

24 Coal & Lignite

Coal plays a pivotal role in sustainable development. It is the most widely used energy source for electricity generation and an essential input to most steel production. As estimated by the 'World Coal Association' coal currently fuels 41% of the world electricity and this proportion is set to remain static over the next 30 years. About 70% of the world's steel production is based on coal. As per Integrated Energy Policy Committee of Planning Commission, coal will remain India's most important energy source till 2031-32 and possibly beyond. In India, about 77% coal output is consumed in power sector. In addition, other industries like cement, fertilizer, chemical, paper and thousands of medium and small-scale industries are dependent on coal for their process and energy requirements. The production of coal at 492.76 million tonnes in 2008-09 increased by 8.0% to 532.06 million tonnes in 2009-10. The production of lignite at 34.07 million tonnes in 2009-10 increased by 5.1% from 32.42 million tonnes in the previous year. India ranks 3rd in world coal production.

RESOURCES

Coal

The Indian coal deposits are primarily concentrated in the Gondwana sediments occurring mainly in the eastern and central parts of Peninsular India. The Tertiary coal-bearing sediments are found in Assam, Arunachal Pradesh, Nagaland and Meghalaya. As a

result of exploration carried out by GSI, CMPDI and other agencies, 276.81 billion tonnes (including that estimated in Sikkim) coal resources to 1,200 m depth have been established in the country as on 1.4.2010. Out of these resources, 109.80 billion tonnes were proved reserves, 130.65 billion tonnes were indicated reserves and the remaining 36.36 billion tonnes were in inferred category. Of the total resources, prime-coking coal was 5.31 billion tonnes, medium-coking & semi-coking were 28.10 billion tonnes and non-coking coal including high sulphur was 243.40 billion tonnes. Statewise/coalfield-wise and statewise/typewise reserves of coal as on 1.4.2010 are given in Tables-1 & 2, respectively.

Lignite

Indian lignite deposits occur in the Tertiary sediments in the southern and western parts of peninsular shield particularly in Tamil Nadu, Puducherry, Gujarat, Rajasthan, Kerala and Jammu & Kashmir. The total known geological reserves of lignite as on 1.4.2010 were about 39.90 billion tonnes. About 80% reserves are located in Tamil Nadu with about 31.98 billion tonnes. Other states where lignite deposits have been located are Rajasthan, Gujarat, Jammu & Kashmir, Kerala, West Bengal and the Union Territory of Puducherry. Statewise/districtwise reserves are given in Table - 3.

**Table – 1 : Reserves of Coal as on 1.4.2010
(By States/Coalfields)**

State/Coalfield	Proved	Indicated	Inferred	Total
All India : Total	109798.17	130653.70	36358.54	276810.41
Gondwana Coalfields*	109320.49	130564.02	35559.05	275443.56
Andhra Pradesh/ Godavari Valley	9256.51	9730.37	3029.36	22016.24
Assam/Singrimari	–	2.79	–	2.79
Bihar/Rajmahal	–	–	160.00	160.00
Chhattisgarh	12441.01	30230.12	4010.88	46682.01
Sohagpur	94.30	10.08	–	104.38
Sonhat	199.49	2463.86	1.89	2665.24
Jhilimili	228.20	38.90	–	267.10
Chirimiri	320.33	10.83	31.00	362.16
Bisrampur	849.15	765.55	–	1614.70
East Bisrampur	–	41.75	–	41.75
Lakhanpur	365.56	85.84	–	451.40
Panchbahini	–	11.00	–	11.00

(Contd.)

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Table - 1 (Contd.)

State/Coalfield	Proved	Indicated	Inferred	Total
Hasdeo-Arand	1369.84	3239.36	384.50	4993.70
Sendurgarh	152.89	126.32	–	279.21
Korba	4980.58	5885.67	838.58	11704.83
Mand-Raigarh	3880.67	15744.25	2552.72	22177.64
Tatapani-Ramkola	–	1806.71	202.19	2008.90
Jharkhand	39633.05	30992.38	6338.26	76963.69
Raniganj	1538.19	466.56	31.55	2036.30
Jharia	15077.57	4352.49	–	19430.06
East Bokaro	3351.87	3868.10	863.32	8083.29
West Bokaro	3629.03	1349.04	34.42	5012.49
Ramgarh	446.27	545.15	58.05	1049.47
North Karanpura	9499.42	5708.86	1864.96	17073.24
South Karanpura	2620.41	2020.82	1508.88	6150.11
Aurangabad	213.88	2279.82	503.41	2997.11
Hutar	190.79	26.55	32.48	249.82
Daltongunj	83.86	60.10	–	143.96
Deogarh	326.24	73.60	–	399.84
Rajmahal	2655.52	10241.29	1441.19	14338.00
Madhya Pradesh	8504.85	11266.70	2216.07	21987.62
Johilla	185.08	104.09	32.83	322.00
Umaria	177.70	3.59	–	181.29
Pench-Kanhan	1405.24	714.91	316.78	2436.93
Pathakhera	290.80	88.13	68.00	446.93
Gurgunda	–	47.39	–	47.39
Mohpani	7.83	–	–	7.83
Sohagpur	1643.20	4295.18	190.36	6128.74
Singrauli	4795.00	6013.41	1608.10	12416.51
Maharashtra	5359.82	2983.76	1964.51	10308.09
Wardha Valley	3297.19	1307.98	1439.07	6044.24
Kamthi	1276.14	1191.83	505.44	2973.41
Umrer	308.41	–	–	308.41
Nand Bander	468.08	483.95	–	952.03
Bokhara	10.00	–	20.00	30.00
Odisha	21506.66	32074.29	12726.30	66307.25
Ib-River	7266.58	9001.40	6180.51	22448.49
Talcher	14240.08	23072.89	6545.79	43858.76
Sikkim/Rangit Valley	–	58.25	42.98	101.23
Uttar Pradesh/Singrauli	866.05	195.75	–	1061.80
West Bengal	11752.54	13029.61	5070.69	29852.84
Raniganj	11638.27	7648.63	4443.91	23730.81
Barjora	114.27	–	–	114.27
Birbhum	–	5380.98	611.78	5992.76
Darjeeling	–	–	15.00	15.00
Tertiary Coalfields	477.68	89.68	799.49	1366.85
Assam	348.65	33.06	3.02	384.73
Makum	315.96	11.04	–	327.00
Dilli-Jeypore	32.00	22.02	–	54.02
Mikir Hills	0.69	–	3.02	3.71
Arunachal Pradesh	31.23	40.11	18.89	90.23
Namchik	31.23	40.11	12.89	84.23
Miao Bum	–	–	6.00	6.00

(Contd.)

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Table - 1 (Concl.)

State/Coalfield	Proved	Indicated	Inferred	Total
Meghalaya	89.04	16.51	470.93	576.48
West Darangiri	65.40	-	59.60	125.00
East Darangiri	-	-	34.19	34.19
Balphakram-Pendenguru	-	-	107.03	107.03
Siju	-	-	125.00	125.00
Langrin	10.46	16.51	106.19	133.16
Mawlong Shelia	2.17	-	3.83	6.00
Khasi Hills	-	-	10.10	10.10
Bapung	11.01	-	22.65	33.66
Jayanti Hills	-	-	2.34	2.34
Nagaland	8.76	-	306.65	315.41
Borjan	5.50	-	4.50	10.00
Jhanzi-Disai	2.00	-	0.08	2.08
Tiensang	1.26	-	2.00	3.26
Tiru Valley	-	-	6.60	6.60
DGM	-	-	293.47	293.47

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.
* - Including Sikkim.

Table - 2 : Reserves of Coal as on 1.4.2010
(By States/Types)

(In million tonnes)

State/Type of coal	Proved	Indicated	Inferred	Total
All India : Total	109798.17	130653.70	36358.54	276810.41
Prime-coking	4614.35	698.71	-	5313.06
Medium-coking	12572.52	11939.85	1880.23	26392.60
Semi-coking	482.16	1003.29	221.68	1707.13
Non-coking	91651.46	116922.17	33457.14	242030.77
High sulphur	477.68	89.68	799.49	1366.85
Andhra Pradesh/Non-coking	9256.51	9730.37	3029.36	22016.24
Arunachal Pradesh/High sulphur	31.23	40.11	18.89	90.23
Assam	348.65	35.85	3.02	387.52
Non-coking	-	2.79	-	2.79
High sulphur	348.65	33.06	3.02	384.73
Bihar/Non-coking	-	-	160.00	160.00
Chhattisgarh	12441.01	30230.12	4010.88	46682.01
Semi-coking	70.77	99.25	-	170.02
Non-coking	12370.24	30130.87	4010.88	46511.99
Jharkhand	39633.05	30992.38	6338.26	76963.69
Prime-coking	4614.35	698.71	-	5313.06
Medium-coking	12008.03	10361.24	1607.40	23976.67
Semi-coking	223.34	471.55	53.45	748.34
Non-coking	22787.33	19460.88	4677.41	46925.62
Madhya Pradesh	8504.85	11266.70	2216.07	21987.62
Medium-coking	354.49	1560.11	272.83	2187.43
Non-coking	8150.36	9706.59	1943.24	19800.19
Maharashtra/Non-coking	5359.82	2983.76	1964.51	10308.09
Meghalaya/High sulphur	89.04	16.51	470.93	576.48
Nagaland/High sulphur	8.76	-	306.65	315.41
Odisha/Non-coking	21506.66	32074.29	12726.30	66307.25
Sikkim/Non-coking	-	58.25	42.98	101.23
Uttar Pradesh/Non-coking	866.05	195.75	-	1061.80
West Bengal	11752.54	13029.61	5070.69	29852.84
Medium-coking	210.00	18.50	-	228.50
Semi-coking	188.05	432.49	168.23	788.77
Non-coking	11354.49	12578.62	4902.46	28835.57

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

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**Table – 3 : Reserves of Lignite as on 1.4.2010
(By States/Districts)**

(In million tonnes)

State/District	Area/Lignite field	Proved	Indicated	Inferred	Total
All India : Total		6145.84	25343.94	8407.71	39897.49
Gujarat		1243.65	259.40	1159.70	2662.75
Kachchh	Panandhro & Panandhro Extn., Akrimota, Umarsar, Lakhpat-Dhedadi, Jhularai-Waghpadar, Mata-No-Madh, Hamla-Ratadia, Kaiyari Block-A & B, Barkhan-Dam, Pranpur.	300.61	32.10	33.09	365.80
Bhavnagar	Kharsalia, Surka, Hoidad, Bhuteshwar, Rampur, etc.	–	–	299.17	299.17
Surat	Tadkeswar, Dungra, East of Kamraj-Vesma, Nani Naroli, Tadkeswar block, Mongrol, Mandvi Vastan, Ghala, etc.	218.28	108.71	336.21	663.20
Bharuch	Bhaga, Luna, Pansoli, Nani Pardi, Bhimpur, Bhuri, Valia, etc. Rajpardi (CGM) by MECL and Rajpardi (GMDC leasehold).	724.76	118.59	491.23	1334.58
Jammu & Kashmir		–	20.25	7.30	27.55
Kupwara	Nichahom, Nichahom-Budhasung	–	20.25	7.30	27.55
Kerala		–	–	9.65	9.65
Kannur	Madayi, Kadamkottumala, Kayyur and Nileswaram	–	–	9.65	9.65
Rajasthan		1166.96	2136.47	1500.50	4803.93
Barmer	Kapurdi, Jalipa, Bothia (Jalipa N Ext.), Giral, Jogeswartala, Sonari, Sachcha-Sauda, Bharka, Bothia-Bhakra-Dunga, Sindhari East & West, Kurla, Chokla North, Mahabar-Shivkar, Mithra, Hodu, Nimbalkot, Nimbalkot North, Nagurda, Nagurda East, Munabao, Kawas Gravity Block and South of Nimbla.	495.23	1861.56	1073.72	3430.51
Jaisalmer & Barmer	Kuuri	–	–	13.80	13.80
Bikaner	Palana, Barsingsar, Gurha East & West, Bholasar, Bithnok Main & East Extn., Gadiyala, Girirajsar, Raneri, Mandal Chaman, Hadla, Badhnu, Hira-ki-Dhani, Chak-Vijaisinghpura, Kuchore (Napasar), Riri, Latamdesar Bada, East of Riri, Bania, Kuchaur-Athuni, Sarupdesar-Palana west, Palana East, Gigasar-Kesardesar, Ambasar-Gigasar, Girirajsar Extn., Bapeau, Bigga-Abhaysingpura, Diyatra, Pyau, Deshnok-Ramsar-Sinthal, Borana.	558.73	214.84	276.55	1050.12
Nagaur	Kasnau-Igiar, Matasukh, Mokala, Nimbri-Chadawatan, Kaprion-ka-Dhani, Merta Road & Meeranagar, Indawar, Kuchera and Lunsara.	113.00	60.07	60.35	233.42
Jalore	Sewara	–	–	76.08	76.08

(Contd.)

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Table - 3 (Concl'd.)

State/District	Area/Lignite field	Proved	Indicated	Inferred	Total
Tamil Nadu		3735.23	22521.92	5718.70	31975.85
Cuddalore	NLC Leasehold areas, South of Vellar (Srimushnam), Veeranam (Lalpettai), Eastern part of NLC leasehold area, Kullanchavadi, Kudikadu, Bhuvanagiri-Kullanchavadi, Eastern part of Neyveli, Bahur*, West of Bahur*.	2831.00	2530.74	1199.78	6561.52
Ariyalur	Meensurutih Jayamkondamcholapuram, Michaelpatti	904.23	302.50	481.07	1687.80
Thanjavur & Thiruvarur	Mannargudi-Central, Mannargudi-NE Mannargudi-NE Extn., Mannargudi SE, Melnattam-Araharam.	–	17248.06	3123.46	20371.52
Thanjavur	Mannargudi-NW & SW, Maharajapuram Orattanadu-Pattukottai, Vadaseri (Orattanadu-Pattukottai), Madukkur-Anaikkadu Veppanagulam-Kasangadu	–	2290.71	72.66	2363.37
Thanjavur & Nagappattinam	Alangudi, Pandanallur, Tirumangaichcheri, Nachiyarkudi	–	125.99	812.94	938.93
Ramanathapuram	Misal of Ramanathapuram Lignite field	–	23.92	28.79	52.71
Puducherry	Bahur & West of Bahur of Neyveli Lignite Field	–	405.61	11.00	416.61
West Bengal	Rakshitpur	–	0.29	0.86	1.15

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

** Both blocks cover parts of Tamil Nadu and Puducherry.*

EXPLORATION & DEVELOPMENT

The agencies engaged in exploration for coal during 2009-10 were mainly GSI, CMPDI, MECL and State Directorates of Geology & Mining. For lignite, exploration was carried out by GSI, MECL, DMG, Rajasthan and GMDC Ltd.

GSI carried out exploration for coal in Gondwana basins of Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha and West Bengal to identify additional resources of power-grade coal and superior-grade coking coal. As a result of exploration carried out, additional resources of 3,420.98 million tonnes coal were assessed in 2009-10 (up to June, 2010). GSI extensively continued its exploration for lignite in Rajasthan and Tamil Nadu, keeping in view the high demand for accelerated growth of power and industrial sectors. As a result of

exploration carried out, additional resources of 0.51 million tonnes lignite were assessed in 2009-10 (up to June, 2010). Details of additional resource estimation and exploration activities for coal & lignite by GSI are given in Tables - 4(A) and 4(B), respectively.

MECL carried out 33,102.55 m exploratory drilling for coal on behalf of Ministry of Coal during the year 2009-10 in Andhra Pradesh, Maharashtra and Chhattisgarh and undertook about 125,101.25 m contractual drilling for coal on behalf of National Thermal Power Corporation (NTPC), Chhattisgarh Mineral Development Corporation (CMDC), CMPDI, West Bengal Mineral Development & Trading Corporation (WBMDTC), APMDC-OMC and NMDC and established 1,691.14 million tonnes coal resources in 2009-10.

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MECL conducted exploration for lignite in Neyveli Lignite Field in Tamil Nadu and Barmer, Bikaner and Jaisalmer Lignite Fields in Rajasthan on promotional basis on behalf of Ministry of Coal and completed 55,127.05 m drilling in 2009-10. Similarly, contractual drilling for lignite to the tune of 2,716.00 m on behalf of NLC was carried out in 2009-10. About 2,273.26 million tonnes lignite resources were established by MECL during 2009-10. Particulars of exploratory drilling carried out for coal & lignite and additional resources estimated by MECL are summarised in Tables - 5(A) and 5(B), respectively.

DGM, Maharashtra estimated 250.83 million tonnes coal resources in 2009-10 in Chandrapur, Wardha, Nagpur and Yavatmal districts. DGM, Chhattisgarh estimated 20 million tonnes coal resources of probable category during 2009-10 in Raigarh, Surguja and Korba districts. DMG, Rajasthan carried out exploration for lignite during 2009-10 in Bikaner district. GMDC conducted exploration and estimated 123 million tonnes lignite geological resources in 2009-10. WBMDTC also carried out exploration for lignite in Bardhaman district in West Bengal. Details on exploration carried out by the various state DGMs and state undertakings are given in Table-6.

CMPDI in its exploration programme for 2009-10 laid emphasis on proving power-grade and superior-grade non-coking coal in CIL and non-CIL blocks. A total of 4,70,261 m of exploratory drilling was achieved by CMPDI and its contractual agencies during 2009-10 which includes 2,65,133 m drilling (that comprised 1,992 m in promotional blocks, 1,83,637 m in CIL blocks and 79,504 m in non-CIL/captive mining blocks) conducted by itself and 2,05,128 m conducted through outsourcing to concerned Departments of State Governments & MECL(MoU), as well as through tender notifications (for CIL and non-CIL blocks). During 2009-10, CMPDI and its contractual agencies conducted exploration in 104 blocks/mines spread over 25 coalfields namely, Raniganj (9 blocks/mines), Rajmahal (1), Jharia (4), West Bokaro (1), Ramgarh (2), North Karanpura (1), Auranga (1), Tawa valley/Patharkheda (3), PENCH Kanhan (6), Kamptee (3), Nand-Bander (2), Wardha (10),

Singrauli (8), Sohagpur (15), Sendurgarh (1), Johilla (1), Mand Raigarh (8), Korba (6), Hasdo-Arand (1), Bistrampur (5), Lakhanpur (1), Sonhat (1), Talcher (8), Ib valley (3) and Makum (3). Out of 104 blocks/mines, 16 were Non-CIL/Captive blocks, 1 promotional block and 87 CIL blocks/mines. CMPDI took up drilling activity in 76 blocks/mines while Contractual agencies awarded the job by way of tendering/MoU undertook drilling operations in 19 blocks and State Government Departments involved in production drilling undertook operations at 9 mines/areas.

SCCL in its detailed exploration undertaken during 2009-10, established proved reserves of coal that were estimated at 74.57 million tonnes as against 229 million tonnes reported in the previous year. Thus, the total proved reserves rose to 9,459 million tonnes as on 31.3.2010 in Godavari Valley coalfield, Andhra Pradesh.

Table – 4 (A) : Additional Resources Estimated by GSI for Coal and Lignite, 2009-10 (up to June 2010)

(In million tonnes)	
State/Coalfield/Block	Additional resources
COAL	
Jharkhand	1784.06
A. Brahmani Coalfield	
(i) Pokharia-Paharpur	584.25
(ii) Gosaipahari-Siulibana	1199.81
Chhattisgarh	1636.92
A. Mand-Raigarh Coalfield	
(i) Sithra-Kurekela	707.24
(ii) Kesarchuan-Lamdand	300.98
B. Tatapani-Ramkula Coalfield	
(i) Odari	229.45
(ii) Bartikhurd	44.46
(iii) Garhauri	161.74
C. Hasdo Arand Coalfield	
(i) Chakeri	28.23
D. East of Bistrampur Coalfield	
(i) Ulia-Gamardih	164.82
Total	3420.98
LIGNITE	
Rajasthan	
Bikaner	
Borana	0.51
Total	0.51

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Table – 4 (B) : Details of Exploration Activities conducted by GSI for Coal & Lignite, 2009-10

State/Coalfield/ Lignite Field	Area/Block	Exploration details
COAL		
Andhra Pradesh		
Godavari Valley Coalfield	Narayanapuram-Pattayagudem	Two prominent coal carbonaceous shale zones (zone-B & C) of Lower Kamthi Formation with individual coal section varying in thickness from 0.40 m to 1.65 m were intersected between 203.35 m and 524.50 m depths.
Chhattisgarh		
Mand-Raigarh Coalfield	Nawagaon block	Twelve regional Barakar coal seams (I to X, XII and XIII) varying in thickness from 0.53 m to 11.09 m were intersected between 24.43 m and 585.60 m depths. The coal seam IV of varying thickness from 4.30 m to 11.09 m was intersected between 24.43 m and 425.04 m depths.
	Chainpur block	Out of ten regional Barakar seams in this area, two coal seams viz. seam I and II were intersected between 466.65 m and 724.87 m depths. Cumulative thickness of seam I ranged from 6.70 m to 8.28 m while that of seam II was 3.27 m thick. Investigation completed.
	Saraipali block	Ten regional Barakar coal seams (III to XII) varying in cumulative thickness from 0.50 m to 5.62 m were intersected between 187.70 m to 509.97 m depths.
Hasdo-Arand Coalfield	Parogia (West) block	Four regional Barakar coal seams (II, IV, V & VI) varying in thickness from 0.81 m to 9.07 m were intersected between 161.30 m and 272.48 m depths. Seam IV (Dhajag) at 9.07 m was the thickest of all. The coal seam V (Morga) with maximum cumulative thickness of 8.35 m occurred at a shallow depth between 178.80 m and 195.60 m.
Tatapani-Ramkola Coalfield	Reonti (West) block	Five regional Barakar coal seams (II to VII) varying in cumulative thickness from 2.30 m to 13.52 m were intersected between 689.71 m and 821.93 m depths.
Madhya Pradesh		
Singrauli Coalfield	Hatta-Dudhmania area	Five Raniganj coal seams (III to VII) varying in thickness from 1.05 m to 1.80 m were intersected between 243.30 m and 497.05 m depths. Five Barakar coal seams varying in maximum thickness from 0.50 m to 5.60 m were intersected between 522.10 m and 627.20 m depths.
Pench Valley Coalfield	Bagbardiya Sector	A maximum thickness of 217.70 m of Motur Formation was drilled.
	Payalidhana Sector	Nine coal horizons of Barakar Formation ranging in thickness from 0.65 m to 3.95 m were intersected between 313.15 m and 356.95 m depths.
Sohagpur Coalfield	Merkhi block	Four regional Barakar coal seams (I to IV) varying in thickness ranging from 0.35 m to 4.68 m were intersected at various depths up to 418.72 m. Three local coal seams varying in thickness from 0.25 m to 1.52 m were intersected between 327.64 m and 482.40 m depths.
	Devanitola block	Four regional Barakar coal seams (I to IV) varying in thickness from 0.77 m to 6.50 m were intersected between 129.45 m and 260.02 m depths. The thickest seam III, occurring as composite seam varied in thickness from 4.92 m to 6.50 m.
	Amiliha block	Four regional Barakar coal seams (I to IV) varying in individual seam thickness from 0.20 m to 2.70 m were intersected between 159.44 m and 327.35 m depths. The thickest seam III varying in thickness from 2.25 m to 2.70 m was intersected between 229.60 m and 285.80 m depths.
	Pachri block	Four regional Barakar coal seams varying in individual seam thickness from 0.75 m to 12.30 m (seam III) were intersected between 113.95 m and 301.50 m depths.
Johilla Coalfield	Naurazabad (North) area	The contact between Parsora Formation and Pali Formation was intersected at 261.15 m depth.

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Table - 4 (B) (Concl'd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration details
Maharashtra		
Wardha Valley Coalfield	Dewala-Mangli block Yavatmal	First borehole was closed and the second borehole through Motur Formation is under progress.
Odisha		
Talcher Coalfield	Simlisahi-Kujabiharipur	Ten regional coal seam zones of Barakar Formation (II to XI) with cumulative thickness ranging from 2.46 m to 42.93 m were intersected between 296.44 m and 641.80 m depths. Coal zone III is the thickest seam zone having a maximum of 6 split sections with cumulative coal thickness varying from 24.87 m to 42.93 m.
	Harichandanpur block	Ten regional coal seam zones of Barakar Formation (II to XI) varying in cumulative thickness from 1.90 m to 71.78 m (seam zone III) were intersected between 104.36 m and 502.40 m depths. Coal seam zone III is thickest with a maximum of 7 split sections.
	Kudanali North-East	Four regional Barakar coal seam zones (III and VI to VIII, block combined) were intersected from 277.20 m to 417.71m depths. Coal seam zone III (27.19 m) is the thickest with a maximum of 7 split sections.
Ib River Coalfield	Piplimal-Khairkuni block	Five regional Barakar coal seam zones namely, Belpahar, Parkhani, Lajkura, Rampur and Ib with cumulative coal thickness varying from 1.39 m to 41.67 m were intersected between 14.34 m and 513.88 m depths. Lajkura is the thickest coal seam zone with 9 split sections.
West Bengal		
Raniganj Coalfield	Bhabaniganj east area	A maximum of 97.50 m of Barakar Formation was intersected with a coal seam of 5 m thickness at 169.25 m depth.
	Binodpur-Bhabaniganj block	Salanpur "A" Group of Barakar seams with maximum cumulative thickness of 11.00 m (including single thick seam of 9.95 m) were intersected between 69.75 m and 463.00 m depths.
Birbhum Coalfield	Mahallah area	Investigation was closed on 23.01.2010.
	Makhdumnagar area	The last borehole intersected about 597 m thick coal-bearing Barakar Formation below younger cover of Tertiaries, Rajmahal Formation, Infratrappeans and Dubrajpur Formation. 21 coal sections ranging in thickness from 0.50 m to 6.30 m were intersected between 548.55 m and 836.75 m depths. Investigation was closed on 21.05.2010.
	Gazipur area	Four coal sections ranging in thickness from 0.50m to 1.50 m were intersected between 639.90 m and 717.10 m depths.
	Dhobbanpur area	The first borehole so far intersected 168 m of Rajmahal Formation below younger cover of Tertiary sediments.
LIGNITE		
Tamil Nadu		
Ramnad-sub-basin in Ramanathapuram district	Bogalur block	One 4.00 m thick lignite seam was intersected at 315.60 m depth.
	Bogalur east block	Development of the regional lignite seams (maximum thickness 15.20 m) was recorded between 332.00 m and 386.00 m depths.
Rajasthan		
Palana basin in Bikaner district	Hadda North & West area	Lignite horizons varying in thickness from 0.70 m to 3.00 m were intersected between 83.00 m and 128.00 m depths.

COAL & LIGNITE

Table – 5 (A) : Exploration of Coal & Lignite by MECL, 2009-10

State/Coalfield	Block	Drilling (m)
COAL		
(A) Promotional on behalf of Ministry of Coal		Total 33102.55
Andhra Pradesh		Total 12303.10
Godavari Valley Coalfield	Somavaram	362.50
	Tadikalaipudi	221.70
	Dip side of Venkatapuram	11718.90
Chhattisgarh		Total 13312.90
Mand Raigarh Coalfield	Gare Pelma/Bhalumura	8016.60
	Dolesara	5296.30
Maharashtra		Total 7486.55
Katol-Kamthi Coalfield	Khapri	992.50
	Gumgaon	3531.85
	Sukuli	2962.20
(B) Contractual		Total 125101.25
Chhattisgarh		Total 91416.55
Mand Raigarh Coalfield		
(i) On behalf of CMPDI	Sayang(C)	20517.30
(ii) On behalf of CMDC	Gare Pelma	27705.80
(iii) On behalf of CMPDI	Boro-Sayang (E)	20517.30
(iv) On behalf of NTPC	Chandrasekharpara	577.60
Bisrampur Coalfield		
(i) On behalf of CMPDI	Ghugra	4720.55
Singrauli Coalfield		
(i) On behalf of CMPDI	Dongrital	13301.00
(ii) On behalf of CMPDI	Patpaharia	4077.00
Odisha		Total 20391.60
Jharia Coalfield		
(i) On behalf of CMPDI	Kapuriya	9807.90
(ii) On behalf of CMPDI	Singra	7895.50
(iii) Production support On behalf of CMPDI		2047.20
(iv) On behalf of NTPC	Pakri-Burwadi	641.00

(Contd.)

Table - 5 (A) (Concl.)

State/Coalfield	Block	Drilling (m)
West Bengal		Total 488.50
Raniganj Coalfield		
(i) On behalf of WBMTDC	Sitrampur	425.70
(ii) On behalf of WBMTDC	Raniganj	62.80
Orissa		Total 12737.60
Talcher Coalfield		
On behalf of APMDC-OMC	Nuagaon-Telishahi	12737.60
Madhya Pradesh		Total 67.00
Sohagpur coalfield		
On behalf of NMDC	Sohagpur (E) & (W)	67.00
LIGNITE		
(A) Promotional on behalf of Ministry of Coal		Total 55127.05
Rajasthan		Total 40066.05
Barmer Lignite field	Bayatu	966.10
	Kurla East	14992.30
Bikaner Lignite field	Diyatra	6823.00
	Pyau	944.20
	Deshnok-Ramsar-Sinthal	648.50
	Kolasar Gravity block	1196.90
	Bangarsar-Jaimalsar	11308.05
Jaisalmer Lignite field	Jaisalmer	3187.00
Tamil Nadu		Total 15061.00
Neyveli Lignite field	Sattanur	4106.00
	Ramnad	
	(Rajsingmangalam)	10955.00
(B) Contractual Gujarat		Total 2716.00
Surat Lignite field		
On behalf of NLC	Valia	2716.00

COAL & LIGNITE

Table – 5(B) : Additional Resources Estimated by MECL for Coal & Lignite, 2009-10

State/Coalfields/District/Block	Additional Resources	
COAL	Total	1691.138
Andhra Pradesh	Total	851.821
Godavari Coalfield		
Jagareddygudem, Dist. West Godavari		81.648
Tadikalapuddi block, Dist. Khammam		24.228
Somvaram block, Dist. Khammam		745.945
Chhattisgarh	Total	377.435
Mand Raigarh Coalfield		
Garepelma Sec-I, Dist. Raigarh		377.435
Madhya Pradesh	Total	461.882
Sohagpur Coalfield		
Shahpur east block, Dist. Shahdol-Umaria		56.606
Shahpur west block, Dist. Shahdol		38.376
Arjuni block, Dist. Umaria		164.720
Pathora block, Dist. Umaria		202.180

(Contd.)

Table - 5(B) (Concltd.)

State/Coalfields/District/Block	Additional Resources	
LIGNITE	Total	2273.261
Gujarat	Total	458.390
Valiablock, Dist. Bharuch		458.390
Rajasthan	Total	240.824
Bikaner		
Deshnok-Ramsar-Sinthol		53.771
Pyau block		62.180
Diyatra block		124.873
Tamil Nadu	Total	1574.047
Nagapattinam & Thiruvarur		
Nachiarkudi		1574.047

Table – 6 : Details of Exploration for Coal and Lignite by State Directorates of Geology & Mining and State Undertakings, 2009-10

Agency/State/ District	Location	Geological mapping		Drilling		Remarks Reserves/resources estimated (in million tonnes)
		Area (sq km)	Scale	Boreholes	Meterage	
COAL						
DGM						
Chhattisgarh						
Raigarh	Dhaurabhata Gare sector 1A	100	1:50,000	05	1722.50	About 20 million tonnes of resources were estimated.
Korba	Saila block	-	1:50,000	06	815.61	Since commencement of work, a total of 51.50 million tonnes of resources was estimated.
Surguja	Sondhdia block	505.0	1:50,000	06	880.30	A total of 11 coal seams has been intersected. Out of which, 6 coal seams have attained workable thickness. Coal seams (III& IV) are most persistent.
Maharashtra						
Chandrapur	Takli	Nil	1:25,000	-	1989.80	About 36.16 million tonnes resources were estimated so far.
-do-	Wislon block	Nil	1:5000	-	896.55	About 4.92 million tonnes resources were estimated (total 21.30 million tonnes so far).

(Contd.)

COAL & LIGNITE

Table - 6 (Contd.)

Agency/State/ District	Location	Geological mapping		Drilling		Remarks Reserves estimated (in million tonnes)
		Area (sq km)	Scale	Boreholes	Meterage	
Chandrapur	Nandori	Nil	1:25,000	–	1450.50	About 155.96 million tonnes of resources were estimated (total 180 million tonnes insitu reserves) so far.
Chandrapur	Panewadala block	Nil	1:25,000	–	718.50	About 13.63 million tonnes of resources were estimated (total 39.0 million tonnes so far).
Wardha	Shekapur	–	1:25,000	–	1072.00	About 8.16 million tonnes of resources were estimated so far.
Nagpur	Makardhokda block-V (Davha-Phukeshwar)	1.00	1:25,000	–	823.50	About 0.94 million tonnes of resources were estimated (total 7.74 million tonnes so far).
-do-	Nand-Panjrepar	0.60	1:25,000	–	2411.20	About 1.24 million tonnes of resources were estimated. (total 19.62 million tonnes so far).
Yavatmal	Adkoli-Paunar,	Nil	1:25,000	–	716.35	About 21.76 million tonnes of resources were estimated. (exploration completed)
-do-	Dara-Parsoda	1.10	1:25,000	–	830.75	About 8.06 million tonnes of resources was estimated so far.
West Bengal Mineral Dev. & Trading Corpn. Ltd. (WBMDTCL)						
Bardhaman	Kulti coal block of Raniganj	0.75	1:2,000	01	62.80	Exploration is under progress.
-do-	Sitarampur coal block	6.00	1:2,000	02	425.70	-do-
-do-	Ichhapur coal block	8.00	1:2,000	–	–	-do-
LIGNITE						
DMG, Rajasthan						
Bikaner	N/V Naion -ki-Basti	–	1:50,000	–	750.00	Reconnoitory drilling was undertaken. Reserves are not to be assessed.
-do-	Surpura	–	1:50,000	06	810.00	Lignite was not encountered in borehole.

(Contd.)

COAL & LIGNITE

Table - 6 (Concl.d.)

Agency/State/ District	Location	Geological mapping		Drilling		Remarks Reserves estimated (in million tonnes)
		Area (sq km)	Scale	Boreholes	Meterage	
GMDC, Gujarat						
Kachchh	N/V Panandhro	-	1:50,000	-	-	About 15 million tonnes of lignite resources were estimated.
-do-	Mata-No-Madh (GMDC lignite project)	-	-	-	-	One million tonnes of lignite resources were estimated.
Bhavnagar	Surka (N)	-	-	32	3933.50	About 107 million tonnes of lignite resources were estimated.
Surat	Tadkeshwar	-	1:50,000	-	-	The thickness of individual lignite seam in boreholes varied from 0.15 m to 9.90 m with an average thickness of 1.84 m. The cumulative thickness of lignite seams varied from 1.15 m to 14.86 m with an average thickness of 5.50 m.
Neyveli Lignite Corpn. Ltd. (NLC) Gujarat						
Bharuch	Valia block (E, F & G)	-	-	28	2716.00	About 458 million tonnes of resources were estimated
Rajasthan						
Barmer	Kurla east	-	-	34	14992.50	Exploration is underway.
-do-	Baytu	-	-	04	966.10	Exploration is underway.
Bikaner	Deshnok-Ramsar- Sinthal area	-	-	06	676.80	About 53.771 million tonnes of inferred reserves were estimated with an average grade of 1442 K Cal/kg.
-do-	Pyau block	-	-	08	915.690	About 62.17 million tonnes of inferred reserves were estimated with an average of 1356 K Cal/kg. (exploration completed)
-do-	Diyatra	-	-	28	5752.00	About 124.873 million tonnes of indicated reserves were estimated.
-do-	Bangarsar- Jaimalsar	-	-	61	12397.10	Exploration is underway.
-do-	Kolasar gravity block	-	-	3	1196.90	-do-
Jaisalmer	Ramgarh	-	-	11	3187.00	-do-

Production, Stocks and Prices

COAL

Production

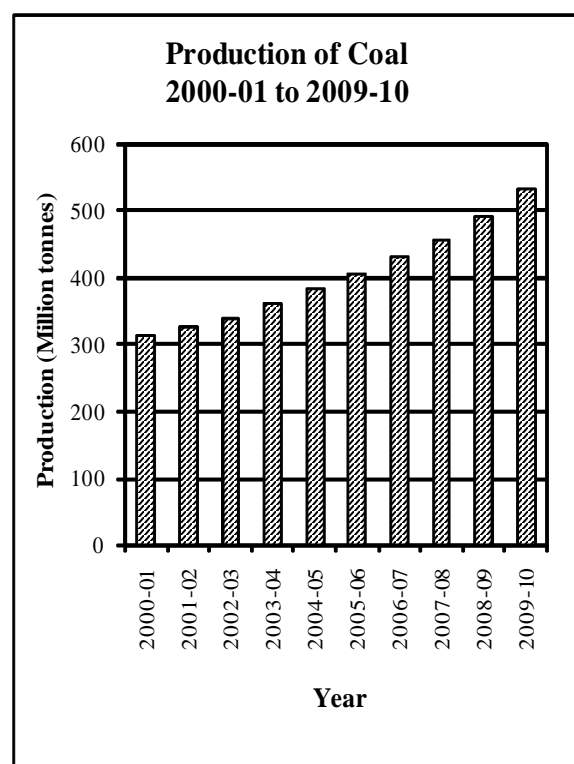
The provisional total production of coal in 2009-10 was around 532.1 million tonnes which was higher by 8% as compared to the previous year. Chhattisgarh continued to be the largest coal producing state with a share of about 20.7% followed closely by Odisha and Jharkhand with contributions of 20% and 19.9% respectively to the national output. Next in order of share in the total production were, Madhya Pradesh (13.9%), Andhra Pradesh (9.5%), Maharashtra (7.7%), West Bengal (4.4%) and Uttar Pradesh 2.6%. The remaining (1.3%) of coal production was accounted for by Arunachal Pradesh, Assam, Jammu & Kashmir and Meghalaya.

During the year 2009-10, coal mining was confined mainly to the public sector which contributed 91% to the national production. In the year 2009-10, out of the total production of coal, 8.3% was coking coal and the rest 91.7% was non-coking coal. As in the earlier years, bulk of the coking coal production i.e. about 83.7% was reported from the public sector. Gradewise analysis in the year 2009-10 of coking coal revealed that washery grade IV had the maximum share at 68.6% followed by washery grade III (22.7%), washery grade II (4.2%) and washery grade I (0.7%). The remaining 3.8% production of coking coal was of steel grade I, steel grade II and semi-coking grade I and SLV1. Out of the total production of coking coal in India, bulk quantity i.e. 98.3% was produced in Jharkhand followed by Madhya Pradesh with 1.2%. The remaining 0.5% was contributed by Chhattisgarh and West Bengal.

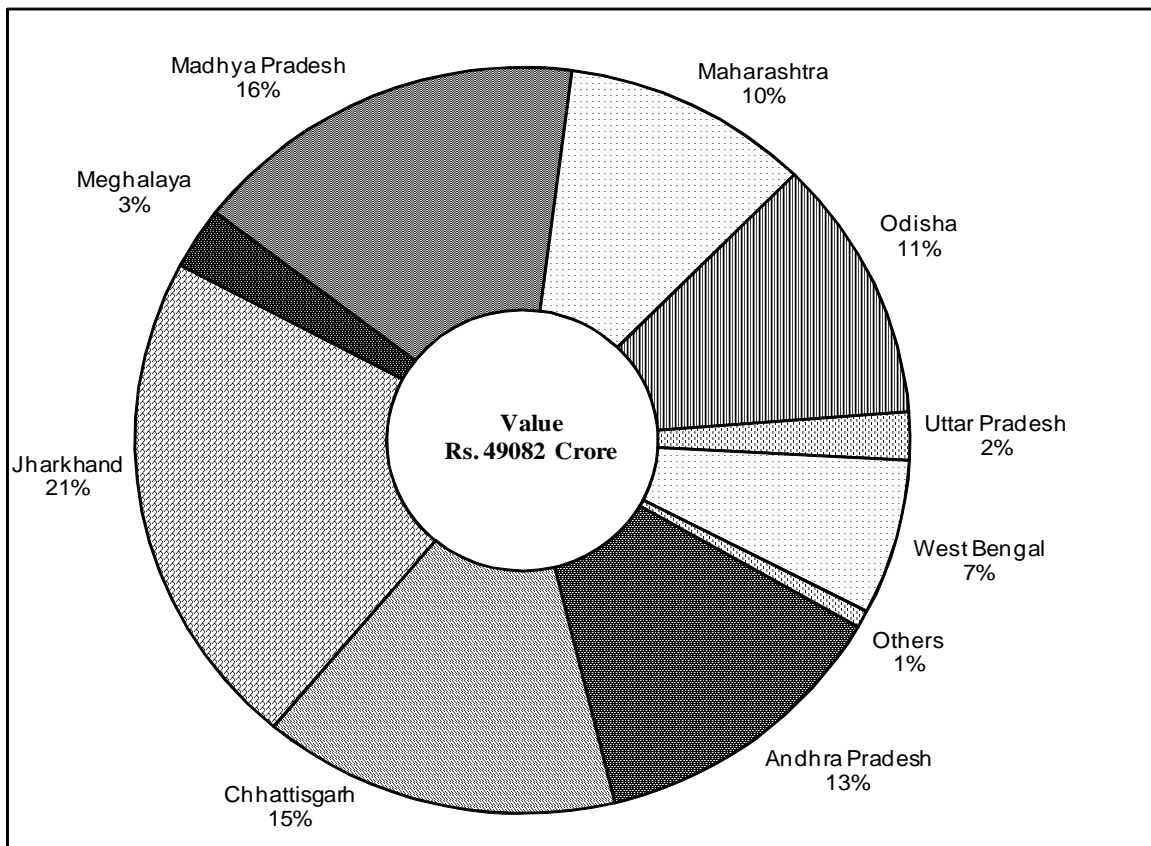
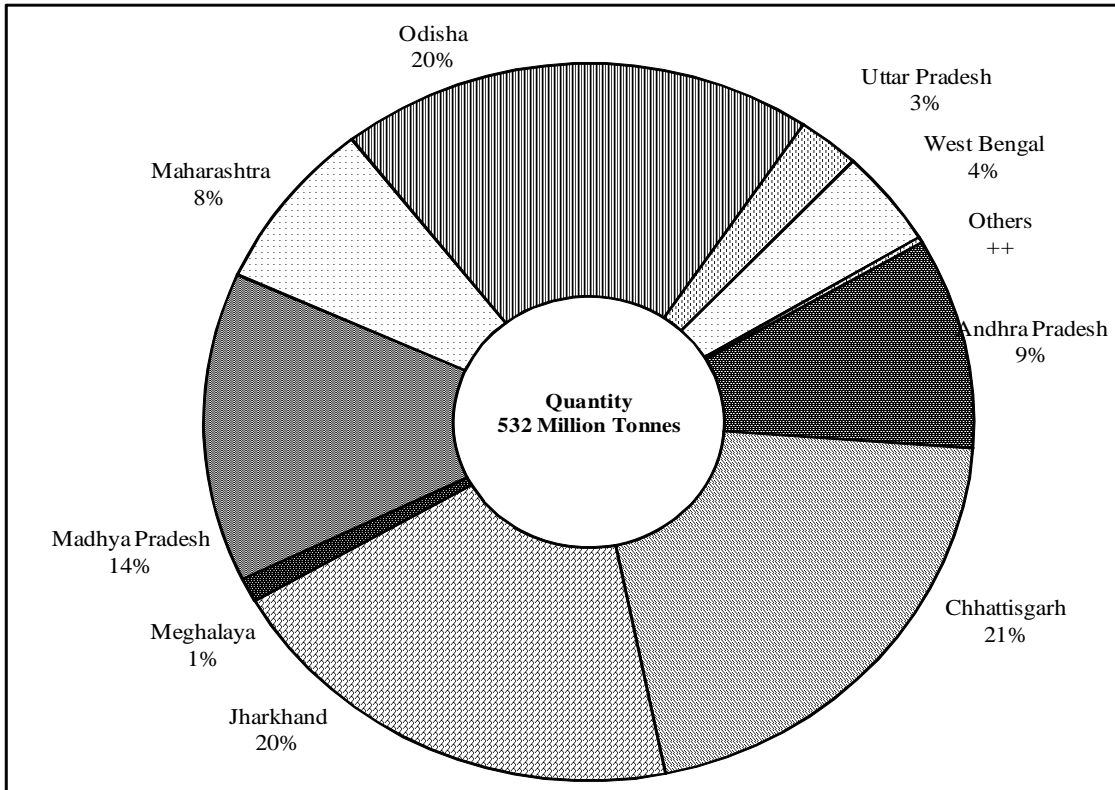
During 2009-10, excepting a nominal quantity of 8.4%, the balance entire production of non-coking coal (91.6%) came from the public sector. Out of the total non-coking coal production, 45% was of F grade, followed by 24.2% of E grade, 11.5% of C grade, 10.4% of D grade and 5.3% of B grade. The remaining 3.6% production was contributed by A grade, G grade and ungraded varieties of non-coking coal. Chhattisgarh was the largest producing state of non-coking coal in 2009-10 which alone accounted for 22.5% of the national output. Next in order were Odisha with a contribution of (21.8%), Madhya Pradesh (15.1%), Jharkhand (12.8%), Andhra Pradesh (10.3%), Maharashtra (8.4%), West Bengal (4.7%)

and Uttar Pradesh (2.9%). The remaining 1.5% production came from the states of Assam, Arunachal Pradesh, Jammu & Kashmir and Meghalaya,

There were 560 coal mines (as on 31.03.2010) in India which reported production in 2009-10. Out of these, 174 mines were located in Jharkhand, West Bengal had 100 mines, Madhya Pradesh (75), Chhattisgarh (60), Maharashtra (55), Andhra Pradesh (49) and Odisha (26). The remaining 21 mines were located in the states of Arunachal Pradesh, Assam, Jammu & Kashmir, Meghalaya and Uttar Pradesh. In 2008-09, there were 12 large mines each producing more than 10 lakh tonnes of coal during the year and these mines accounted for 35.5% of the total production. The bulk of the production i.e. 51.6% was contributed by 133 mines with annual output ranging between 5,00,001 to 10 lakh tonnes. About 12.4% of the total coal production was shared by 293 mines whose individual production per year varied between 50,001 to 5 lakh tonnes. Only 0.5% of the production was contributed by 123 small mines each producing up to 50,000 tonnes per annum (Tables - 7 to 12).



Quantity and Value of Production of Coal in Different States in 2009-10



COAL & LIGNITE

Despatches

Despatches of coal at 513.8 million tonnes in 2009-10 were higher by 5.03% as compared to that in the previous year. Chhattisgarh was the leading state in the despatches in 2009-10 and accounted for 20.8% of the total despatches. The states next in order were Odisha (19.6%), Jharkhand (19.4%), Madhya Pradesh (14.3%), Andhra Pradesh (9.6%), Maharashtra (7.9%), West Bengal (4.3%) and Uttar Pradesh (2.6%). The remaining 1.5% was shared by Assam, Arunachal Pradesh, Jammu & Kashmir and Meghalaya.

Statewise analysis revealed that despatches except from West Bengal, increased in 2009-10 as compared to that of the previous year (Table-13).

From the total despatches of raw coal effected in 2009-10, a sizable share of 73.6% was made to the electricity sector. As much as 3.6% was made to the steel industry, 3.4% to the sponge iron industry, 2.8% to the cement industry, 0.5% each to fertilizers and paper & pulp industry and 0.1% to other basic metal sector. The remaining 15.5% was made for other priority sectors including textile & rayons, chemical and cokerries (Table-14).

Stocks

The mine-head stocks of coal at the end of the year 2009-10 were 64.9 million tonnes which was 37.1% more than that at the beginning of the year. Bulk of the coal stocks (about 98.4%) at the end of the year was accounted for by the mines located in the states of Jharkhand, Odisha, Chhattisgarh, Maharashtra, Madhya Pradesh, West Bengal, and Andhra Pradesh (Table - 15).

Prices

Domestic prices of coal during 2007-08 to 2009-10 are furnished in the General Review on 'Prices'.

LIGNITE

Production and Despatches

During the year 2009-10, the production of lignite at 34.08 million tonnes increased by 5.1%

in comparison to that of the previous year. The production from Tamil Nadu accounted for 66%. The share of Gujarat in lignite production was 31% and that of Rajasthan was 3.5%.

Out of total 13 mines of lignite that were in operation during 2009-10, seven are located in Gujarat and three each in Tamil Nadu and Rajasthan (Tables - 16 and 17).

The quantum of despatches of lignite was 34.4 million tonnes undertaken during the year 2009-10 which was by 8.3% as compared to that higher in the previous year (Table - 18).

Stocks

Stocks of lignite at the end of 2009-10 were 565 thousand tonnes as against 903 thousand tonnes at the beginning of the year (Table- 19).

**Table – 7 : Number of Coal Mines,
2008-09 & 2009-10
(By States)**

State	No. of Mines	
	2008-09 #	2009-10 \$
India	561	560
Andhra Pradesh	50	49
Arunachal Pradesh	1	1
Assam	8	7
Chhattisgarh	61	60
Jammu & Kashmir	7	7
Jharkhand	173	174
Madhya Pradesh	75	75
Maharashtra	55	55
Meghalaya	–	1
Odisha	25	26
Uttar Pradesh	5	5
West Bengal	101	100

Relates to number of mines as on 31.3.2009.

\$ Relates to number of mines as on 31.3.2010.

COAL & LIGNITE

**Table – 8 : Production of Coal, 2007-08 to 2009-10
(By Sectors/States)**

(Quantity in '000 tonnes; value in Rs. '000)

State	2007-08		2008-09		2009-10(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	457082	384645565	492757	455370200	532062	490815205
Public sector	422116	355269449	450115	418973800	484053	446527984
Private sector	34916	29376116	42642	36396400	48009	44287221
Andhra Pradesh	40604	44405347	44546	55682500	50425	63031250
Arunachal Pradesh	79	144176	142	323800	250	570070
Assam	1101	2009337	1009	2707900	1113	2987010
Chhattisgarh	90172	58120363	101922	67873600	109959	73225733
Jammu & Kashmir	17	13804	11	57800	23	120855
Jharkhand	90895	84356924	96272	96741700	105933	106449835
Madhya Pradesh	67841	68703260	71325	78404100	74074	81425942
Maharashtra	36403	40013813	38705	47850300	41005	50693749
Meghalaya	6541	5292390	5489	12514900	5767	13148739
Odisha	89482	42115599	98402	51725700	106409	55934636
Uttar Pradesh	11426	8864062	12029	8747200	13969	10157921
West Bengal	22521	30606490	22905	32740700	23135	33069465

**Table – 9 : Production of Coal, 2007-08 & 2008-09
(By Frequency Groups)**

Production group (Tonnes)	No. of mines #		Production for the group ('000 tonnes)#		Percentage in total production #		Cumulative percentage	
	2007-08\$	2008-09\$	2007-08	2008-09	2007-08	2008-09	2007-08	2008-09
All Groups	560	561	450541	487268	100.00	100.00	–	–
0-10000	57	55	50	63	0.01	0.01	0.01	0.01
10001-25000	15	16	269	310	0.06	0.06	0.07	0.08
25001-50000	46	52	1715	1916	0.38	0.39	0.45	0.47
50001-100000	73	71	5382	5513	1.19	1.13	1.64	1.60
100001-300000	159	156	30003	29676	6.66	6.09	8.30	7.68
300001-500000	66	66	26032	25418	5.78	5.22	14.08	12.90
500001-1000000	136	133	265405	251563	58.91	51.63	72.99	64.53
1000001 & above	8	12	121685	172809	27.01	35.47	100.00	100.00

Excluding Meghalaya.

\$ Relates to mines as on 31.03.2009.

COAL & LIGNITE

**Table – 10 : Production of Coal, 2008-09 & 2009-10
(By Grades and by Sectors)**

(In '000 tonnes)

Grade	2008-09			2009-10		
	Total	Pub. Sec.	Pvt. Sec.	Total	Pub. Sec.	Pvt. Sec.
All Grades	492757	450115	42642	532062	484053	48009
Coking	34809	27547	7262	44256	37043	7213
ST-I	75	75	–	109	109	–
ST-II	960	960	–	1380	1380	–
W-I	318	318	–	297	297	–
W-II	1717	1706	11	1868	1589	279
W-III	8090	6735	1355	10068	8135	1933
W-IV	23472	17576	5896	30367	25366	5001
SC-I	169	169	–	167	167	–
SLV1	8	8	–	–	–	–
Non-coking	457948	422568	35380	487806	447010	40796
A	9170	3681	5489	10692	4925	5767
B	24854	23601	1253	25827	24836	991
C	52067	47315	4752	56147	51902	4245
D	48006	42694	5312	50518	44179	6339
E	113001	111025	1976	117855	113115	4740
F	201278	192941	8337	219274	206311	12963
G	9332	1071	8261	7099	1348	5751
Ungraded	240	240	–	394	394	–

Note: Meghalaya Coal has not been graded by Coal Controller. For statistical purpose, grade may be treated as 'A'/'B' non-coking coal.

**Table – 11 (A) : Production of Coking Coal, 2008-09
(By States and by Grades)**

(In '000 tonnes)

State	All-Grades	ST-I	ST-II	W-I	W-II	W-III	W-IV	SLV1	SC-I
India	34809	075	960	318	1717	8090	23472	008	169
Chhattisgarh	146	–	–	–	–	–	–	–	146
Jharkhand	33877	042	960	318	987	8090	23472	008	–
Madhya Pradesh	730	–	–	–	730	–	–	–	–
West Bengal	056	033	–	–	–	–	–	–	023

COAL & LIGNITE

**Table – 11 (B) : Production of Coking Coal, 2009-10
(By States and by Grades)**

(In '000 tonnes)

State	All-Grades	ST-I	ST-II	W-I	W-II	W-III	W-IV	SLV1	SC-I
India	44256	109	1380	297	1868	10068	30367	–	167
Chhattisgarh	150	–	–	–	–	–	–	–	150
Jharkhand	43509	74	1380	297	1323	10068	30367	–	–
Madhya Pradesh	545	–	–	–	545	–	–	–	–
West Bengal	52	35	–	–	–	–	–	–	17

**Table –12 (A) : Production of Non-coking Coal, 2008-09
(By States and by Grades)**

(In '000 tonnes)

State	All-Grades	A	B	C	D	E	F	G	Ungraded
India	457948	10179	24854	51058	48006	112993	201286	9332	240
Andhra Pradesh	44546	–	752	7053	8013	14326	13231	1071	100
Arunachal Pradesh	142	142	–	–	–	–	–	–	–
Assam	1009	1009	–	–	–	–	–	–	–
Chhattisgarh	101776	1112	7518	4533	2849	–	77812	7952	–
Jammu & Kashmir	011	–	–	–	–	–	–	–	011
Jharkhand	62395	–	837	9303	9922	25586	16438	309	–
Madhya Pradesh	70595	1493	3381	22201	8143	35377	–	–	–
Maharashtra	38705	5489	403	1540	13222	23540	–	–	–
Meghalaya	5489	–	–	–	–	–	–	–	5489
Orissa	98402	–	232	233	1685	5431	90821	–	–
Uttar Pradesh	12029	–	–	453	3213	8363	–	–	–
West Bengal	22849	934	11731	5742	959	370	2984	–	129

**Table – 12 (B) : Production of Non-coking Coal, 2009-10
(By States and by Grades)**

(In '000 tonnes)

State	All-Grades	A	B	C	D	E	F	G	Ungraded
India	487806	10692	25827	56147	50518	117855	219274	7099	394
Andhra Pradesh	50425	34	729	7394	9444	17377	13791	1285	371
Arunachal Pradesh	250	250	–	–	–	–	–	–	–
Assam	1113	1113	–	–	–	–	–	–	–
Chhattisgarh	109809	1252	8259	4413	2847	–	89009	4029	–
Jammu & Kashmir	23	–	–	–	–	–	–	–	23
Jharkhand	62424	194	658	9611	9495	25475	16928	63	–
Madhya Pradesh	73529	1249	2843	27271	9758	32408	–	–	–
Maharashtra	41005	–	407	2262	12065	26271	–	–	–
Meghalaya	5767	5767	–	–	–	–	–	–	–
Odisha	106409	–	232	238	1734	6153	96330	1722	–
Uttar Pradesh	13968	–	–	100	4336	9532	–	–	–
West Bengal	23084	833	12699	4858	839	639	3216	–	–

COAL & LIGNITE

**Table – 13 : Despatches of Raw Coal, 2008-09 & 2009-10
(By States)**

(In '000 tonnes)

State	2008-09	2009-10(P)
India	489172	513792
Andhra Pradesh	44410	49266
Arunachal Pradesh	129	226
Assam	835	1071
Chhattisgarh	103022	106921
Jammu & Kashmir	12	17
Jharkhand	95414	99863
Madhya Pradesh	72042	73481
Maharashtra	39238	40743
Meghalaya	5489	5767
Odisha	93316	100591
Uttar Pradesh	12448	13587
West Bengal	22817	22259

**Table – 14 : Despatches of Raw Coal, 2008-09 & 2009-10
(By Priorities)**

(In '000 tonnes)

Priority	2008-09	2009-10 (P)
Total	489172	513792
Steel	17509	18359
Sponge Iron	13941	17259
Chemical	653	578
Electricity	364699	378242
Cement	12881	14362
Cokeries	262	215
Paper & pulp	2158	2335
Fertilizer	2432	2626
Textile & Rayons	2534	272
Other Basic metal	871	742
Others	71232	78802

Note: Steel includes direct feed & coking washery for metallurgical use and steel (boilers); non-coking washery included in others.

**Table – 15 : Mine-head Stocks of Coal, 2009-10
(By States)**

(In '000 tonnes)

State	At the beginning of the year	At the end of the year
India	47317	64863
Andhra Pradesh	152	1224
Arunachal Pradesh	22	49
Assam	252	294
Chhattisgarh	4303	7015
Jammu & Kashmir	2	8
Jharkhand	19171	24933
Madhya Pradesh	1615	2498
Maharashtra	2386	2701
Odisha	17474	23409
Uttar Pradesh	283	664
West Bengal	1657	2068

COAL & LIGNITE

**Table – 16 : Production of Lignite, 2007-08 to 2009-10
(By Sector/States)**

(Quantity in '000 tonnes; value in Rs.'000)

	2007-2008		2008-2009		2009-10(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	33980	29608836	32421	36877900	34080	38785770
Public sector	33889	29529542	32318	36555996	33764	38426137
Private sector	91	79294	283	321904	316	359633
Gujarat	11788	8277771	10114	8926300	10536	9298747
Rajasthan	606	511799	999	1160000	1206	1400361
Tamil Nadu	21586	20819266	21308	26791600	22338	28086662

**Table – 17 : Number of Lignite Mines
2008-09 & 2009-10
(By States)**

State	No. of Mines	
	2008-09	2009-10
India	13	13
Gujarat	7	7
Rajasthan	3	3
Tamil Nadu	3	3

**Table – 18 : Despatches of Lignite
2008-09 & 2009-10
(By States)**

(In '000 tonnes)

State	2008-09	2009-10
India	31793	34430
Gujarat	10046	10411
Rajasthan	999	1207
Tamil Nadu	20748	22812

**Table – 19 : Mine-head Stocks of
Lignite, 2009-10
(By States)**

(In '000 tonnes)

State	At the beginning of the year	At the end of the year
India	903	565
Gujarat	41	155
Rajasthan	–	–
Tamil Nadu	862	410

MINING & MARKETING**Coal**

Coal mining in the country is being carried out by opencast and underground methods. Opencast mining contributed over 89% of total production whereas rest of the production (about 11%) comes from underground mining. These mines are mostly semi-mechanised or mechanised. The machinery deployed commonly are drill machines, load-haul-dumper (LHD), ventilation fans, pumps for dewatering, haulage for transport, etc. In order to arrest the decline in production from a few underground mines, "mass production technology" by introducing 'continuous miner' is being practised. Modern roof-bolting technology with "flexibolts" up to 5 m length; 'smart bolting' for cost reduction of roof support; introduction of mechanised roof bolting using hydraulic bolts for difficult roof are new technology absorptions in Indian Underground Coal Mining. Mechanised Long wall mining (long wall powered support) has also been introduced in a limited scale which yield higher output with high percentage recovery (70-80%). In opencast mines, machinery like draglines, dozers, shovels, dumpers and graders are deployed for various operations.

The latest policy pursued by CIL is to encourage technology upgradation through Global Tender. Global tender approach has been used towards introduction of high productivity with the use of Continuous Miners, at SECL and WCL.

COAL & LIGNITE

There are eight coal producing companies in the public sector. Out of these, Eastern Coalfields Limited (ECL), Bharat Coking Coal Limited (BCCL), Central Coalfields Limited (CCL), Western Coalfields Limited (WCL), South-Eastern Coalfields Limited (SECL), Mahanadi Coalfields Limited (MCL), Northern Coalfields Limited (NCL) and North-Eastern Coalfields Limited (NEC) are subsidiary companies of Coal India Ltd (CIL), a Government of India undertaking. The Singareni Collieries Company Limited (SCCL) is a joint venture of the Government of India and the Government of Andhra Pradesh. CMPDI is a subsidiary of CIL which is engaged in surveying, planning and designing work with a view to optimise coal production.

BCCL is the major producer of prime-coking coal (raw and washed). Medium-coking coal is also produced in Mohuda and Barakar areas. In addition to production of hard coke and soft coke, BCCL operates a number of sand gathering plants, a network of aerial ropeways for transport of sand and nine coal washeries, namely, Dugda-I, Dugda-II, Bhojudih, Patherdih, Mahuda, Sudamdih, Barora, Moonidih and Madhuband.

CCL operates mines in Bokaro, Ramgarh, Giridih and North and South Karanpura Coalfields in Jharkhand and four coal washeries, namely, Kathara, Swang, Rajrappa and Kedla. Its products included medium-coking coal (raw and washed), non-coking coal, soft coke and hard coke.

WCL operates coal mines located in Pench and Kanhan in Maharashtra and Patharkheda in Madhya Pradesh. This company largely met the requirements of industries and power stations in the western region of the country.

ECL covers Raniganj Coalfields in West Bengal and Mugma and Rajmahal Coalfields in Bihar. It produced and supplied coal to the loco and other industries which required relatively higher grades of coal.

The coalfields of Chhattisgarh, viz, Korba (East & West), Baikunthpur, Chirimiri, Hasdeo, Sohagpur, Jamuna-Kotma and Johilia are under SECL. This subsidiary continued to be the leading producer of CIL.

NEC is responsible for development and production of coal in the North-Eastern States. The present mining activities are confined to Assam and Meghalaya. The area has large proven reserves of low ash, high calorific value coal but because of its high sulphur content, it cannot be used directly as metallurgical coal.

SCCL operates coal mines in Andhra Pradesh producing non-coking coal. The coal requirements of consumers in south are mostly met by this company.

MCL has been incorporated as another subsidiary company of CIL w.e.f. 3.4.1992. Its area of jurisdiction comprises Talcher and Ib Valley Coalfields of Orissa.

NCL covers the entire Singrauli Coalfields situated in Madhya Pradesh and Uttar Pradesh.

Bihar State Mineral Development Corporation Ltd (BSMDC), Damodar Valley Corporation (DVC) and Jammu & Kashmir Minerals Ltd (JKML) are the State Government undertakings engaged in coal mining. IISCO steel plant of SAIL is the only public sector steel unit operating captive mines for coal. Bengal Emla Coal Mines Ltd (BECL), Jindal Steel & Power Ltd (JSPL), Hindalco and Tata Steel are the companies, operating captive mines in the private sector.

As on 31.3.2010, there were 560 operating mines for coal in the country, out of which 200 were opencast while 324 were underground mines. The remaining 36 were mixed collieries. There were 536 public sector mines and 24 mines in private sector (Table-20). Thrust is now given to further increase production from opencast mines where the gestation period is comparatively shorter. In 2009-10, share of production of raw coal from opencast mines was 89% against 11% from underground mines (Table-21). Production of coal by different mining technologies employed is furnished in Table-22. The overall output per man shift (OMS) in 2009-10 was 4.48 tonnes as against 4.09 tonnes in 2008-09.

COAL & LIGNITE

**Table – 20 : Number* of Coal Mines, 2009-10
(By Sectors/States)**

State	No. of collieries			
	OC	UG	Mixed	Total
All India	200	324	36	560
Public sector	183	317	36	536
Private sector	17	7	–	24
Andhra Pradesh	14	35	–	49
Arunachal Pradesh	1	–	–	1
Assam	3	4	–	7
Chhattisgarh	19	40	1	60
Jammu & Kashmir	–	7	–	7
Jharkhand	70	77	27	174
Madhya Pradesh	21	52	2	75
Maharashtra	32	23	–	55
Meghalaya	–	1	–	1
Odisha	17	9	–	26
Uttar Pradesh	5	–	–	5
West Bengal	18	76	6	100

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

* As on 31.3.2010

Note: OC - Opencast UG - Underground.

Table – 21 : Production of Raw Coal

(In million tonnes)

Year	Production from opencast mines (% share)	Production from underground mines (% share)	Total production
2007-08	398.18 (87.1%)	58.90 (12.9%)	457.08
2008-09	433.79 (88%)	58.97 (12%)	492.76
2009-10	473.52 (89%)	58.52 (11%)	532.04

Source: Coal Directory of India, 2009-10 Coal Controller's Organisation, Kolkata.

**Table – 22 : Production of Coal, 2009-10
(By Technologies)**

(In million tonnes)

Technology adopted	Production	Percentage of total
All India : Total	532.042	100
<i>Opencast (Total)</i>	<i>473.519</i>	<i>89.00</i>
Mechanised	467.391	98.70
Manual	6.128	1.30
<i>Underground (Total)</i>	<i>58.523</i>	<i>11</i>
Conventional B&P	11.668	19.90
Mechanised B&P	42.619	72.80
Conventional LW	0.000	0.00
Mechanised LW	1.279	2.20
Other methods	2.957	5.10

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

Note: B&P - Board-and-pillar; LW - Longwall

As coking coal was deregulated with effect from 1.4.1996, distribution is done by CIL/coal companies. The Government of India has amended provisions of Colliery Control Order 1945 and Colliery Control Order 2000 has been notified, according to which, the price & distribution of all grades of coal with effect from 1.1.2000 have been deregulated.

Coal movements by coastal shipment to southern and western regions through Haldia, Paradip and Vizag ports were continued. Major portion of the despatches was through railways, followed by roads, Merry-Go-Round System, belt conveyor, ropeways and sea route.

Lignite

Out of the thirteen opencast working mines, three are owned by Neyveli Lignite Corporation (NLC), five by Gujarat Mineral Development Corporation Ltd. (GMDCL), three by Rajasthan State Mines and Minerals Limited (RSMML) and one mine each by Gujarat Industries Power Co. Ltd (GIPCL) & Gujarat Heavy Chemicals Ltd (GHCL). Sectorwise, twelve mines are under public sector and the remaining one is under private sector i.e. GHCL. NLC shared maximum production during the period under review. The NLC mines are a part of an integrated complex consisting of three opencast lignite mines (10.5 million tpy + 10.5 million tpy + 3 million tpy), 3 thermal power plants (600 MW+ 420 MW+1470 MW) and a carbonisation and briquetting plant (262,000 tpy) producing carbonised

briquettes, commercially called “Leco”. The third mine having 3 million tpy capacity feeds an independent power project of 250 MW. Capacity increase of Mine-II from 10.5 million tpy to 15 million tpy with the installation of 2x250 MW units has been approved by the Ministry of Coal. The new Barsingar Thermal-cum-Mine Project will have 2.1 million tpy lignite capacity to feed the 2x125 MW thermal project. The mine is expected to produce 1.79 million tonnes lignite per annum by 2012-13. The NLC's mines are highly mechanised. Electric-powered equipment like bucket-wheel excavators, fabric & steel cord belt conveyors, tippers and spreaders are used in their opencast mines for excavation, transportation and refilling of overburden. The Neyveli Lignite Mines is the largest opencast mine in the whole country with eco-friendly technology. Hydraulic shovels & dumpers are used only for auxiliary works. Mobile Transfer Conveyor (MTC) of capacity 4420 cu m/hr, stacker of 4000 t/hr capacity and reclaimers of 2000 t/hr capacity are also deployed.

Policy–Captive Coal and Lignite Block Allocation

Under the Coal Mines (Nationalisation) Act, 1973, coal mining was originally reserved for the public sector exclusively. The said Act was amended from time to time to allow: (a) captive mining by private companies engaged in production of iron and steel and sub-lease for coal mining to private parties in isolated small pockets not amenable to economic development and not requiring rail transport (amended in 1976); (b) private sector participation in coal mining as linkage for power generation, for washing of coal obtained from a mine or for other end-uses to be notified by Government from time to time (amended on 9.6.1993), in addition to existing provision for the production of iron and steel; and (c) mining of coal for production of cement (amended on 15.3.1996) (d) mining of coal for production of syn-gas obtained through coal gasification (underground and surface) and coal liquefaction (amended on 12.7.2007).

The Central Government, a Government Company (including a State Government company), a Corporation owned, managed and controlled by the Central Government can undertake coal mining without the restriction of captive use.

The allocation of coal blocks to private parties is done through the mechanism of an Inter-Ministerial and Inter-Governmental body called Screening Committee.

The Ministry of Power proposes to set up four Ultra Mega Power Projects (UMPP) with capacity of 4000 MW each, through tariff-based competitive bidding. The Ministry of Coal has allocated at Moher, Moher-Amlori Extension and Chhatrasal coal blocks (750 million tonnes) for the proposed UMPP to be set up at Sasan in Madhya Pradesh; Meenakshi, Meenakshi-B and dip side of Meenakshi coal blocks (885.24 million tonnes) for the proposed UMPP to be set up in Odisha and Kerandari BC coal block (972 million tonnes) in Jharkhand for the proposed UMPP.

At present, captive coal blocks are only allotted to companies in power, cement and steel sectors. Till 31.3.2010, a total of 207 coal blocks with 50,621.1 million tonnes geological reserves have been allotted in various states (Table-23). Similarly, 28 captive lignite blocks with 2,223.53 million tonnes geological reserves have been allocated in Gujarat, Rajasthan and Tamil Nadu for power (15 blocks) and commercial (13 blocks) till 31.3.2010.

In consultation with CIL and NLC, 47 new coal blocks with geological reserves of about 17,721.52 million tonnes and 38 lignite blocks with geological reserves of about 6,240.34 million tonnes have been identified.

Coal Bed Methane (CBM) and Underground Coal Gasification (UCG)

In terms of Govt. of India, CBM Policy 1997, consortium of CIL and ONGC has been allotted 2 blocks—one each in Raniganj and Jharia coalfield for development of Coal Bed Methane. So far, 26 CBM blocks have been allotted to various operations for exploration and exploitation of CBM. Ten more blocks were offered in the 4th round of bidding concluded in October, 2009.

Under the guidelines for conducting underground coal gasification and allocation of blocks issued on 13.7.2009, five lignite blocks and two coal blocks have been identified for allocation.

FOREIGN COLLABORATION

To meet the country's growing demand for coal, Coal India Limited (CIL) is looking for foreign collaboration with a view to:

(a) bringing in proven technologies and advanced management skills for running underground (UG) and opencast (OC) mines and in coal preparation for efficient management of the Indian coal industry and development of necessary skills by way of appropriate training, etc.;

(b) exploration and exploitation of coal bed methane and in situ gasification of coal;

(c) locating overseas companies, interested in joint ventures for overseas operations, in the field of coal mining with special thrust on coking coal mining; and

(d) exploring financial assistance for import of equipment and other investment needs for coal industry.

Keeping these objectives in view, Joint Working Group on coal had been set up with a number of countries such as UK, France, Russia, USA, Poland, Germany, Australia and China. The priority areas, inter alia, include acquiring modern technology for mass production in underground and opencast mining, methodology of underground mining in difficult geological conditions including steep seams, fire and subsidence control, mines safety, coal preparation, use of washery rejects for power generation, exploitation of coal bed methane from working mines and abandoned mines, coal gasification, application of geographical information system (GIS), environmental mitigation and emission trading, overseas ventures for sourcing coking coal, etc. Training of CIL personnel for effective adaptation of the state-of-the-art technologies, available with the developed countries, is also a prime subject of focus.

COAL WASHERIES

Presently 19 coal washeries (15 in public sector and 4 in private sector) with 32.80 million tonnes per annum capacity produced about

6.55 million tonnes coking coal in 2009-10. Similarly, 31 coal washeries with 103.65 million tonnes capacity produced 39.33 million tonnes non-coking coal during the year. In public sector, BCCL operates 9 coking coal washeries (Dugda II, Bhojudih, Patherdih, Sudamdih, Barora, Moonidih, Mahuda, Madhubann and Dugda-I), CCL operates 4 washeries (Kathara, Swang, Rajrappa and Kedla), WCL one (Nandan) and SAIL operates one (Chasnala) whereas 4 washeries (W. Bokaro-II, W. Bokaro-III, Jamadoba and Bhelatand) were operated by Tata Steel Ltd, in private sector. In public sector, 7 non-coking coal washeries (three each in BCCL & CCL and one in NCL) were operational, whereas in private sector, 24 non-coking coal washeries were in operation. Production of washed coking coal during 2009-10 was about 3.50 million tonnes in Public Sector and about 3.05 million tonnes in Private Sector.

By and large, ash content in raw coal used by washeries varied between 24 and 33%. The ash content in the washed coal and middlings produced by washeries ranged from 19 to 22% and 35 to 40%, respectively. The rejects in most washeries contained over 50% ash. The capacity and production of washed coking/non-coking coal is shown in Tables - 24, 25, 26 and 27, respectively.

Table – 23 : Allotment of Captive Coal Blocks, (Till 2010) (Statewise)

(In million tonnes)		
State	No. of Coal Blocks	Geological Reserves
Total	207*	50621.10
Arunachal Pradesh	1	27.00
Andhra Pradesh	4	237.20
Chhattisgarh	39	8954.70
Jharkhand	59	16538.50
Madhya Pradesh	25	3352.40
Maharashtra	26	1090.00
Odisha	33	16267.10
West Bengal	20	4154.20

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

*Note : * Including one block allocated in June, 2010 (Bankui for UMPP)*

COAL & LIGNITE

Table – 24 : Production of Washed Coking Coal, 2008-09 & 2009-10 (Sectorwise/Companywise)

	(In '000 tonnes)	
	2008-09	2009-10
All India : Total	7182.0	6547.0
Public Sector	4257.0	3499.0
BCCL	1605.0	1329.0
CCL	1709.0	1396.0
WCL	366.0	248.0
SAIL	577.0	526.0
Private Sector	2925.0	3048.0
Tata Steel Ltd	2925.0	3048.0

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

Table – 25 : Capacity of Washed Coking Coal, 2009-10

Coalfield/washery	State	Raw coal capacity (In '000 tpy)
Grand Total		32800
Public Sector	Total	27140
BCCL		14550
Dugda-I	Jharkhand	2500
Dugda-II	-do-	2000
Bhojudih	-do-	1700
Patherdih	-do-	1600
Sudamdih	-do-	1600
Barora	-do-	420
Moonidih	-do-	1600
Mahuda	-do-	630
Madhubann	-do-	2500
CCL		9350
Kathara	-do-	3000
Swang	-do-	750
Rajrappa	-do-	3000
Kedla	-do-	2600

(Contd.)

Table - 25 (Concl.)

Coalfield/washery	State	Raw coal capacity (In '000 tpy)
WCL		1200
Nandan (Pench-Kanhan)	Madhya Pradesh	1200
SAIL		2040
Chasnala	Jharkhand	2040
Private Sector	Total	5660
Tata Steel Ltd		5660
West Bokaro-II	Jharkhand	1800
West Bokaro-III	-do-	2100
Jamadoba	-do-	900
Bhelatand	-do-	860

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata (except totals).

Table – 26 : Production of Washed Non-coking Coal : 2008-09 & 2009-10 (Sectorwise/Companywise)

	(In '000 tonnes)	
	2008-09	2009-10
All India : Total	40951.90	39331.80
Public Sector	10506.00	11617.00
BCCL	987.00	671.00
CCL	6558.00	7424.00
NCL	2961.00	3522.00
Private Sector	30445.90	27714.80
JSPL	1606.00	1766.40
BLA Ind. Ltd	230.00	293.60
Aryan Coal Beneficiation Pvt. Ltd.	15112.70	14959.60
Aryan Energy Pvt. Ltd	723.80	61.00
Bhatia International Ltd	1162.80	2467.00
Indo Unique Flames Ltd	365.90	-
Global Coal & Mining Pvt. Ltd	1315.00	2239.70
Gupta Coal & Washeries Ltd	4594.70	-
Kartikey Coal Washeries Pvt. Ltd	257.00	782.30
Spectrum Coal & Power Ltd	5078.00	5145.20

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata.

COAL & LIGNITE

Table – 27 : Capacity of Washed Non-coking Coal, 2009-10

Coalfield/washery	Location	State	Raw Coal Capacity (In '000 tpy)
Grand Total			103650
Public Sector	Total		20200
BCCL			
Jharia Coalfield, Jharkhand			3980
Dugda-I	Jharia	Jharkhand	1000
Lodna	Jharia	Jharkhand	480
Madhuban	Jharia	Jharkhand	2500
CCL			
East Bokaro Coalfield, Jharkhand			11720
Gidi	East Bokaro	Jharkhand	2500
Piparwar	N. Karanpura	Jharkhand	6500
Kargali	S. Karanpura	Jharkhand	2720
NCL			4500
Bina Deshelling	Bina	Uttar Pradesh	4500
Private Sector	Total		83450
Jindal Steel & Power Ltd			
Pit Head Washery (JSPL)	Mand Raigarh	Chhattisgarh	6000
BLA Industries Pvt. Ltd			
BLA Washery	Dharmasthal	Madhya Pradesh	330
Aryan Coal Beneficiation Pvt. Ltd			
Chakabuwa	Korba	Chhattisgarh	6000
Dipka	Korba	Chhattisgarh	12000
Pander Pauni	Ballarpur	Maharashtra	3000
Gevra	Korba	Chhattisgarh	5000
Aryan Energy Pvt. Ltd			
Indaram	Ramagundam	Andhra Pradesh	600
Talcher	Talcher	Odisha	2000
Bhatia International Ltd			
Wani	Wardha	Maharashtra	2000
Ghugus	Wardha	Maharashtra	4000
Global Coal & Mining Pvt. Ltd			
Ib Valley	Ib Valley	Odisha	1500
Ramagundam	Ramagundam	Andhra Pradesh	1000
Talcher	Talcher	Odisha	2500
Gupta Coal field & Washeries Ltd			
Sasti	Wardha	Maharashtra	2400
Ramagundam	Ramagundam	Andhra Pradesh	2400
Ghugus	Wardha	Maharashtra	2400
Gondegaon	Kamptee	Maharashtra	2400
Majri	Wardha	Maharashtra	2400
Wani	Wardha	Maharashtra	1920
Kartikay Coal Washeries Pvt. Ltd			
Wani	Wardha	Maharashtra	13000
Spectrum Coal & Power Ltd (ST-CLI)			
Korba	Korba	Chhattisgarh	5200
Indo Unique Flames Ltd			
Nagpur	Wardha	Maharashtra	600
Punwat	Wardha	Maharashtra	2400
Wani	Wardha	Maharashtra	2400

Source: Coal Directory of India, 2009-10, Coal Controller's Organisation, Kolkata (Except totals).

CLASSIFICATION AND GRADES

Indian coal is classified into two main categories, namely, coking and non-coking. Coking coal is a type of coal from which, on carbonisation, coke suitable for use in metallurgical industries, particularly in iron and steel industries, can be produced. Parameters determining coking property of coal are coking index, volatile matter (VM %), vitrinite %, crucible swell no., fluidity, reflectance, etc., Although for commercial gradation, ash percentage is the sole criterion, for semi-weakly-coking coal, along with ash percentage, moisture percentage too is considered as an added criterion. For non-coking coal, an empirical formula is used to determine Useful Heat Value (UHV) of coal in kcal/kg.

The classification of coal as per the Ministry of Coal is given in Table - 28. Changing, grading and

pricing of thermal coal from the existing Useful Heat Value (UHV) system to the international practice of Gross Calorific Value (GCV) system is under consideration of Ministry of Coal. A Pilot Study on migration from UHV to GCV-based gradation of coal has been completed by CFRI. The draft report is being overviewed by a Committee comprising members from Ministry of Coal, CEA, NTPC, CIL and CFRI.

CONSUMPTION

Thermal power plants, Iron & Steel and Cement continued to be the major consuming industries for coal in India. Sizable quantities are also consumed by the railways, collieries and as a domestic fuel. Data regarding consumption in these sectors are not available. However, industrywise despatches of coal are given in Table - 29.

Table – 28 : Classification of Coal

Sl. No	Class	Grade	Grade/Specification
1.	Non-coking coal produced in all states other than Assam, Arunachal Pradesh, Meghalaya and Nagaland	A	Useful Heat Value exceeding 6200 kcal per kg.
		B	Useful Heat Value exceeding 5600 kcal per kg but not exceeding 6200 kcal per kg
		C	Useful Heat Value exceeding 4940 kcal per kg but not exceeding 5600 kcal per kg.
		D	Useful Heat Value exceeding 4200 kcal per kg but not exceeding 4940 kcal per kg.
		E	Useful Heat Value exceeding 3360 kcal per kg but not exceeding 4200 kcal per kg.
		F	Useful Heat Value exceeding 2400 kcal per kg but not exceeding 3360 kcal per kg.
		G	Useful Heat Value exceeding 1300 kcal per kg but not exceeding 3360 kcal per kg.
2.	Non-coking coal produced in Arunachal Pradesh, Assam, Meghalaya and Nagaland	A	Useful Heat Value between 6200 and 6299 kcal per kg and corresponding ash plus moisture content between 18.85 and 19.57%.
		B	Useful Heat Value between 5600 and 6199 kcal per kg and corresponding ash plus moisture content between 19.58 and 23.91% Ash content not exceeding 15%.
3.	Coking coal	Steel Grade I	Ash content exceeding 15% but not exceeding 18%.
		Steel Grade II	Ash content exceeding 18% but not exceeding 21% .
		Washery Grade I	Ash content exceeding 21% but not exceeding 24%.
		Washery Grade II	Ash content exceeding 24% but not exceeding 28%.
		Washery Grade III Washery Grade IV	Ash content exceeding 28% but not exceeding 35%.
4.	Semi-coking and weakly-coking coal	Semi-coking Grade I	Ash plus moisture content not exceeding 19%.
		Semi-coking Grade II	Ash plus moisture content exceeding 19% but not exceeding 24%.
5.	Hard coke	By-product Premium	Ash content not exceeding 25%.
		By-product Ordinary	Ash content exceeding 25% but not exceeding 30%.
		Beehive Premium	Ash content not exceeding 27%.
		Beehive Superior Beehive Ordinary	Ash content exceeding 27% but not exceeding 31%. Ash content exceeding 31% but not exceeding 36%.

**Table – 29 : Despatches* of Coal
2007-08 to 2009-10
(By Industries)**

(In million tonnes)

Industry	2007-08	2008-09	2009-10
Total	453.57	489.17	513.79
Iron & steel ¹	17.97	17.77	18.57
Sponge iron	20.92	19.78	23.10
Fertilizer	2.47	2.43	2.63
Cement	15.27	13.12	14.66
Electricity	350.58	377.27	390.57
Others (Chemical, base metals, paper & pulp, textile & rayon, bricks, etc.	46.36	58.80	64.26

Source: Coal Directory, 2007-08, 2008-09 and 2009-10.

* Data on consumption is not available.

¹ Includes direct feed, cokeries and boilers.

DEMAND & SUPPLY

XIth Plan Working Group for Coal & Lignite has assessed a coal demand of 731.10 million tonnes by terminal year i.e. 2011-12. The indigenous coal supply projection in the terminal year is projected to be 680 million tonnes. The demand-supply gap emerging from these projections would be 51.10 million tonnes, which will be met by imports of 40.85 million tonnes of coking coal and 10.25 million tonnes of non-coking coal.

XI Plan Demand Projections

(Million tonnes)

Sl. No.	Sector	2011-12
1	Steel & Coke Oven	68.50
2	Power (Utility)	483.00
3	Power (Captive)	57.06
4	Cement	31.90
5	Sponge Iron	28.96
6	Others	61.68
Total		731.10

XI Plan Supply Projections

(Million tonnes)

Source	2011-12
CIL	520.50
SCCL	40.80
Others	118.70
Total Indigenous Supply	680.00
Import - Coking	40.85
Non-coking	10.25
Total Imports	51.10

WORLD REVIEW

World proved coal reserves were estimated at 860.94 billion tonnes at the end of 2010 of which, 404.76 billion tonnes (47%) is classified as anthracite & bituminous coal and 456.18 billion tonnes (53%) as sub-bituminous coal & lignite (Table-30). World production of coal and lignite increased from about 6.63 billion tonnes in 2008 to 6.94 billion tonnes in 2009. China continued to be the largest producer of coal and lignite in 2009 with about 44% share in total world production, followed by USA (14%), India (8%), Australia (6%) and Russia & South Africa (4% each). The remaining 20% of the total world coal production was from other producing countries (Table-31). Global primary energy consumption fell by 1.1% over the preceding year. Asia Pacific and the Middle East has increased coal consumption during the year.

**Table – 30 : World Proved Coal Reserves
at the end of 2010
(By Principal Countries)**

(In million tonnes)

Country	Anthracite and bituminous coal	Sub-bituminous coal and lignite	Total
World : Total	404762	456176	860938
Australia	37100	39300	76400
Brazil	–	4559	4559
Canada	3474	3108	6582
China	62200	52300	114500
Colombia	6366	380	6746
Germany	99	40600	40699
India*	56100	4500	60600
Indonesia	1520	4009	5529
Kazakhstan	21500	12100	33600
Poland	4338	1371	5709
Russian Federation	49088	107922	157010
South Africa	30156	–	30156
Ukraine	15351	18522	33873
USA	108501	128794	237295
Other countries	8969	38711	47680

Source: Survey of Energy Resources, 2010; World Energy Council.

* India's reserves of coal as on 1.4.2010 are estimated at 276.81 billion tonnes to a depth of 1,200 m and those of lignite at 39.90 billion tonnes.

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**Table – 31 : World Production of Coal and Lignite
(By Principal Countries)**

(In Million tonnes)			
Country	2007	2008	2009
World : Total	6419	6625	6938
Australia			
Hard coal	325	333	347
Brown coal	66	66	68
Bulgaria			
Brown Coal & lignite	28	29	27
Canada			
Hard coal	58	58	52
Lignite	11	10	11
China			
Hard coal	2536	2622	3050
Colombia			
Hard coal	70	74	73
Czech. Rep.			
Bituminous coal	12	12	11
Brown Coal	49	47	45
Germany			
Hard coal	24	19	15
Brown coal	180	175	170
Greece			
Lignite	66	65	62
India			
Hard coal	457	493	532
Lignite	34	32	34
Indonesia			
Hard coal	217	229	245
Kazakhstan			
Hard coal	94	106	87
Korea Democratic Rep.			
Coal all form	24	25	25
Mexico			
Bituminous coal	12	16	23
Poland			
Hard coal	88	84	78
Lignite	58	60	57
Romania			
B. Coal & lignite	36	35	30
Russia			
Hard coal	314	326	298
South Africa			
Hard coal	248	252	251
Thailand			
Lignite	18	18	16
Turkey			
Hard coal	3	3	4
Lignite	74	86	82
Ukraine			
Hard coal	76	78	55
United Kingdom			
Bituminous coal	17	18	18
USA			
Hard coal	959	997	909
Lignite	71	69	66
Vietnam			
Anthracite	42	40	44
Other Countries	152	148	153

*Source: World Mineral Production, 2005-2009.
Hard coal – Including anthracite, bituminous & sub-bituminous coal.*

As estimated by the 'World Coal Association', coal currently fuels 41% of the world electricity and this proportion is set to remain static over the next 30 years. About 70% of the world's steel production is based on coal. The World Coal Institute in its report "Coal Meeting the Climate Challenge: Technology to reduce Greenhouse Gas Emission" released in 2007, outlined two primary ways of reducing CO₂ emission from coal use. The first is by carbon capture and storage (CCS) which can reduce 80-90% CO₂ emission into atmosphere and second is storing CO₂ in geological formations. CCS is now acknowledged as the only technology that can significantly reduce emissions from fossil fuel power stations and other industrial plants. International Energy Agency has emphasised need to install CCS on coal-fired plants by 2030. With the widespread deployment of CCS, fossil fuels will become an important part of solution rather than part of the problem.

Australia

Australia is the world's fourth largest producer of coal. Queensland and New South Wales were Australia's leading coal producing states and accounted for more than 95% of the country's total output. The infrastructure bottlenecks held back Australia's mineral exports, especially coal, while a number of new infrastructure projects were underway. One additional 90 million tonnes per year of new coal terminal port capacity has been scheduled to come for 2014. At Newcastle, New South Wales, Port Waratah Coal Services expanded its Kooragang Terminal capacity by 13 million tonnes per year to 102 million tonnes per year and planned a further increase to 113 million tonnes per year. The Newcastle Coal Infrastructure Group planned to add a 30 million tonnes per year terminal in 2010. The total combined terminal capacity in the states of New South Wales and Queensland would be 448 million tonnes per year.

China

Owing to high coal and coking coal prices in the domestic market and weak international coal prices, coastal coking coal producers imported a large volume of coal. Nickel furnaces were also reportedly shut down by Government to conserve energy. To conserve supplies, quite a few coal-to-liquid projects were suspended. The Government continued to close small coal mines to reduce fatalities. Many more small coal mines are slated for closure. In the long-term, several

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large companies are expected to produce coal along with small mines.

FOREIGN TRADE

Exports

In 2009-10, exports of coal increased about 49% to 2.47 million tonnes from 1.66 million tonnes in the previous year. Exports of coke on the other hand, decreased to 0.13 million tonnes in 2009-10 from 1.35 million tonnes in 2008-09. Coal was mainly exported to Bangladesh (59%), Nepal (32%), Australia (3%) and Bhutan & China (2% each). Coke was exported predominantly to Italy (31%), Brazil (30%), Bhutan (17%), Pakistan (12%), Bahrain (5%) and South Africa (1%). Exports of lignite were negligible in 2009-10. Exports of coal gas decreased to 8,621 tonnes in 2009-10 from 21,000 tonnes in the previous year. The export of coal gas in 2009-10 was mainly to Oman (93%) and Singapore (7%) (Tables - 32 to 35).

Imports

Imports of coal increased by 24% to 73 million tonnes in 2009-10 from 59 million tonnes in the previous year. Imports of coke increased by 25% to 2.35 million tonnes in 2009-10 from 1.90 million tonnes in the previous year. Coal was mainly imported from Indonesia (44%), Australia (31%) and South Africa (20%) whereas coke was imported mainly from Russia (25%), Poland (16%), Australia (13%), Japan (12%), Sweden (10%) and Colombia (8%) (Tables - 36 to 39).

**Table – 32 : Exports of Coal (Excl. Lignite)
(By Countries)**

Country	2008-09		2009-10	
	Qty ('000 t)	Value (Rs.'000)	Qty ('000 t)	Value (Rs.'000)
All Countries	1656	3484645	2471	5208101
Bangladesh	1292	2829414	1449	3339023
Nepal	236	449759	794	753265
Australia	-	-	78	537925
Bhutan	110	178550	55	194618
China	-	-	55	186610
Indonesia	-	-	11	61243
Vietnam	-	-	7	44986
Korea, Rep. of	-	-	3	22550
USA	++	1121	5	20258
Philippines	-	-	2	11821
Other countries	18	25801	12	35802

**Table – 33 : Exports of Coal : Lignite
(By Countries)**

Country	2008-09		2009-10	
	Qty ('000 t)	Value (Rs.'000)	Qty ('000 t)	Value (Rs.'000)
All Countries	11	186090	++	6397
UAE	-	-	++	4738
Saudi Arabia	-	-	++	842
Nigeria	-	-	++	434
Hong Kong	-	-	++	381
Nepal	++	186	++	2
Korea, Rep. of	9	183551	-	-
Namibia	2	1927	-	-
Singapore	++	425	-	-
Other countries	++	1	-	-

**Table – 34 : Exports of Coke
(By Countries)**

Country	2008-09		2009-10	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	1345534	7295252	127251	2057266
Italy	-	-	39600	725698
Brazil	192000	4177969	38500	673869
Pakistan	9696	74086	15770	254097
Bhutan	97119	404591	21823	222845
Bahrain	521950	390117	6055	83184
South Africa	182	3506	1833	34809
Nepal	32198	70755	428	6605
Argentina	46000	928752	-	-
France	420500	1013804	-	-
Japan	22000	197133	-	-
Other countries	3889	34539	3242	56159

**Table – 35 : Exports of Coal Gas, etc.
(Except Gaseous Hydrocarbons)
(By Countries)**

Country	2008-09		2009-10	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	21000	465624	8621	412734
Oman	-	-	8000	277540
Singapore	15750	293515	600	134327
Saudi Arabia	-	-	21	866
Nepal	-	-	++	1
UAE	5250	172108	-	-
Other countries	++	1	++	++

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**Table – 36 : Imports of Coal (Excl. Lignite)
(By Countries)**

Country	2008-09		2009-10	
	Qty (‘000 t)	Value (Rs. ‘000)	Qty (‘000 t)	Value (Rs. ‘000)
All Countries	59004	413413525	73257	391798228
Australia	19592	201648752	22837	183802972
Indonesia	28768	126439907	32165	115473599
South Africa	7093	44981007	14492	62269478
USA	1215	16322038	1400	13303028
New Zealand	840	8862858	1059	9976882
Philippines	194	715140	671	2235122
Vietnam	258	3419100	188	1694285
Russia	436	6367310	146	1382493
Ukraine	–	–	95	610943
China	523	4006358	45	235500
Other countries	85	651055	159	813926

**Table – 37 : Imports of Coke
(By Countries)**

Country	2008-09		2009-10	
	Qty (t)	Value (Rs. ‘000)	Qty (t)	Value (Rs. ‘000)
All Countries	1882191	46063197	2355535	33310985
Russia	62897	1376594	587398	8516623
Poland	–	–	384121	5131822
Australia	143901	3153874	305417	4305050
Japan	70325	1007631	281043	4004989
Sweden	–	–	246192	2671350
Colombia	603	7623	176962	2594249
China	1603667	40502837	86146	1794164
Egypt	–	–	86317	1514360
USA	118	2973	94395	1254991
Ukraine	–	–	30990	521322
Other countries	680	11665	76554	1002065

**Table – 38 : Imports of Coal : Lignite
(By Countries)**

Country	2008-09		2009-10	
	Qty (‘000 t)	Value (Rs. ‘000)	Qty (‘000 t)	Value (Rs. ‘000)
All Countries	++	1654	++	1053
Canada	++	1640	++	1053
Australia	++	13	–	–
Other countries	++	1	–	–

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**Table – 39 : Imports of Briquettes of coke, semi-coke of Coal
(By Countries)**

Country	2008-09		2009-10	
	Qty (t)	Value (Rs. '000)	Qty (t)	Value (Rs. '000)
All Countries	42	1482	23	581
Germany	42	1482	22	571
USA	-	-	1	10

FUTURE OUTLOOK

The country has surplus resources of coal and lignite but the availability of good coking coal is limited. About 88% production of coal is consumed by power houses, steel & cement plants and fertilizer industries. SAIL and other steel manufacturers import coking coal to improve the quality of overall blend for technological reasons. Coal-based power stations and cement plants are also importing non-coking coal on consideration of transport logistics and commercial prudence.

Per capita energy consumption in India is 285 kg oil per annum against 1,454 kg in the world. The Indian demand for energy will remain high and coal alone can meet this. The dominant role of coal in energy consumption and electricity

generation is likely to continue for decades because of huge proven reserves of coal vis-a-vis the reserves of oil and natural gas. It is reported that as per Planning Commission of India, the demand for coal rose by about 8% a year during 11th Plan and may rise by about the same magnitude during the next Plan. Against that coal output expanded at about 7% per year in the five year period. As per National Steel Policy, the requirement of coking coal for Iron & Steel industry will be 70 million tonnes and non-coking coal will be 26 million tonnes by 2019-20. A massive increase in production is needed to meet the growing demand of coal & lignite. The future of Indian Coal Industry is reasonably secured and it has the capability of facing the emerging issues and challenges before it.