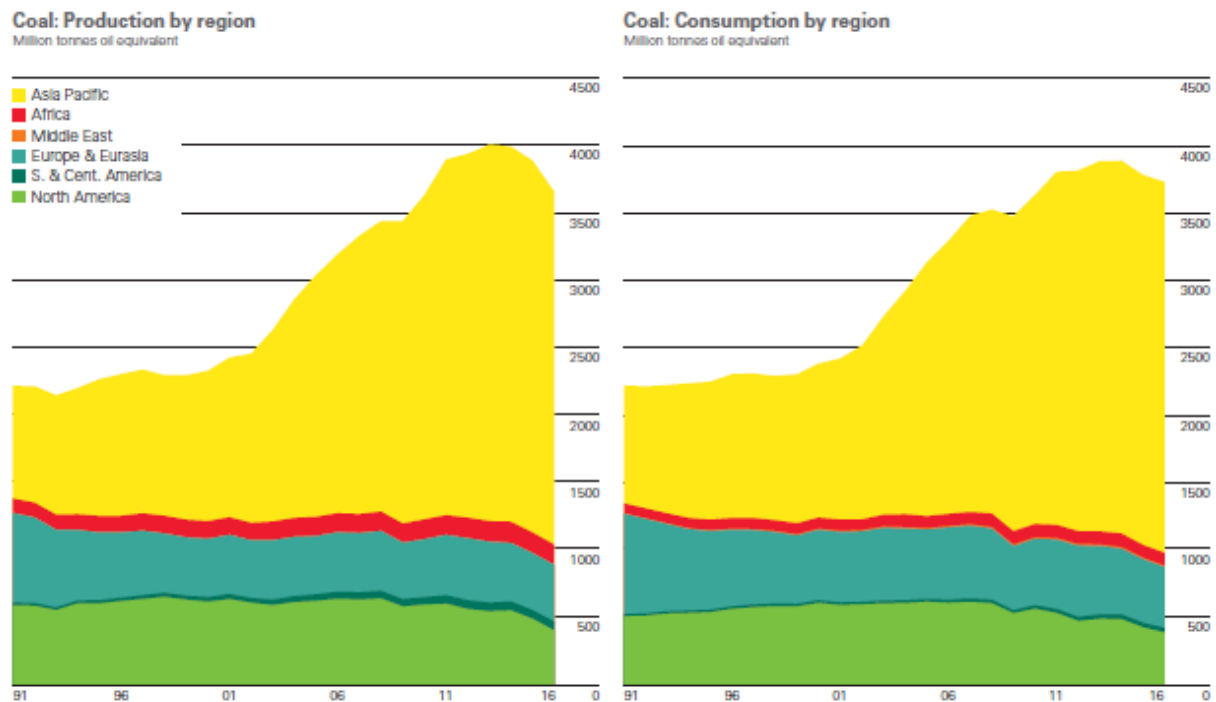
Notes: Annual changes and shares of total are calculated using million tonnes oil equivalent figures.

Growth rates are adjusted for leap years.

Coal production data expressed in million tonnes is available at bp.com/statisticalreview

Tablica 5. Najveći svjetski potrošači ugljena

Million tonnes oil equivalent	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Growth rate per annum			Share 2016
											2016	2016	2005-15	
US	565.7	573.3	564.2	496.2	525.0	495.4	437.9	454.6	453.5	391.8	358.4	-8.8%	-3.8%	9.6%
Canada	29.2	30.3	29.4	23.5	24.8	21.8	21.0	20.8	19.7	19.6	18.7	-5.2%	-4.2%	0.5%
Mexico	12.3	11.3	10.1	10.3	12.7	14.7	12.8	12.7	12.7	12.7	9.8	-22.9%	1.0%	0.3%
Total North America	607.1	614.9	603.7	530.0	562.5	531.9	471.8	488.1	486.0	424.2	386.9	-9.0%	-3.7%	10.4%
Argentina	1.1	1.2	1.4	1.0	1.3	1.5	1.3	1.3	1.5	1.4	1.1	-22.5%	1.9%	*
Brazil	12.8	13.6	13.8	11.1	14.5	15.4	15.3	16.5	17.5	17.7	16.5	-6.8%	-3.1%	0.4%
Chile	3.4	4.1	4.4	4.0	4.5	5.8	6.7	7.5	7.6	7.3	8.2	12.3%	10.2%	0.2%
Colombia	3.7	3.2	4.9	4.0	4.7	3.7	4.6	5.0	5.2	5.3	4.6	-14.0%	14.8%	0.1%
Ecuador	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	0.8	1.0	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	-	-1.3%	*
Trinidad & Tobago	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	-66.4%	18.4%	*
Other S. & Cent. America	2.3	2.4	2.4	2.1	2.2	2.7	2.7	2.9	3.2	3.2	3.4	5.4%	4.9%	0.1%
Total S. & Cent. America	24.3	25.7	28.0	23.2	28.1	30.2	31.7	34.2	36.1	35.9	34.7	-3.7%	5.4%	0.9%
Austria	4.1	3.9	3.8	2.9	3.4	3.5	3.2	3.3	3.0	3.2	3.2	-2.3%	-2.1%	0.1%
Belarus	†	†	†	†	†	†	†	†	†	†	†	-	-19.8%	*
Belgium	0.6	0.7	0.6	0.6	0.6	0.8	0.8	0.9	0.8	0.7	0.8	16.5%	-0.3%	*
Denmark	5.0	4.4	4.5	3.1	3.8	3.5	3.2	3.3	3.3	3.2	3.0	-6.7%	-4.7%	0.1%
Bulgaria	7.0	7.9	7.6	6.4	6.9	8.1	6.9	5.9	6.4	6.6	5.7	-13.5%	-0.4%	0.2%
Czech Republic	21.0	21.4	19.7	17.7	18.8	18.4	17.4	17.2	16.0	16.6	16.9	1.7%	-2.0%	0.5%
Denmark	5.6	4.7	4.1	4.0	3.8	3.2	2.5	3.2	2.6	1.7	2.1	20.8%	-7.3%	0.1%
Finland	7.4	7.0	5.3	5.4	6.8	5.5	4.5	5.0	4.5	3.8	4.1	8.0%	-2.2%	0.1%
France	12.4	12.8	12.1	10.8	11.5	9.8	11.1	11.6	8.6	8.4	8.3	-1.1%	-4.6%	0.2%
Germany	84.5	86.7	80.1	71.7	77.1	78.3	80.5	82.8	79.6	78.5	75.3	-4.3%	-0.4%	2.0%
Greece	8.4	8.8	8.3	8.4	7.9	7.9	8.1	7.0	6.7	5.6	4.7	-16.7%	-4.6%	0.1%
Hungary	3.1	3.1	3.1	2.6	2.7	2.7	2.6	2.3	2.2	2.4	2.3	-3.6%	-2.5%	0.1%
Ireland	2.4	2.3	2.3	2.0	2.0	1.9	2.3	2.0	2.0	2.2	2.2	-0.7%	-2.0%	0.1%
Italy	16.7	16.3	15.8	12.4	13.7	15.4	15.7	13.5	13.1	12.3	10.9	-13.1%	-2.9%	0.3%
Kazakhstan	28.3	31.1	33.8	30.9	33.4	36.3	36.5	36.3	41.0	35.8	35.6	-0.8%	2.9%	1.0%
Lithuania	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	4.8%	-0.1%	*
Netherlands	7.7	8.4	8.0	7.5	7.5	7.5	8.2	8.2	9.1	11.0	10.3	-7.0%	3.1%	0.3%
Norway	0.6	0.7	0.7	0.6	0.8	0.8	0.8	0.8	0.9	0.8	0.8	-0.1%	1.3%	*
Poland	57.4	55.9	55.2	51.8	55.1	55.0	51.2	53.4	49.4	48.7	48.8	*	-1.2%	1.3%
Portugal	3.3	2.9	2.5	2.9	1.6	2.2	2.9	2.7	2.7	3.3	2.9	-11.9%	-0.2%	0.1%
Romania	9.5	10.1	9.6	7.6	7.0	8.2	7.6	5.8	5.7	5.9	5.4	-8.9%	-3.9%	0.1%
Russian Federation	97.0	93.9	100.7	92.2	90.5	94.0	98.4	90.5	87.6	92.2	87.3	-5.5%	-0.3%	2.3%
Slovakia	4.5	4.0	4.0	3.9	3.9	3.7	3.5	3.5	3.4	3.3	3.1	-5.0%	-2.5%	0.1%
Spain	17.9	20.0	13.5	9.4	6.9	12.8	15.5	11.4	11.6	13.7	10.4	-23.9%	-4.0%	0.3%
Sweden	2.7	2.7	2.4	1.9	2.5	2.5	2.2	2.2	2.1	2.1	2.2	6.0%	-2.1%	0.1%
Switzerland	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-1.1%	*
Turkey	26.2	29.5	29.6	30.9	31.4	33.9	36.5	31.6	36.1	34.7	38.4	10.3%	4.6%	1.0%
Turkmenistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ukraine	39.8	39.8	41.8	35.9	38.3	41.5	42.5	41.6	35.6	27.3	21.5	14.9%	-3.1%	0.8%
United Kingdom	40.9	38.4	35.6	29.8	30.9	31.4	39.0	36.8	29.7	23.0	11.0	-52.5%	-4.7%	0.3%
Uzbekistan	0.8	1.0	1.0	1.0	0.9	1.1	1.2	1.1	1.2	1.1	1.0	-10.1%	1.9%	*
Other Europe & Eurasia	21.0	21.2	22.2	21.3	22.5	24.6	22.9	23.8	21.9	23.0	23.0	-0.1%	1.1%	0.6%
Total Europe & Eurasia	536.3	540.2	528.3	475.8	492.5	514.9	528.1	508.1	487.3	471.3	451.6	-4.5%	-0.9%	12.1%
Iran	1.5	1.6	1.2	1.4	1.3	1.4	1.1	1.4	1.6	1.6	1.7	4.3%	0.5%	*
Israel	7.8	8.0	7.9	7.7	7.7	7.9	8.8	7.4	6.9	6.7	5.7	-15.5%	-1.6%	0.2%
Kuwait	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Qatar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saudi Arabia	†	0.1	0.1	†	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	13.5%	*
United Arab Emirates	0.3	0.1	0.3	0.6	0.7	1.3	1.7	1.4	1.5	1.3	1.3	-	24.1%	*
Other Middle East	0.1	0.1	0.2	0.2	0.3	0.4	0.6	0.5	0.7	0.5	0.5	*	13.2%	*
Total Middle East	9.8	9.9	9.7	9.9	10.1	11.2	12.3	10.9	10.8	10.2	9.3	-9.5%	0.4%	0.2%
Algeria	0.9	0.8	0.8	0.5	0.3	0.3	0.3	0.2	0.2	0.1	0.1	-	-13.2%	*
Egypt	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	4.3%	-7.0%	*
South Africa	81.5	83.7	93.3	93.8	92.8	90.5	88.3	88.6	89.8	83.4	85.1	1.8%	0.4%	2.3%
Other Africa	7.4	6.9	6.7	6.1	6.5	7.2	7.0	8.3	11.9	11.4	10.3	-10.3%	3.8%	0.3%
Total Africa	90.6	92.1	101.5	101.0	100.1	98.5	96.1	97.5	102.3	95.3	95.9	0.4%	0.7%	2.6%
Australia	53.1	52.7	54.9	53.1	49.4	48.1	45.1	43.0	42.6	44.1	43.8	-0.9%	-1.6%	1.2%
Bangladesh	0.5	0.6	0.6	0.8	0.8	0.7	0.9	1.0	0.8	0.7	0.8	17.0%	3.7%	*
China	1454.7	1584.2	1609.3	1685.8	1748.9	1903.9	1927.8	1969.1	1954.5	1913.6	1887.6	-1.6%	3.7%	50.6%
China Hong Kong SAR	6.9	7.5	6.9	7.2	6.2	7.4	7.3	7.8	8.1	6.7	6.7	-0.3%	-0.2%	0.2%
India	219.4	240.1	259.3	280.8	290.4	304.8	330.0	352.8	387.5	396.6	411.9	3.6%	6.5%	11.0%
Indonesia	28.9	36.2	31.5	33.2	39.5	46.9	53.0	57.0	45.1	51.2	62.7	22.2%	7.7%	1.7%
Japan	112.3	117.7	120.3	101.6	115.7	109.6	115.8	121.2	119.1	119.9	119.9	-0.2%	0.5%	3.2%
Malaysia	7.3	8.8	9.8	10.6	14.8	14.8	15.9	15.1	15.4	16.9	19.9	17.6%	9.4%	0.5%
New Zealand	2.2	1.7	2.1	1.6	1.4	1.4	1.7	1.5	1.5	1.4	1.2	-15.4%	-4.5%	*
Pakistan	4.0	5.4	6.0	4.9	4.6	4.0	4.0	3.2	4.7	4.7	5.4	15.1%	2.2%	0.1%
Philippines	5.0	5.4	6.4	6.1	7.0	7.7	8.1	10.0	10.6	11.6	13.5	16.0%	9.7%	0.4%
Singapore	†	†	†	†	†	†	†	0.3	0.4	0.4	0.4	-6.5%	47.4%	*
South Korea	54.8	59.7	66.1	68.6	75.9	83.6	81.0	81.9	84.6	85.5	81.6	-4.8%	4.6%	2.2%
Taiwan	37.0	38.8	37.0	35.2	37.6	38.9	38.0	38.6	39.0	37.8	38.6	1.7%	0.7%	1.0%
Thailand	12.4	14.0	15.1	15.1	15.5	15.8	16.5	16.3	17.9	17.6	17.7	0.7%	4.3%	0.5%
Vietnam	5.3	5.8	11.4	10.7	14.0	16.5	15.0	15.8	18.9	22.3	21.3	-4.4%	9.5%	0.6%
Other Asia Pacific	21.9	18.8	20.6	20.9	20.4	16.5	17.2	13.8	16.0	16.9	20.6	21.3%	-2.3%	0.6%
Total Asia Pacific	2025.7	2197.4	2257.3	2336.3	2442.3	2620.6	2677.4	2748.3	2767.0	2747.7	2753.6	-0.1%	3.9%	73.8%
Total World	3293.9	3480.2	3528.4	3476.1	3635.6	3607.2	3817.3	3887.0	3889.4	3784.7	3732.0	-1.7% </		



Slika 4. Proizvodnja i potrošnja ugljena po regijama

U tablici 6. vidljivo je da najveći proizvođači ugljena nisu nužno i najveći izvoznici jer očito sami potroše velike količine ugljena, a iz tablice 6. vidljivo je da neke zemlje veliki proizvođači također spadaju i među najveće uvoznike. Iz tablice 7. u kojoj se navode najveći uvoznici potrebno je istaknuti Japan kao zemlju koja potpuno ovisna o uvozu energenta, a tu činjenicu je dodatno pogoršala katastrofa u nuklearnoj elektrani u Fukushima 11. ožujka 2011. koju je razorio cunami izazvan snažnim potresom. Nakon toga je donesena odluka o postupnom gašenju svih nuklearnih elektrana u Japanu.

Tablica 6. Najveći izvoznici ugljena u 2014. (izvor World Coal Institute-IEA)

	Ukupno (od toga)	za energetiku	za čelik
Indonezija	410 Mt	408 Mt	2 Mt
Australija	375 Mt	195 Mt	180 Mt
Rusija	155 Mt	133 Mt	22 Mt
SAD	88 Mt	31 Mt	57 Mt
Kolumbija	80 Mt	79 Mt	1 Mt
Južna Afrika	76 Mt	76 Mt	0 Mt
Kanada	35 Mt	4 Mt	31 Mt

Tablica 7. Najveći uvoznici ugljena u 2013. (izvor World Coal Institute-IEA)

	Ukupno (od toga)	za energetiku	za čelik
Kina	292 Mt	229 Mt	63 Mt
Indija	239 Mt	189 Mt	50 Mt
Japan	188 Mt	137 Mt	51 Mt
Južna Koreja	131 Mt	97 Mt	34 Mt
Tajvan	67 Mt	60 Mt	7 Mt
Njemačka	57 Mt	47 Mt	10 Mt
UK	41 Mt	35 Mt	6 Mt

iako bi se na temelju prethodno iznesenih brojki i razmišljanja moglo očekivati stabilne cijene ugljene iz podataka danih u tablici 8. vidljivo je da to nije tako.

Uočljivo je veliko povećanje cijena na karakterističnim tržištima u razdoblju od dvadeset godina s izrazitim skokom u 2008. i 2011. godini.

Tablica 8. Cijene ugljena na karakterističnim točkama trgovanja

US dollars per tonne	Northwest Europe marker price†	US Central Appalachian coal spot price index‡	Japan steam spot cif price‡	China Qinhuangdao spot price‡
1996	41.25	29.86	–	–
1997	38.92	29.76	–	–
1998	32.00	31.00	–	–
1999	28.79	31.29	–	–
2000	35.99	29.90	–	27.52
2001	39.03	50.15	37.69	31.78
2002	31.65	33.20	31.47	33.19
2003	43.60	38.52	39.61	31.74
2004	72.08	64.90	74.22	42.76
2005	60.54	70.12	64.62	51.34
2006	64.11	62.96	65.22	53.53
2007	88.79	51.16	95.59	61.23
2008	147.67	118.79	157.88	104.97
2009	70.66	68.08	83.59	87.96
2010	92.50	71.63	108.47	110.08
2011	121.52	87.38	126.13	127.27
2012	92.50	72.06	100.30	111.89
2013	81.69	71.39	90.07	95.42
2014	75.38	69.00	76.13	84.12
2015	56.79	53.59	60.10	67.53
2016	59.87	53.56	71.66	71.35

†Source: IHS. Northwest Europe prices for 1996-2000 based on monthly data, 2001-2016 on weekly data. China prices for 2000-2005 based on monthly data, 2006-2016 on weekly data. China basis 5,500 kilocalories per kg NAR CFR. Japan basis = 6,000 kilocalories per kg NAR CIF.

‡Source: Platts. Prices are for Central Appalachian 12,500 BTU, 1.2 SO₂ coal, FOB. Prices for 1996-2000 are by coal price publication data, 2001-2016 by coal price assessment data.

Note: cif = cost+insurance+freight (average prices); cfr = cost and freight; fob = free on board.