

COAL & LIGNITE



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COAL & LIGNITE

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**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

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Coal plays a pivotal role in sustainable development. It is the most widely used energy source for electricity generation and an essential input for steel production. Coal is an essential resource for meeting the challenges facing the modern world. India has long history of commercial coal mining since 1774 and nationalisation of coal mines w.e.f. 01.05.1973. 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 80% 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 565.8 million tonnes in 2013-14 increased by 7.7% to 609.2 million tonnes in 2014-15. The production of lignite at 48.3 million tonnes in 2014-15 increased by 9% from 44.3 million tonnes in the previous year. India ranks 3rd in world coal production in 2014.

RESOURCES

Coal

The coal deposits in India are primarily concentrated in the Gondwana sediments occurring mainly in the eastern and central parts of Peninsular India, although Gondwana coal deposits also occur in Assam and Sikkim in north eastern part of the country. 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, 306.596 billion tonnes (including that estimated in Sikkim) of geological coal reserves up to 1,200 m depth have been established in the country as on 1.4.2015. Out of these reserves, 131.614 billion tonnes are proved reserves, 143.241 billion tonnes are indicated reserves and the remaining 31.740 billion tonnes are in inferred category. Of the total reserves, the share of prime-coking coal is 5.313 billion tonnes, medium-coking & semi-coking is 29.089 billion tonnes and non-coking coal, including high sulphur is 272.193 billion tonnes. Statewise/coalfield-wise and statewise/typewise reserves of coal as on 1.4.2015 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, Kerala, Gujarat, Rajasthan and Jammu & Kashmir. The total known geological reserves of lignite as on 1.4.2015 are about 44.114 billion tonnes, of which about 80% reserves i.e. about 35.209 billion tonnes are located in Tamil Nadu. Other states where lignite deposits have been located are Gujarat, Jammu & Kashmir, Kerala, Rajasthan, West Bengal and the Union Territory of Puducherry. Statewise/districtwise reserves of lignite as on 1.4.2015 are detailed in Table - 3.

**Table – 1 : Geological Reserves of Coal as on 1.4.2015
(By States/Coalfields)**

State/Coalfield	Proved	Indicated	Inferred	Total
All India : Total	131614.07	143241.10	31740.39	306595.56
Gondwana Coalfields*	131020.26	143141.76	30940.90	305102.92
Andhra Pradesh/	0.00	1149.05	431.65	1580.70
Godavari Valley				
Assam/Singrimari	–	4.13	–	4.13
Bihar/Rajmahal	–	–	160.00	160.00
Chhattisgarh	18237.00	34390.09	2285.11	54912.20
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	1141.94	487.98	–	1629.92
East Bisrampur	–	164.82	–	164.82
Lakhanpur	455.88	3.35	–	459.23
Panchbahini	–	11.00	–	11.00
Hasdeo-Arand	2032.28	3273.42	223.12	5528.82

(Contd.)

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Table - 1 (Contd.)

State/Coalfield	Proved	Indicated	Inferred	Total
Sendurgarh	152.89	126.32	–	279.21
Korba	5651.14	5936.50	168.02	11755.66
Mand-Raigarh	7910.12	19036.75	1651.40	28598.27
Tatapani-Ramkola	50.43	2826.28	209.68	3086.39
Jharkhand	41462.92	33026.38	6559.47	81048.77
Raniganj	1538.19	466.56	31.55	2036.30
Jharia	15127.97	4302.09	–	19430.06
East Bokaro	3385.77	3903.71	863.32	8152.80
West Bokaro	3761.25	1308.71	33.66	5103.62
Ramgarh	756.11	742.08	58.05	1556.24
North Karanpura	9499.42	6914.61	1864.96	18278.99
South Karanpura	3230.09	1867.66	1480.22	6577.97
Aurangabad	352.05	2141.65	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	3211.18	11219.06	1691.82	16122.06
Madhya Pradesh	10411.43	12783.81	3340.55	26535.79
Johilla	185.08	104.09	32.83	322.00
Umaria	177.70	3.59	–	181.29
Pench-Kanhan	1465.78	878.66	692.13	3036.57
Patharkhera	290.80	88.13	68.00	446.93
Gurgunda	–	84.92	53.39	138.31
Mohpani	7.83	–	–	7.83
Sohagpur	1751.56	5528.36	319.42	7599.34
Singrauli	6532.68	6096.06	2174.78	14803.52
Maharashtra	5953.39	3189.64	2110.21	11253.24
Wardha Valley	3756.78	1492.58	1424.07	6673.43
Kamthi	1276.14	1204.88	505.44	2986.46
Umrer Makardhokra	308.41	–	160.70	469.11
Nand Bander	602.06	492.18	–	1094.24
Bokhara	10.00	–	20.00	30.00
Odisha	30746.81	36545.04	8507.23	75799.08
Ib-River	11193.68	9324.24	4312.62	24830.54
Talcher	19553.13	27220.80	4194.61	50968.54
Telangana	9806.52	8807.92	2596.91	21211.35
Godavari Valley	9806.52	8807.92	2596.91	21211.35
Sikkim/Rangit Valley	–	58.25	42.98	101.23
Uttar Pradesh/Singrauli	884.04	177.76	–	1061.80
West Bengal	13518.15	13009.69	4906.79	31434.63
Raniganj	13317.36	7288.25	4027.22	24632.83
Barjora	200.79	–	–	200.79
Birbhum	–	5721.44	864.57	6586.01
Darjeeling	–	–	15.00	15.00
Tertiary Coalfields	593.81	99.34	799.49	1492.64
Assam	464.78	42.72	3.02	510.52
Makum	432.09	20.70	–	452.79
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-Namphuk	31.23	40.11	12.89	84.23
Miao Bum	–	–	6.00	6.00

(Contd.)

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Table - 1 (Concl.d.)

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, 2014-15, Coal Controller's Organisation, Kolkata.
* Including Sikkim.

Table - 2 : Geological Reserves of Coal as on 1.4.2015
(By States/Types)

(In million tonnes)

State/Type of coal	Proved	Indicated	Inferred	Total
All India : Total	131614.07	143241.10	31740.39	306595.56
Prime-coking	4614.35	698.71	-	5313.06
Medium-coking	13388.90	12113.56	1879.47	27381.93
Blendable/Semi-coking	482.16	1003.68	221.68	1707.52
Non-coking	112534.85	129325.81	28839.75	270700.41
High sulphur	593.81	99.34	799.49	1492.64
Andhra Pradesh/Non-coking	-	1149.05	431.65	1580.70
Arunachal Pradesh/High sulphur	31.23	40.11	18.89	90.23
Assam	464.78	46.85	3.02	514.65
Non-coking	-	4.13	-	4.13
High sulphur	464.78	42.72	3.02	510.52
Bihar/Non-coking	-	-	160.00	160.00
Chhattisgarh	18237.00	34390.09	2285.11	54912.20
Semi-coking	70.77	99.25	-	170.02
Non-coking	18166.23	34290.84	2285.11	54742.18
Jharkhand	41462.92	33026.38	6559.47	81048.77
Prime-coking	4614.35	698.71	-	5313.06
Medium-coking	12483.99	10553.45	1606.64	24644.08
Semi-coking	223.34	471.55	53.45	748.34
Non-coking	24141.24	21302.67	4899.38	50343.29
Madhya Pradesh	10411.43	12783.81	3340.55	26535.79
Medium-coking	354.49	1560.11	272.83	2187.43
Non-coking	10056.94	11223.70	3067.72	24348.36
Maharashtra/Non-coking	5953.39	3189.64	2110.21	11253.24
Meghalaya/High sulphur	89.04	16.51	470.93	576.48
Nagaland/High sulphur	8.76	-	306.65	315.41
Odisha/Non-coking	30746.81	36545.04	8507.23	75799.08
Sikkim/Non-coking	-	58.25	42.98	101.23
Uttar Pradesh/Non-coking	884.04	177.76	-	1061.80
West Bengal	13518.15	13009.69	4906.79	31434.63
Medium-coking	550.42	-	-	550.42
Semi-coking	188.05	432.49	168.23	788.77
Non-coking	12779.68	12577.20	4738.56	30095.44

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

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**Table – 3 : Geological Reserves of Lignite as on 1.4.2015
(By States/Districts)**

(In million tonnes)

State/District	Area/Lignite field	Proved	Indicated	Inferred	Total
All India : Total		6182.41	26281.58	11650.25	44114.24
Gujarat		1278.65	283.70	1159.70	2722.05
Kachchh	Panandhro & Panandhro Extn., Barkhan Dam, Kaiyari Block-A & B, Mata-No-Madh, Umarsar, Lakhpatt-Dhedadi (Punahrajpur), Akrimota, Jhularai-Waghapadar, Hamla-Ratadia & Pranpur.	335.61	56.40	33.09	425.10
Bharuch	Bhuri, Valia, Bhaga, Luna, Pansoli, Nani Pardi, Bhimpur, Rajpardi (GMDC leasehold) by MECL and Rajpardi (CGM) by MECL.	724.76	118.59	491.23	1334.58
Bhavnagar	Kharsalia, Rampur, Hoidad, Bhuteshwar, Surka, 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
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		1168.53	2670.84	1887.34	5726.71
Bikaner	Palana, Barsinghsar, Gurha East & West, Bholasar, Bithnok Main & East (Extn.), Gadiyala, Girirajsar, Raneri, Mandal Chaman, Hadda, Hadda north & west, Hadla, Badhnu, Hira-ki-Dhani, Chak-Vijaisinghpura, Kuchore (Napasar), Riri, Lalamdesar, Lalamdesar Bada, East of Riri, Bania, Kuchaur-Athuni, Sarupdesar-Palana west, Palana East, Gigasar-Kesardesar, Khar Charan, Ambasar-Gigasar, Girirajsar Extn., Bapeau, Bigga-Abhaysinghpura, Diyatra, Pyau, Deshnok-Ramsar-Sinthal, Borana, Bangarsar-Jaimalsar and Krnta-Ki-Basti & South of Bhane-Ka-Gao.	560.30	230.24	309.28	1099.82
Barmer	Kapurdi, Jalipa, Bothia (Jalipa N Ext.), Giral, Jogeswartala, Sonari, Sachcha-Sauda, Bharka, Bothia-Bhakra-Dunga, Sindhari East & West, Kurla, Kurla East, Chokla North, Mahabar-Shivkar, Mithra, Hodu, Nimbalkot, Nimbalkot North, Nagurda, Nagurda (East), Munabao, Kawas Gravity Block, South of Nimbla and Magne-Ki-Dhani.	495.23	2380.03	1336.49	4211.75
Jaisalmer & Bikaner	Panna	–	–	2.21	2.21
Jaisalmer	Ramgarh & Khuiyala	–	–	70.44	70.44
Jaisalmer & Barmer	Khuri	–	–	13.80	13.80
Nagaur & Pali	Kasnau-Igiar, Matasukh, Mokala, Nimbri-Chadawatan, Kaprion-Ki-Dhani, Merta Road & Meeranagar, Indawar, Kuchera, Lunsara and Phalki.	113.00	60.57	79.04	252.61
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	22900.05	8573.62	35208.90
Cuddalore	Neyveli Lignite Corporation (NLC) Leasehold areas, (Mine-I & expansion, Mine-IA, II & expansion, Mine-III, Block B, Mine-I, II & III and river), Devandgudi & 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* of Neyveli Lignite Field.	2831.00	2530.74	1199.78	6561.52
Ariyalur	Meensuruti, Jayamkondamcholapuram, Michaelpatti of Neyveli Lignite Field	904.23	302.50	481.07	1687.80
Thanjavur & Thiruvarur	Mannargudi-Central, Mannargudi-NE Mannargudi-NE Extn., Mannargudi SE, Melnattam-Araharam of Mannargudi Lignite Field	–	17248.06	3123.46	20371.52
Thanjavur	Mannargudi-NW & SW, Maharajapuram Orattanadu-Pattukottai, Vadaseri (Orattanadu-Pattukottai), Madukkur-Anaikadu Veppanagulam-Kasangadu of Mannargudi Lignite Field	–	2290.71	72.66	2363.37
Thanjavur & Nagapattinam	Alangudi, Pandanallur, Tirumangaicheri, and Thirumangalam of Mannargudi Lignite Field	–	359.21	926.62	1285.83
Thiruvarur & Nagapattinam	Nachiyarkudi of Mannargudi Lignite Field	–	–	574.05	574.05
Ramnad	Rajasing Mangalam of Mannargudi Lignite Field	–	–	964.97	964.97
Ramnad & Sivaganga	Settanur of Mannargudi Lignite Field	–	–	20.24	20.24
Ramanathapuram	Misal, Bogalur, Bogalur (East) and Tiyanur of Ramanathapuram Lignite Field	–	168.83	1210.77	1379.60
Puducherry	Bahur & West of Bahur of Neyveli Lignite Field	–	405.61	11.00	416.61
West Bengal	Rakshitpur, Mahalla & Dhobbanpur	–	1.13	1.64	2.77

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

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

EXPLORATION & DEVELOPMENT

The agencies engaged in exploration for coal during 2014-15 were mainly GSI, CMPDIL, MECL and State Directorates of Geology & Mining. Lignite exploration was carried out by GSI, MECL, NLC, DMGs Rajasthan & Nagaland and GMDC Ltd.

GSI carried out exploration for coal in Gondwana basins of Assam, Bihar, Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha, Telangana and West Bengal to identify additional resources of power-grade coal and superior-grade coking coal. 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. However, no additional resources of lignite were estimated. In 2014-15, GSI carried out the CBM-related studies in Djara area, Birbhum Coalfield, West Bengal and Gare (south) block, Mand-Raigarh Coalfield, Chhattisgarh. The in-situ gas content varies from 0.45 to 1.22 cc/gm in Djara area and 0.33 to 0.64 cc/gm in Gare (south) block. Details of exploration activities for coal by GSI are furnished in Table - 4.

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MECL carried out exploration in the states of Tamil Nadu, Chhattisgarh, Madhya Pradesh and Telangana during 2014-15. A total of 3,547 million tonnes resources of coal have been established at Godavari Valley coalfield in Telangana, Mand-Raigarh coalfield in Chhattisgarh and Singrauli coalfield in Madhya Pradesh. MECL also carried out exploration for lignite in Tamil Nadu during 2014-15. A total of 392 million tonnes of lignite resources were established in Tamil Nadu.

DGM, Chhattisgarh carried out exploration for coal during 2014-15 in Surguja district and estimated 5 lakh tonnes of coal resources. DGM, Maharashtra carried out exploration for coal during 2014-15 in Nagpur and Yavatmal districts and estimated about 8.81 million tonnes of coal resources. DGM, Meghalaya carried out exploration for coal during 2014-15 in West Garo Hills. GMDC conducted exploration for lignite during 2014-15 in Bhavnagar, Surat and Kachchh districts in Gujarat and estimated at 146.27 million tonnes of lignite resources. Neyveli Lignite Corporation Ltd (NLC) also carried out exploration for lignite in Barmer & Nagaur districts in Rajasthan and Cuddalore district in Tamil Nadu in 2014-15. DMG, Rajasthan carried out exploration for lignite during 2014-15 in Bikaner and Jaisalmer districts and estimated 9.79 million tonnes of lignite resources. Details on exploration carried out by the various state Directorates and state undertakings are given in Table-5.

CMPDIL in its exploration programme for 2014-15 laid emphasis on proving power-grade and superior-grade non-coking coal in CIL and non-CIL blocks.

In 2014-15, a total of 8.28 lakh m exploratory drilling was achieved by CMPDIL through departmental resources (3.56 lakh m) and outsourcing (4.72 lakh m) to State Governments/MECL(MOU)/Tendering (CIL/Non-CIL blocks). Out of total drilling, 5.45 lakh m has been drilled in CIL blocks and 2.83 lakh m in Non-CIL blocks.

CMPDIL deployed its departmental resources for exploration of CIL/Non-CIL blocks, whereas

State Governments of Madhya Pradesh and Odisha deployed resources in CIL blocks only. Besides, eight other contractual agencies were also deployed for detailed drilling/exploration in CIL/Non-CIL blocks. A total of 140 to 160 drills were deployed in 2014-15 out of which 57-61 were departmental drills.

Besides, CMPDIL continued the technical supervision of promotional exploration work taken by GSI, CMPDIL, MECL and DGM (Assam & Nagaland) and achieved about 1.40 lakh m (0.71 lakh metre in coal sector) and (0.69 lakh m in lignite sector) drilling in 2014-15. In coal sector, MECL (CIL & SCCL areas) in 9 blocks, namely, Mand Raigarh (3), Bistrampur (2), Singrauli (2) and Godavari valley (2) and achieved 0.503 lakh m drilling. GSI in 11 blocks, namely, Raniganj CF(2), Talcher CF (2), Ib Valley (2), Sohagpur (3) and Tatapani Ramakola (2) and achieved 0.189 lakh m drilling, while DGM (Nagaland) undertook one block in Northern Khar and 0.004 lakh m drilling and DGM(Assam) undertook one block in Karbianglong and no drilling for coal sector on behalf of Ministry of Coal. In lignite sector, GSI undertook promotional exploration work in 4 blocks and achieved 0.085 lakh m drilling and MECL undertook 8 blocks and achieved 0.603 lakh m drilling on behalf of Ministry of Coal.

During 2014-15, CMPDIL and its contractual agencies conducted exploration in 93 blocks/mines spread over 22 coalfields situated in 6 states. Out of the 93 blocks/mines, 30 were Non-CIL/Captive blocks and 63 CIL blocks/mines. Departmental drills of CMPDIL took up drilling activity in 57 blocks/mines, whereas contractual agencies drilled in 36 blocks/mines.

The Singareni Collieries Company Limited (SCCL) in its detailed exploration undertaken during 2014-15, proved reserves of coal estimated at 89.86 million tonnes as against 150.23 million tonnes reported in the previous year. Thus, the total proved reserves rose to 10,163.4 million tonnes as on 31.3.2015 in Godavari Valley Coalfield, Telangana.

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Table – 4: Details of Exploration Activities conducted by GSI for Coal & Lignite, 2014-15

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
COAL		
Assam		
Singrimari Coalfield	Sukchar-Singrimari area, (around Phatapara) Dhubri district of Assam & Meghalaya	An area of 2 sq km was covered by Large Scale Mapping on 1: 10000 scale in and around Khopati-Baratila area, which is totally covered by alluvium. A total of 715 m was drilled in two boreholes, viz. SP-01 and SP-02 in Phatapara area. Borehole SP-01 has reached a depth of 340.00 m and intersected Lower Barakar Formation. One coal seam of 0.74 m thickness has been intersected at a depth of 214.26 m. The second borehole SP-02 has been closed on 17.03.15 at a depth of 375.00 m within basement metamorphics. Three coal seams of 1 m, 5.45 m and 4.79 m thickness have been intersected at depths of 108.63 m, 191.73 m and 290.51 m, respectively. Cumulative coal thickness is 11.24 m, which is, so far, the maximum thickness of coal recorded from a single borehole in Singrimari Coalfield since commencement of regional exploration in 1985-86. Coal samples have been sent for chemical analysis and coal petrographic study.
	Sukchar-Singrimari area Dhubri district of Assam & Meghalaya	A total meterage of 185.55 m was drilled in one borehole (SK-02 part). Two thin coal bands ranging in thickness from 0.70 m (SK-02) to 0.90 m (SK-01) have been intersected within a depth range from 109.00 m (SK-01) to 254.60 m (SK-02). These coal seams are associated with carbonaceous shale-grey shale-mudstone intercalation. The recovery in coal-carbonaceous shale zones is very poor due to technical difficulties in drilling.
Bihar		
Rajmahal Coalfield	Mirjagaon area, Bhagalpur district	A total of 3330.10 m was drilled in 7 boreholes (RBMG-1 to RBMG-7) out of which 2467.75 m drilling have been carried out. Cumulative coal seam thickness as intercepted at each borehole are 41.32 m in RBMG-1, 55.00 m in RBMG-2, 30.00 m in RBMG-3, 32.00 m in RBMG-4, 35.10 m in RBMG-5, 21.75 m in RBMG-6 and 11.15 m in RBMG-7. Based on band by band proximate analysis of coal intersected at each borehole, four coal seam zones have been identified. Coal seam zone-A thickness varies from 10.60 m (432.80-443.40) in RBMG-1 to 103.15 m (495.85-599.00) in RBMG-4. Zone B thickness varies from 57.00 m (400.35-457.35) in RBMG-2 to 122.75 m (261.25-384.00) in RBMG-1. Zone C thickness varies from 27.80 m (220.00-247.80 m) in RBMG-1 to 41.60 m (360.90-402.50) in RBMG-3. Zone D thickness varies from 58.95 m (109.75-168.70) in RBMG-1 to 102.36 m (241.89-344.25) in RBMG-3. The Intertrappean beds with Ptilophyllum sp in RBMG-4 in Barakar Formation indicates cretaceous age for the Intertrappean bed. Coal petrographic study reveals, that rank wise the coal can be categorized under Lignito-Bituminous to Sub-Bituminous type. From the data, accrued so far, a tentative geological resource of coal of about one thousand million tonne is expected from the Mirjagaon Area.
Chhattisgarh		
Mand-Raigarh Coalfield	Samarsingha block Raigarh district	A total of 789.80 m was drilled in three boreholes, namely, MRSS-12 to 14. A total of nine regional Barakar coal seams (I, II, IV to IX & XIII in ascending order) have been intersected between depths of 106.68 m (MRSS-14) and 668.55 m (MRSS-14). Thickness of coal seams varies from 1.94 m (Seam VIII; MRSS-14) to 8.38 m (Seam IV; MRSS-14). Seam I is an important seam with thickness varying from 5.65 m (cumulative, MRSS-13) to 7.81 m (cumulative, MRSS-14) and has been intersected in the depth range of 450.72 m (MRSS-13) to 668.55 m (MRSS-14). The continuity of the coal seam have been established along dip direction towards south-west for about 5 km. Coal seams are inter-banded in nature and quality-wise are of power grade.
	Purunga block Raigarh district	A total of 4472.40 m drilling was achieved during Regional exploration for coal in nine boreholes. Among these six boreholes are completed (MRPR-1 to MRPR-6) and three boreholes are in progress (MRPR-7, MRPR-8 and MRPR-9). Altogether, twelve regional Barakar coal seams (I to X, XII & XIII in ascending order) were intersected. Thickness of individual coal seam varies from 0.53 m (Seam no. X in borehole MRPR-1) to 10.74 m (Seam no. IV in borehole MRPR-2). Area is covered by Lithounits of Barren Measures and Barakar Formations. A total of 1581.85 m geophysical logging and a total of 4 sq km large scale mapping (RF 1:10000) has been carried out.

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COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
	Amlidhonda block Raigarh district	Regional exploration was carried out, a meterage of 541.75 was drilled in two boreholes during this period viz. MRA- 15 (in part) & 17. The strike of beds is NW-SE with 2° to 4° south-westerly dip. The area of investigation is covered with rocks of Barren Measures. During this period, the maximum intersected thickness of Barren Measures is 105.05 m have been recorded in borehole MRA-17 located at the western part. This litho-sequence is marked by dominance of argillaceous facies represented by grey shale, siltstone and ironstone shale bands, interspersed with few arenaceous units of fine to medium grained, cross laminated sandstone. The contact between the Barren Measure and Barakar formations is gradational in nature. A total of five regional coal seams (Seam- IV, VI+VII combined, IX and X in ascending order) and a few local seams intersected between 170.65 m and 318.84 m depths. Thickness of individual coal section varies from 0.69 m to 2.56 m. The coal seams have been traced for nearly 4 km in strike and 4 km in dip direction within the block. Most of the seams, particularly the thicker seams, are interbanded in nature and are of power grade.
	Gare (South) block, Raigarh district	About 5171.00 m drilling has been achieved in twelve boreholes, viz., MRGS-1 to MRGS-12 (all completed). Seven regional Barakar coal seams /zones (seam nos. III, IV, V, VI+VII, IX & X in ascending order) have been intersected between the depths of 166.15 m (Seam X, MRGS-5) and 516.87 m (Seam III, MRGS-12). Thickness of individual coal seam / zone varies from 0.51 m (Seam V, MRGS-12) to 13.24 m (Seam VI + VII in four split sections, MRGS-9). A total of 3307.62 m geophysical logging was carried out in this block.
Tatapani-Ramkola Coalfield	Pipraul block, Surguja district	Regional exploration for coal under G2 stage was continued in this block. A total of 3346.60 m drilling was achieved in six boreholes namely TRP-3 to 8. Large Scale Geological mapping of 4 sq km area was carried out on 1:10000 scales. One East-West trending fault, identified in the north central part of the block has been found passing just south of borehole TRP-1 separating the exploration area in two lithologically distinct zones in north and south. Eleven regional Barakar coal seams (Seam-I to IX, XII, XIII in ascending order) and few local seams with thickness ranging from 0.50 m to 17.17 m (cumulative) have been intersected between the depths of 8.94 m and 757.15 m. During this period, Seam-III Top & Bottom occurs as the thickest seam in the studied area which is interbanded in nature and generally occurs in two split sections. Investigation is continuing.
Madhya Pradesh Pench Valley Coalfield	Bhurkumdhana Sector Chhindwara district	A total of 445.50 m (including re-drilling) has been drilled in two boreholes namely PBK- 4A & 5. Borehole PBK-4A was re-drilled at the adjacent location of PBK-4 which was abandoned at a depth of 299.50 m within Motur Formation. The contact between Motur & Barakar formation marked at 403.25 m depth. In this borehole, Barakar coal seams were intersected between the depths of 424.78 and 485.41 m. The cumulative thickness of coal is 12.85 m and individual seam thickness varies from 0.55 to 3.95 m. The borehole closed at the depth of 498.50 m within Barakar Formation. The borehole PBK- 5 commenced and drilled up to a depth of 484.50 m and abandoned in Motur Formation. The coal exploration operation in this sector has been closed with the completion of the borehole PBK-4A.
	Dhorakuhi Sector Chhindwara district	A total of 759.85 m was drilled in three boreholes, namely, PDK-1, 2A & 3. The first borehole PDK-1 progressed from 0.00 to 351.30 m depth. The contacts between Deccan Trap & Motur Formation, Motur & Barakar formations are demarcated at 163.45 m & 305.40 m depths, respectively. A total of 3.65 m coal (cumulative thickness) has been intersected within the depth range from 327.02 m to 348.03 m and borehole abandoned due to drilling difficulties at 351.30 m within coal zone. The second borehole PDK-2 commenced and progressed up to the depth of 363.50 m. This borehole also abandoned at the depth of 363.50 m in Motur Formation. The borehole was re-drilled at adjacent location as PDK-2A and progressed up to 157.10 m in Deccan Trap. Borehole no. PDK-3 commenced and progressed up to depth of 54.95 m in Deccan Trap. Investigation is continuing.

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COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
Singrauli Coalfield	Sarai (west) Sector Singrauli district	A total of 1745.45 m of drilling has been achieved in five boreholes (completed: SSW-7, SSW-9, & SSW-10; in-progress: SSW-11 & 12). Large Scale Mapping (RF: 1:10000) over an area of 5 sq km in the studied block has been completed. The major part of the area is covered with rocks of Raniganj Formation. Rocks of Barren Measures are exposed in eastern part, whereas rocks of Pali Formation occupy a small area in central and north-western part. Raniganj, Barren Measures and Barakar formations have been intersected in the boreholes. Three regional Raniganj coal seams/zones (seam nos. R-I to R-III in ascending order) have been intersected in the depth range from 5.58 m to 134.02 m. The individual thickness of Raniganj coal seam varies from 0.68 m (Seam R-II, SSW-12) to 4.22 m (Seam R-I, SSW-11). However, borehole wise cumulative thickness of all Raniganj coal seams including the local ones varies from 7.17 m (SSW-11) to 8.82 m (SSW-12). Down-dip extension of Raniganj seams for about 800 m has been established during the period. Seven regional Barakar coal seams/zones (Seam I to VII in ascending order) have been intersected in the depth range from 431.13 m (SSW-11) to 620.35 m (SSW-10). The thickness of individual coal seams varies from 0.88 m (Seam IV, SSW-10) to 3.22 m (Seam II, SSW-10). The maximum cumulative thickness of regional Barakar coal seams has been recorded to be 8.15 m (SSW-10). Investigation is continuing.
Sohagpur Coalfield	Bihar block, Shahdol district	A total of 2583.55 m was drilled in nine boreholes SBR-10 to SBR-18 and 5 sq km area was geologically mapped on 1:10000 scale. The thickness of the Lameta Formation intersected in boreholes ranges from 26.30 m to 54.60 m. The North eastern part of the area is covered with Barren Measures, which is mostly dominated by feldspathic sandstones and variegated mudstones/shales. General strike of bedding is NW-SE with low dip (1° to 2°) towards NE. The thickness of the Barren Measures intersected in boreholes ranges from 50.40 m to 87.75 m. The contact with underlying Barakar Formation is marked at the base of thick variegated mudstone/shale horizon. Barakar Formation is characterized by dominantly arkosic sandstone. Four regional Barakar coal seams (I to IV in ascending order) and four local seams (L1, L2, L3 & Local) were intersected between the depths 122.90 m and 321.20 m. Seam III is considered as the marker seam. The thickness of the coal seams varies from 0.50 m to 5.18 m. Continuity of all the coal seams intersected in the present block has already been established through exploration in the adjacent Pachri and Devanitola blocks to the north. The coal seams have been traced over 6 km in strike and over 2 km in dip direction within the block. Talcher Formation was intersected in two boreholes and it comprised of fine to very fine grained khaki colored feldspathic sandstone with bioturbations at top. The sandstone as well as mudstone of Talchir Formation frequently characterized by the presence of striated and faceted pebbles, cobbles and boulders of basement metamorphics. Investigation is continuing.
	Malka block Shahdol district	A total of 2305.30 m (including re-drilling) has been drilled in five boreholes namely, SMLK-2 (part), 3 (part), 5, 6 & 7 and 1 sq km area was geologically mapped on 1:10000 scale. Raniganj and Barakar Formations are the main coal bearing sequence in this block. Though the Barakar Formation is the main storehouse of coal, Raniganj Formation also contains two to five coal zones. Four regional Barakar coal seams namely, I, III, IV and V (in ascending order) and three local seams (L1, L2 & L3) have been intersected within a depth range from 371.46 to 642.50 m with cumulative coal thickness ranging from 0.55 to 7.78 m. Seam III is the thickest seam. Qualitywise Barakar seams are mostly of superior grade. Raniganj coal seams are interbanded in nature and qualitywise are of power grade. It has been intersected between the depth range of 14.90 m and 108.80 m. The continuity of the coal seam has been established along dip and strike directions for about 4 km and 1km, respectively. The investigation was completed.
	Harri block Shahdol district	A total of 1132.25 m has been drilled in three boreholes namely, SHR-1, 2 & 3 through the deployment of three drill rigs and 4 sq km area was geologically mapped on 1:10000 scale. Raniganj and Barakar Formations are the main coal bearing sequence in the Malka block. Though the Barakar Formation is the main storehouse of coal, Raniganj Formation also contains two to five coal zones. Three regional Barakar coal seams

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COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
		namely, III, IV and V (in ascending order) and one local seam (L1), have been intersected within a depth range from 362.92 m to 438.00 m with cumulative coal thickness ranging from 1.53 m to 5.75 m. Seam III is the thickest seam. Qualitywise Barakar seams are mostly of superior grade. Raniganj coal seams are interbanded in nature and qualitywise are of power grade. It has been intersected between the depth range of 17.45 m and 92.10 m. The continuity of the coal seam has been established along dip and strike directions for about 5 km and 1 km, respectively. Investigation is continuing.
Maharashtra Wardha Valley Coalfield	Jhamkola area, Yavatmal district	A total of 975.50m has been drilled in two boreholes viz. WJ-3A (outsourcing), 4D. In borehole WJ-3A, Deccan Trap/Motur and Motur/Barakar formational contacts were demarcated at 110.62 m and 460.55 m depths, respectively. One composite Barakar coal seam has been intersected within the depth range from 521.95 m to 540.59 m. The cumulative thickness of coal is 5.35 m with individual seam thickness varies from 0.55 m to 3.20 m. The borehole was closed at the depth of 546.50 m in Barakar Formation. Boreholes WJ-4 to WJ-4C and WJ-4D abandoned in Motur Formation. Investigation was closed.
	Dabhadi Sector, Yavatmal district	A total of eight boreholes were drilled however, the effective drilling of 2082.50 m has been considered by outsourcing in five boreholes WDD-1A, 2, 3 (completed), 4A & 5A (abandoned). The intersected thickness of Deccan Trap varies from 128.27 m (WDD-1A) to 171.33 m (WDD-2). The Motur-Barakar formational contact in this sector varies from 322.70 m (WDD-3) to 363.89 m (WDD-1A). The entire Barakar Formation has been intersected in borehole WDD-3 and the thickness of Barakar Formation is 82 m in this area (from 322.70 m to 404.70 m). The borehole closed at 417.50 m depth within Talcher Formation (12.80 m+). Barakar coal seams were intersected within the depth range from 357.70 m (WDD-3) to 452.58 m (WDD-1A).The individual coal thickness varies from 0.80 m (WDD-1A) to 5.05 m (WDD-2) but boreholewise cumulative coal thickness varies from 2.30 m (WDD-3) to 6.98 m (WDD-1A). Borehole no. WDD- 4A & 5A abandoned in Motur Formation at the depth of 417.00 m and 324.00 m, respectively. Investigation was closed.
	Wadhona-Phukta area, Yavatmal district	A total of 291.45 m drilling has been carried out in two boreholes namely WWP- 1 & 2. The planning of borehole WWP-1 was made on the basis of geophysical investigation carried out during the FS: 2004-05 by Geophysics Division, CHQ, GSI. The drilling operation commenced with the commencement of borehole WWP-1. Interpretation of geophysical report showed considerably thick sediments below the Deccan Trap but the borehole WWP-1 reached to the basement sediments of Sullavai Formation after intersecting Deccan Trap & Lameta Formations without intersecting lower Gondwana Sequence. The Deccan Trap/Lameta Formation contact demarcated at the depth of 61.05 and Lameta/Sullavai formation at 65.90 m depth. The borehole closed at a depth of 125.70 m. Borehole WWP-2 commenced and also intersected basement at the depth of 139.12 m below Deccan Trap. The borehole closed at the depth of 165.75 m in Sullavai Formation. Investigation was completed.
Odisha Mahanadi Valley Coalfield	Grindola block, Jharsuguda district	A total of 321.10 m was drilled in last two boreholes (IBGD-6 & IBDG-7 completed) in which two regional coal seam zones of Barakar Formation i.e., Rampur seam zone (intersected from 626.27 m to 789.69 m in two boreholes) and Ib seam zone (intersected from 761.01 m to 771.63 m in B.H. no. IBDG 7 only) were intersected. A total of 91.95 m coal samples were collected and sent to CIMFR for analysis. Rampur seam zone is the thickest seam zone having maximum cumulative coal thickness of 49.68 m with eight splits intersected at roof depth of 666.32 m in IBDG-6 and Ib seam zone has cumulative coal thickness of 2.83 m with four split sections. The grade of coal varies mostly from D to F. Total indicated resources of 839.64 million tonnes has been assessed for the block.

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COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
	Bandbahal block, Jharsuguda district	A total of 2,687.45 m was drilled in five boreholes (three completed and two in progress) in Bandbahal Block along with collection of 504.47 m coal sample. Four regional coal seam zones of Barakar Formation (Belpahar, Parkhani, Lajkura and Rampur from top to bottom) were intersected from 235.86 m to 861.75 m depths. The Lajkura seam zone, having the maximum cumulative thickness of 63.09 m (in BH no IBBA-5), is the most important for its regional persistence and its thickness increases towards the down dip direction. The Belpahar and Parkhani seam zones have maximum cumulative thickness of 15.77 m in IBBA-5 and 35.30 m in IBBA-6, respectively. Four regional coal seams of Raniganj Formation (R-IV to R-I) were intersected within 54.95 m to 230.48 m depths. The R-I seam zone having maximum thickness of 17.58 m, is most important for the shallow depth occurrence. The maximum cumulative coal thickness of R-IV, R-III and R-II is 5.82 m, 14.71 m and 2.26 m, respectively. The exploration also indicates promising down dip occurrence of R-I seam in shallow depth and increase in cumulative coal thickness of Lajkura seam zone. The extensions of regional Barakar and Raniganj coal seam zones have been established for about 2 km along the strike and 1.5 km along the dip.
	Bartap block, Jharsuguda district	A total of 2686.15 m was drilled in four boreholes (3 completed and one in progress) along with collection of 629.88 m coal sample during the period. Three regional coal seam zones of Raniganj Formation (Raniganj: R-III to R-I in descending order) and five regional coal seam zones of Barakar Formation (Belpahar to Ib from top to bottom) were intersected between 13.96 m and 684.47 m depth. Amongst the Raniganj seam zones R-I (2 to 4 splits) was the most important seam intersected at 13.96 m depth in IBBR-1 and it has the maximum thickness of 10.10 m in IBBR-2. The other seam zones R-III (maximum cumulative thickness of 1.72 m with two splits in IBBR-4) and R-II (maximum cumulative thickness 5.37 m with two splits in IBBR-2) have their regional persistency. Amongst the Barakar seam zones, Lajkura (with 4 to 6 splits) was the most important seam intersected at 357.72 m depth in IBBR-1 and it had the maximum thickness of 61.58 m in IBBR-3. The other seam zones, Belpahar (maximum cumulative thickness of 19.10 m with ten splits in IBBR-4), Parkhani (maximum cumulative thickness 28.84 m with fourteen splits in IBBR-2), Rampur (maximum cumulative thickness 51.82 m with seven splits in IBBR-2) and Ib (maximum cumulative thickness 4.79 m with four splits in IBBR-1) have their regional persistency and were intersected in all boreholes. CBM desorption study of eighteen coal samples from IBBR-1 indicate the maximum desorbed gas content of 0.12 cc/g at NTP. Extension of Raniganj and Barakar regional coal seams has been established for about 2 km along strike and 2.5 km along dip direction.
Talcher Coalfield	Kantaikoliya area, Angul district	A 1331.10 m was drilled in 3 boreholes (2 completed and one in progress) and an area of 4 sq km coalfield map was updated on 1:50000 scale. Four regional coal seams (seam nos: IX, IV, III and II) of Barakar Formation have been established for 2 km in strike direction. A total cumulative coal thickness of 15.22 m (during this period only) was intersected from the depth range from 155.50 m to 372.94 m representing parts of seam zones IX (0.54 m-2.04 m), VII (0.75 m), IV (1.04 m-2.44 m), III (0.75 m-2.23 m) and II (1.07 m) in borehole no.TKK-2. In the third borehole TKK-3, total cumulative coal thickness of 17.07 m was intersected from 116.04 m to 363.92 m depth forming part of seam zone IX (0.85 m-2.11 m), IV (0.76 m-1.15 m), III (0.51 m-2.19 m) and II (1.03 m). A total of 955 m geophysical logging was done in two boreholes. The fourth borehole (TKK-4) was progressed up to 342.40 m depth intersecting Barren Measure Formation and Barakar Formation devoid of any coal seam. However, a thin band of coal (0.44 m) was intersected between the depth ranges from 180.74 m to 181.18 m probably representing the part of the degenerated seam zone of III.

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COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
Telangana		
Godavari Valley Coalfield	Sirpur-Kagaznagr blocks, Adilabad district	The area comprises of major hill ranges of sandstone and limestone. The Block area is covered by the rocks of Upper and Lower Gondwana Formations. The overall regional strike of the lithologies is trending NW direction & dip towards NE with varying dip amount but southern side of block gives the NW dip direction. On the basis of borehole drilled by MECL earlier, borehole in GSS-1 at elevation 200 m was finalized towards dip section from MECL boreholes MK-13, 22. Drilling & logging data gives the clear picture of lithological variation of formation. Megascopically Kamthi Formation exposed on surface to approximately 50-60 m depth. Borehole encountered Kamthi Formation as well as Barren Measure Formation with <30 cm carbonaceous bands/coalgy bands at depths of 102 m, 118 m 170 m & 173 m.
	Rudrakshapalli- Ganugalapalli area Adilabad district	On the basis of current study, an area of 25 sq km was delineated for taking up LSM and to initiate mapping on (1:10000) around 4 sq km. During the mapping (Reconnaitory Survey) and LSM, mainly four Formational units were identified in the area. Gangpur Formation- whitish colour, fine grained sandstone composed mainly quartz and feldspar (feldspar is mainly kaolinised). This Formation is well exposed in and around Lingalapally village, north of Gangalapalli village (2 km towards north), west of Jamedaribunjara and Nallvarigudem village. It is also exposed to north of Appraopeta village area. Gangpur Formation exposed around Lingalapally village area is contain fossil impression. Kota Formation is composed of greyish white to variegated coloured sandstone with clay gall/siltstone of varying size (5 mm to 150 mm). In few places sandstone is marked with mega ripples, scouring structures. It is well exposed in and around Ankapalem village, Arlapenta village, Kodisalagudem village, south of Patta Gangaram and in and around Togugudem village area. Kamthi Formation-Brownish colour, hard compact, cross bedded sandstone composed mainly of quartz and feldspar. It is ferruginous in nature. North of High way connecting the Vinayakpuram and Kotta Gangaram Kamthis can be well traced. In and around Pusukunta, Kuturu and east and north of Jinnalegudem village Kamthi formation is exposed in the form of hills. Maler Formation-Brownish to Light chocolate coloured medium to coarse grained, unsorted lithic sandstone composed mainly of quartz as a primary constituent, very less amount of feldspar and some lithic fragment. It is at places very coarse, pebbly to conglomeratic in nature and highly weathered. It is matrix supported sandstone. A total 21 rock samples were collected and 6 samples submitted to petrology division and their results are awaited. Some of the samples from Gangpur Formation is suspected to contain fossil impression were collected and submitted to Palaeontology division, GSI,SR, Hyderabad for further study. During the course of mapping, fossil wood (>1 mt) is also encountered in the mapping area within the Kota Formation.
	Pagaderu (East) Sector, Adilabad district	The regional exploration in Pagaderu (East) sector covering an area of about 6 sq km located to the north of Manuguru Mining block. The exploration area is mostly covered by soil and alluvium. The area composed of the litho units of Upper, Middle and Lower Kamthi formations. The general strike of the area is N70E-S70W and dipping 10° North westerly. A total of 1848.00 m drilling was achieved from three boreholes (GPDE- 1, 2 and 3), GPDE-1 borehole drilled from 294.50 to 631.00 m (drilled depth is 336.50 m) passed through Barakar Formation which is characterised by greyish white, coarse to very coarse grained, massive, micaceous, feldspathic, garnetiferous sandstone with bands/seams of coal and carbonaceous shale sequence and grey, massive shale. In GPDE-1 borehole a cumulative thickness of 9.15 m (pre-analysis by CIMFR) of coal intersected within the Lower Kamthi Formation ranging its thickness from 0.50 to 1.20 m in 12 split sections. It also intersected coal bands/seams of Barakar Formation with a cumulative thickness 38.02 m (pre-analysis by CIMFR) ranging its thickness from 0.50 to 11.64 m in 28 split sections. GPDE-1 borehole intersected hot water artesian aquifer at 340.00 m depth having an average temperature of 60 °C at surface. GPDE-1 borehole closed at a depth of 631.00 m after intersecting Talchir Formation at 624.99 m depth. GPDE-2 borehole drilled in the down dip side of Pagaderu (East) sector. GPDE-2 borehole drilled from 0.00 to 770.00 m (drilled depth is 770.00 m), it initiated

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COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
		<p>within Upper Kamthi Formation which is characterized by brownish to yellowish brown, coarse to very coarse grained, massive to occasionally laminated, micaceous sandstone with mainly ferruginous cement also subrounded pebbles of quartzite. GPDE-2 intersected Middle Kamthi Formation at 76.96 m depth, which is characterized by grey to greenish grey, variegated shale and siltstone with occasional bands of red clay and grey, fine grained, micaceous sandstone. It intersected Lower Kamthi Formation at 155.50 m depth which consist of greyish white, coarse grained, massive, micaceous, feldspathic (fully kaolinised) sandstone, grey to dark grey massive shale and siltstone with bands of coal and carbonaceous shale. Intersected Barren Measures at 283.50 m depth it is of greenish grey to grey, massive shale and siltstone with bands of siderite devoid of coal and carbonaceous shale bands. GPDE-2 intersected Barakar Formation at 356.00 m and still continuing through the same Formation. In GPDE-2 borehole a cumulative thickness of 5.78 m (pre-analysis by CIMFR) of coal intersected within the Lower Kamthi Formation ranging its thickness from 0.50 to 1.00 m in 9 split sections. It also intersected coal bands/seams of Barakar Formation with a cumulative thickness 22.36 m (pre-analysis by CIMFR) ranging its thickness from 0.50 to 4.34 m in 19 split sections. GPDE-3 borehole drilled in the same strike direction of GPDE-1 borehole in Pagaderu (East) sector. GPDE-3 borehole drilled from 0.00 to 447.00 m (drilled depth is 447.00 m), it initiated within Lower Kamthi Formation which consist of greyish white, coarse grained, massive, micaceous, feldspathic (fully kaolinised) sandstone, grey to dark grey massive shale and siltstone with bands of coal and carbonaceous shale. Intersected Barren Measures at 237.91 m depth it is of greenish grey to grey, massive shale and siltstone with bands of siderite devoid of coal and carbonaceous shale bands. GPDE-3 intersected Barakar Formation at 320.00 m and still continuing through the same Formation. In GPDE-3 borehole a cumulative thickness of 10.64 m (pre-analysis by CIMFR) of coal intersected within the Lower Kamthi Formation ranging its thickness from 0.50 to 1.20 m in 14 split sections. It also intersected coal bands/seams of Barakar Formation with a cumulative thickness 2.32 m (pre-analysis by CIMFR) ranging its thickness from 0.55 to 1.22 m in 3 split sections. In this sector a total of 896 m was geophysically logged in GPDE-1 and GPDE-2 boreholes.</p>
	Bayyaramcherla area, Adilabad district	<p>The study area is covered by the rocks of Upper Kamthi, Maleri and Kota Formations. The rocks of Upper Kamthi Formation in the southernmost boundary of the study area were mapped previously as Maleri Formation. The drilling of Borehole GBC-1 commenced and progressed to a depth of 403.3 m passing through Maleri and Kamthis. The 1st coal seam of 0.25 m was intersected within lower Kamthi Formation at 295.92 m depth. Several coal seams were intersected in the Lower Kamthi Formation between 295 m and 356 m with a maximum thickness of 1 m for an individual coal seam. A cumulative thickness of 4.05 m coal was obtained in 06 splits ranging in thickness from 0.50 to 1.00 m, within Lower Kamthi Formation.</p>
	Mangrude village, Bela Mandal, Adilabad district	<p>The area is located at Bela mandal of Adilabad District and an area of 100 sq km area adjacent to Telangana-Maharashtra border area is taken up for large scale mapping in 1:125000. A sandstone body has been identified as well as its surfacial extension delineated on the field. The body is been located south of the Mangrude village and most of the exposures are identified in a nala section (E-W trending). There is reported occurrence of coal in an agricultural borewells dug by locals at a very shallow depth of 15 m. Moreover, in a place called Mukutban in Maharashtra around 4 km North-east from the present area there is 3 operative open cast mines. One coal seam of around 2 m thickness at a very shallow depth is being mined in that mine. The limestone of the Mangruda formation is been mapped and samples (13 nos.) for chemical analysis is taken to assess the potentiality of the limestone for various industrial use. The red shale is mostly exposed along the nala section and a dominant lithology of the entire mapping block. The red shale in the area is mostly very low dipping (1-5°) towards NE. They are also at places showing two sets of joints (350,040). The red shale formation</p>

(Contd.)

COAL & LIGNITE

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
		showing alternate thick red coloured and thin pale green coloured shale bands. An area of apx.15 sq km previously been mapped as red shale has been remapped as recent deposit from areas north of Kapsi village. The areas is showing black coloured soil with few isolated exposure on nala section north of Kapsi (E-W trending nala joining Penganga river) to Maniyarpur village. The recent deposit is been observed to rest over the red shale of Bela formation.
West Bengal		
Raniganj Coalfield	Gaurangapur-Bankati area, Barbhaman district	The exploration for coal under G-3 stage was continued in this area, Bankati area, concealed under younger tertiary sediments lies in the easternmost extremity of the known limits of Raniganj Coalfield. This block is outside the domain of CBM Block and in the east of previously explored Bistupur-Dandeswar area. A total of 2560.70 m was drilled in five boreholes (two complete and three running) viz.RGB-1 to 5 and 2,126 m was geophysically logged. Raniganj coal seam zones namely R-IX, R-VIII and R-VII (in ascending order) were recorded in borehole RGB-3 within the depth range of 276.80 m and 435.50 m. The coal seam zone R-IX is a solitary seam with a thickness of 1.02 m. Coal seam zone R-VIII is the most promising seam zone, having cumulative coal thickness of 8.25 m with seven split sections and their thicknesses varying from 0.50 m to 3.20 m. Seam zone R-VII in this borehole is also having two split sections with thicknesses 0.67 m and 3.95 m, respectively. Two thin seams of around 0.50 m thickness were intersected in borehole RGB-4 within the depth range of 281 m to 302 m. Another two coal seams of thicknesses 0.90 m and 0.63 m, respectively were recorded in borehole RGB-5 within the depth range of 199.78 m to 227.85 m. One 1.85 m thick lignite band was also recorded in borehole RGB-5 at a depth of 147. Gastropod and bivalve shells were recorded in Tertiary sediments and Plant and Vertibraria fossil impressions were recorded in Raniganj Formation in all the borehole cores. Coal petrographic study reveals, that rankwise the coal can be categorized under High Volatile Bituminous C type.
Birbhum Coalfield	Djara area, Birbhum district	A total of 2424.25 m has been drilled in four boreholes, Rajmahal Birbhum Coalfield, Birbhum district, WB (three boreholes completed and one borehole in progress) with intersection of 2.48 m lignite (in two split sections) within the depth range of 95.39 m to 162.01 m. Barakar coal seam zones II (thickness-1.49 m), III (Cumulative coal thickness from 3.22 m-6.91 m) and IV (thickness-2.14 m) in ascending order were intersected between the depth range of 663.38 m to 787.86 m. During this period 11 samples of CBM desorption study was carried out with maximum 0.99 cc/gm desorbed gas. The area is covered with Tertiary sediments. The maximum thickness of Tertiary sedimentaries is 323.40 m; Rajmahal Formation is 317.40 m, Barakar Formation is 233.41 m and Talchir Formation is 61.37 m, respectively. Geophysical logging of 797 m has been done in one borehole.
	Gazipur (west) Sector, Birbhum district	A total of 1435.90 m have been drilled in three boreholes in Rajmahal Birbhum Coalfield, Birbhum District, WB.A 2.38 m lignite intersected at a depth of 251.11 m in Borehole BGZW-5. Barakar coal seam zones III and IV in ascending order and having a cumulative coal thickness range between 0.63 m to 1.30 and 1.96-1.97 m, respectively, has been intersected between the depth ranges of 520.21 m to 710.88 m. Desorption study carried out in borehole No. BGZW-4 for two no. of samples and the desorbed gas (cc/gm) ranged between 0.011 cc/gm to 0.012 cc/gm. The borehole data reveals that the entire area is covered by Tertiary sediments. The maximum thickness of Tertiary sedimentaries is 275.60 m; Rajmahal Formation is 383.30 m and Barakar Formation is 183.19 m, respectively. Geophysical logging of 657 m was undertaken in one borehole.

(Contd.)

COAL & LIGNITE

Table - 4 (Concl.d.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
LIGNITE		
Rajasthan		
West Coast Lignite field	Panna area, Jaisalmer & Bikaner districts	Exploration under G-4 stage continued under Promotional scheme to locate lignite bearing blocks, establish the stratigraphic set up of the area and preliminary assessment of lignite resource. A total of 119.50 m drilling has been done in two boreholes RPP-7 and 9 without intersecting any lignite seams. Investigation was closed. Scout drilling to locate lignite bearing blocks, establish the stratigraphic set up of the area and preliminary assessment of lignite resource in the Charanwala area (27°51'08" to 27°55'00" N and 72°00'00" to 72°15'00" E) in the unexplored virgin areas of Palana basin, Bikaner district, Rajasthan. A meterage of 3950.50 m of drilling have been completed in sixteen boreholes in the block. Geophysical borehole logging of 3063.19 m was carried out in the block. Lignite seams have been intersected in western and northern part of the area. Thickness of individual lignite seam varies from 0.50 m to 3.50 m in the depth range from 109.00 m to 195.00 m. The lignite seam is hosted within the Lower Tertiary Palana Formation. Carbonized leaf impression is also observed.
Tamil Nadu		
Ramnad Basin	Uttarakosimangai Sector Ramanathapuram district	A total of 1936.15 m have been drilled in six boreholes (RUL-22 to RUL-27) which includes 286 m of Quaternary Formation, 955.75 m of Cuddalore/Tittacheri Formation and 694.40 m of Neyveli formation. The thickness of these Quaternary sediments including alluvium intersected ranges between 94.00 m (RUL-27) and 96.00 m (RUL-25 & RUL-26), whereas the thickness of Cuddalore/Tittacheri Formation intersected ranges from 177.00 m (RUL-25) to 204.00m (RUL-22). The thickness of Neyveli Formation intersected in boreholes during the period varies from 87.00 m (RUL-25) to 134.50 m (RUL-23). All the six boreholes intersected lignite seams and the cumulative thickness of lignite seams intersected in boreholes drilled during the field season varies from a minimum of 6.00 m (RUL-26 & RUL-27) to a maximum of 16.50 m (RUL-24) within a depth range of 311.00 m to 395.00 m. A total of 27 boreholes have been drilled for a total meterage of 11,141.35 m in this area of 56 sq km. Geophysical logging was carried out in 23 out of the 27 boreholes for total of 9,174.00 m. The investigation was completed.
	Kalari (West) Sector Ramanathapuram district	A total of 2454.50 m was drilled in seven boreholes, which includes 753.00 m of Quaternary sediments, 1197.60 m of Cuddalore/Tittacheri Formation and 503.90 m of Neyveli Formation. The thickness of Quaternary sediments intersected during the period including alluvium ranges between 95.00 m (TRKW-3) and 117.00 m (TRKW-1) in this sector. The thickness of Cuddalore/Tittacheri Formation intersected during the period varies between 177.00 m (TRKW 1) and 231.00 m (TRKW-3). The thickness of Neyveli Formation intersected ranges between 105.00 m (TRKW-4) to 130.60 m (TRKW-3). Lignite was intersected in all the completed (4 nos.) boreholes (TRKW-I to TRKW-4) between depths of 374.00 m and 442.00 m. The cumulative thickness of lignite seams varies between 12.00 m and 22.00 m. The occurrence of lignite has been proved in the entire explored area of about 30 sq km. The investigation is in progress.

COAL & LIGNITE

Table – 5 : Details of Exploration for Coal and Lignite by State Directorates of Geology & Mining and State Undertakings, 2014-15

Agency/State/ District	Location	Geological mapping		Drilling		Remarks Reserves/Resources estimated
		Area (sq km)	Scale	Boreholes	Meterage	
COAL						
DGM						
Chhattisgarh						
Surguja	Gotan-Birjupali area	20 1.10	1:50000 1:4000	-	-	-
-do-	Tara area	25 0.50	1:50,000 1:4,000	1	214.50	About 5 lakh tonnes of coal resources were estimated.
Maharashtra						
Nagpur	Dawa-Phukeshwar area	-	1:5000 1:25000	4	1,158.30	About 0.12 million tonnes resources of coal were estimated. So far about 10.70 million tonnes resources were estimated.
-do-	Nand-Panjrepar area	-	-do-	16	7,757.90	About 3.89 million tonnes resources of coal were estimated. Total 35.86 million tonnes resources of coal were estimated till end of 2014-15.
Yavatmal	Adkoli-Khadakdoh-3 Chichghat area	-	-do-	8	1,722.00	About 4.11 million tonnes resources of coal were estimated. So far 9.60 million tonnes resources were estimated at the end of 2014-15.
-do-	Ashtona Kothurna & Mangli area	-	-do-	5	915.50	About 0.69 million tonnes resources of coal were estimated. So far 2.50 million tonnes resources were estimated at the end of 2014-15.
Meghalaya						
West Garo Hills	Damal Asim	3	1:4000	3	82.00	Work is in progress. Geochemical analysis were carried out.
LIGNITE						
GMDC, Gujarat						
Bhavnagar	Tagdi village	-	-	43	4,494.68	Total geological reserves/resources were estimated at 114.72 million tonnes (111).
Kachchh	N/v Panandhro	-	1:5000	-	-	Balance reserves of lignite at the end of March, 2015 were estimated at 2.55 million tonnes.
Kachchh	N/v Mota No Madh	-	-	188	13,825.30	-

(Contd.)

COAL & LIGNITE

Table - 5 (Concl'd.)

Agency/State/ District	Location	Geological mapping		Drilling		Remarks Reserves/Resources estimated
		Area (sq km)	Scale	Boreholes	Meterage	
Surat	N/v Tadmashwar	-	-	29	2,268.00	About 29 million tonnes of reserves/resources were estimated.
Neyveli Lignite Corp. Ltd (NLC)						
Rajasthan						
Barmer	Matasar Tala	-	-	1	384.00	Exploration work is suspended and will resume shortly.
-do-	Baytu	-	-	1	72.30	-do-
-do-	Bhurtiya	-	-	57	20,077.70	Exploration work is in progress.
Nagaur	Gangardi & Ucharda	-	-	54	13,486.10	-do-
-do-	East of Gangardi	-	-	5	1,244.00	Exploration work is completed.
-do-	Deswal	-	-	15	3,393.10	Exploration work is suspended and will resume shortly.
Tamil Nadu						
Cuddalore	East of Sethiathope	-	-	41	12,888.00	Exploration work under progress.
-do-	Vayalamur	-	-	19	8,786.00	-do-
DMG, Rajasthan						
Bikaner	N/v Kenya-Ki-Basti	-	-	24	4,113.80	About 9.79 million tonnes of geological reserves were estimated.
-do-	N/v Bikampur, Tavariwala, etc	500	1:50000	-	-	-
Jaisalmer	N/v Deunga, Anita	200	RMS (RF:1:50000)	1	195	Cumulative thickness of lignite was found out to be 0.55 m.
Nagaur	N/v Phalki Lunias, etc	400	1 cm=500 m	-	-	Carbonaceous zones were identified in tube wells.

PRODUCTION, STOCKS AND PRICES

COAL Production

The provisional total production of coal in 2014-15 was around 609.2 million tonnes which was higher by 7.7% as compared to the previous year. Chhattisgarh continued to be the largest coal producing state with a share of about 22.1% followed closely by Jharkhand and Odisha with contributions of 20.4% and 20.3%, respectively, to the national output. Next in order of share in the total production were Madhya Pradesh (14.4%), Telangana (8.6%), Maharashtra (6.3%), West Bengal (4.9%) and Uttar Pradesh 2.5 percent. The remaining 0.5% of coal production was accounted for from Arunachal Pradesh, Assam, Jammu & Kashmir and Meghalaya.

As a comparison, the production of coal in 2013-14 was 565.8 million tonnes increased by 1.7% in comparison to that of previous year. Chhattisgarh was

the largest coal producing state with a share of about (22.5%) followed by Jharkhand and Odisha (20% each), Madhya Pradesh (13.4%), Telangana (8.9%), Maharashtra (6.6%), West Bengal 4.9%) and Uttar Pradesh 2.6 percent. The remaining 1.1% of coal production share was from the states of Arunachal Pradesh, Assam, Jammu & Kashmir and Meghalaya (Table-7).

During the year 2014-15, coal mining was confined mainly to the public sector which contributed 93.1% to the national production. In 2014-15, out of the total production of coal, 9.4% was coking coal and the rest 90.6% was non-coking coal. As in the earlier years, bulk of the coking coal production, i.e., about 88.8% was reported from the Public sector. Gradewise analysis of coking coal in 2014-15 revealed that washery grade IV had the maximum share at 73.3%, followed by washery grade III (21.5%), washery grade II (3.9%) and washery grade I (0.2%). The remaining 1.1% production of coking coal was of steel grade II, steel

grade I, semi-coking grade I and SLVI. Out of the total production of coking coal in India, bulk quantity, i.e., 98.2% was produced in Jharkhand followed by West Bengal with 1 percent. The remaining 0.8% was contributed by Chhattisgarh and Madhya Pradesh.

During 2014-15, except a nominal quantity (6.5%), the balance production of non-coking coal (93.5%) came from the Public sector. Out of the total non-coking coal production, 23.7% was of G11 grade, followed by 14.3% of G12 grade, 13.8% of G13 grade, 11.7% of G10 grade, 9.6% of G9 grade, 6.9% of G7 grade, 5.5% of G8 grade, 4.1% of G6 grade, 3.4% of G4 grade and 2.7% of G5 grade. The remaining 4.3% production was contributed by G3, G14, G15, G17, G1, G16, G2 and UNG grades of non-coking coal. Chhattisgarh was the largest producing state of non-coking coal in 2014-15 which alone accounted for 24.4% of the national output. Next in order were Odisha with a contribution of (22.4%), Madhya Pradesh (15.8%), Jharkhand (12.3%), Telangana (9.5%), Maharashtra (6.9%), West Bengal (5.3%) and Uttar Pradesh (2.7%). The remaining 0.7% production came from the states of Assam, Arunachal Pradesh, Jammu & Kashmir and Meghalaya (Tables-8 to 10).

A total of 539 coal mines (as on 31.03.2015) in India reported production in 2014-15. Out of these, Jharkhand accounted for 152 mines while West Bengal for 99 mines, Madhya Pradesh (70), Maharashtra (66), Chhattisgarh (61), Telangana (48) and Odisha (27). The remaining 16 mines were from the states of Arunachal Pradesh, Assam, Jammu & Kashmir, Meghalaya and Uttar Pradesh (Table - 6).

Despatches

Despatches of coal at about 603.8 million tonnes in 2014-15 were higher by around 5.5% as compared to those in the previous year. Chhattisgarh was the leading state in the despatches in 2014-15 and accounted for 21.5% of the total despatches. The states next in order were Odisha (20.8%), Jharkhand (20.2%), Madhya Pradesh (12.3%), Telangana (8.7%), Maharashtra (6.4%), Uttar Pradesh and West Bengal (4.8 % each). The remaining 0.5% despatches were from the states of Meghalaya, Assam, Arunachal Pradesh and Jammu & Kashmir.

During the year 2014-15, statewide analysis revealed that despatches of coal increased in the states of Assam, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Telangana and West Bengal and decreased in the states of Meghalaya and Uttar Pradesh in the previous year. Jammu & Kashmir has no change as against the previous year.

Of the total despatches of raw coal effected in 2014-15, a sizeable share of 80.5% was made to the Electricity Sector. As much as 2% each was

made to the Steel Industry and Sponge Iron Industry, 1.8% to the Cement Industry, 0.4% to the Fertilizer and 0.3% to the Paper & Pulp Industry. The remaining 13% was made for other priority sectors including Textile & Rayons, Cokerries, Chemical and Other Basic Metals.

During the year 2013-14, the total despatches of raw coal, a sizeable share of 76.5% was made to the electricity sector. As much as 2.7% was made to the steel industry and 2.2% to the sponge iron industry, 2.0% to the cement industry, 0.4% to the fertilizer and 0.3% to the paper & pulp industry. The remaining 15.9% was made for other priority sectors including chemical, cokerries, textile & rayons and other basic metals (Tables-11 & 12).

Stocks

The mine-head stocks of coal at the end of the year 2014-15 were 59.4 million tonnes which increased by 7% compared to the stocks available at the beginning of the year. Bulk of the coal stocks (about 99.6%) at the end of the year was accounted for by the mines located in the states of Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Maharashtra, Uttar Pradesh, Telangana and West Bengal (Table-13).

Prices

Domestic prices of coal during 2012-13 to 2014-15 are furnished in the General Review on 'Prices'.

LIGNITE

Production

During the year 2014-15, the production of lignite at 48.3 million tonnes increased by 9% in comparison to that of the previous year. The production from Tamil Nadu alone accounted for 52.2%. The share of Gujarat in lignite production was 25.5% and that of Rajasthan was 22.3 percent (Table-14).

Out of the total 19 mines that reported lignite production in 2014-15, ten are located in Gujarat, six in Rajasthan and remaining three in Tamil Nadu (Table-15).

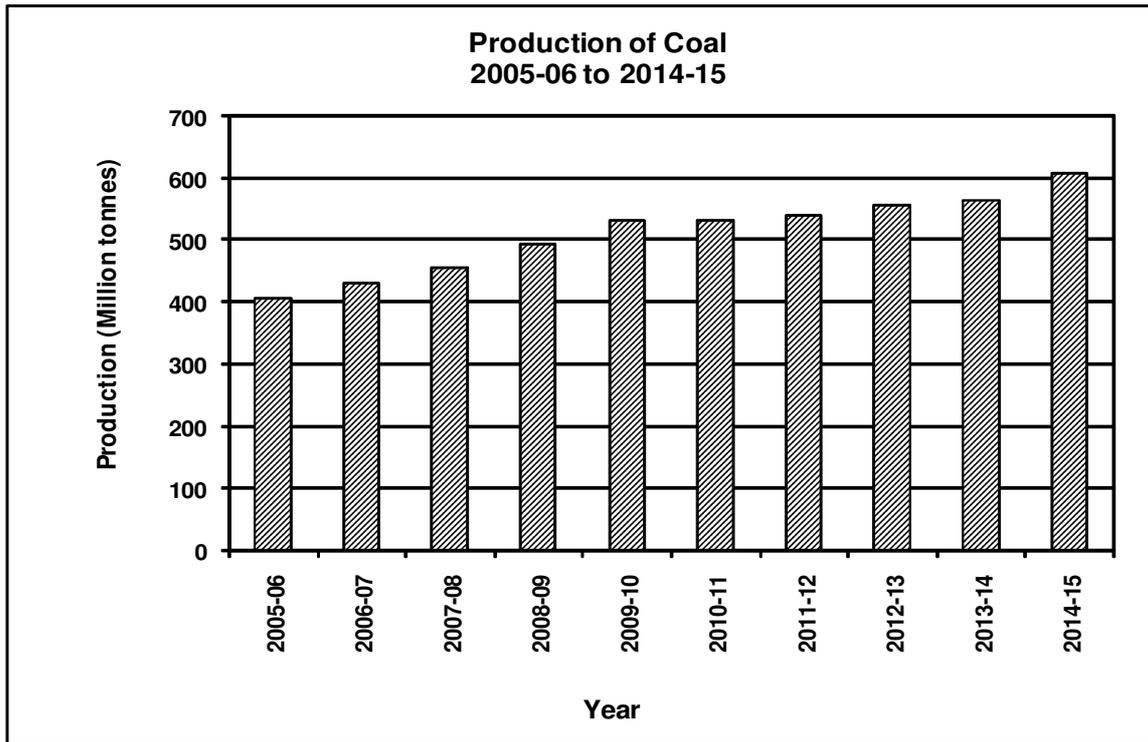
Despatches

The quantum of despatches of lignite was 47 million tonnes during the year 2014-15, which increased by 7% as compared to that in the previous year (Table-16).

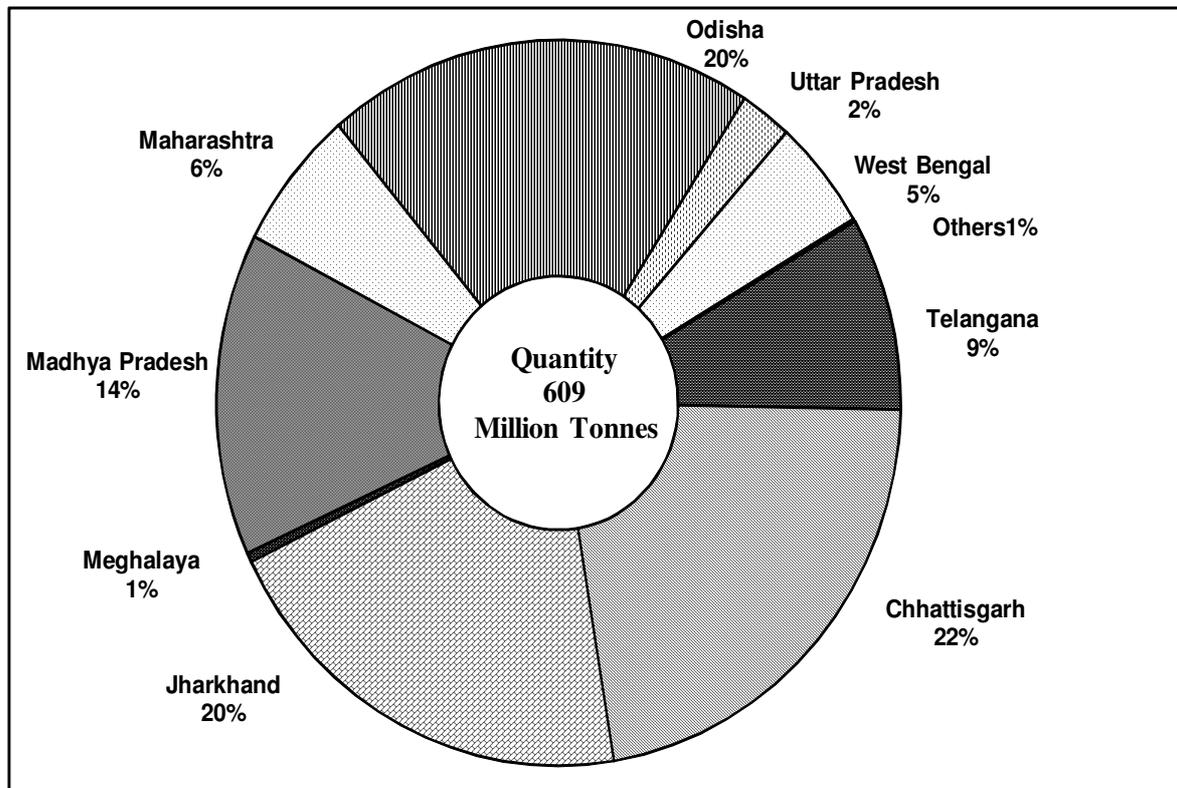
Stocks

The mine-head stocks of lignite at the end of 2014-15 were 3,878 thousand tonnes which steeply increased by 108.5% compared to the stocks available at the beginning of the year. The bulk of the coal stocks (73.3%) at the end of the year was accounted for by the mines located in the state of Tamil Nadu (Table- 17).

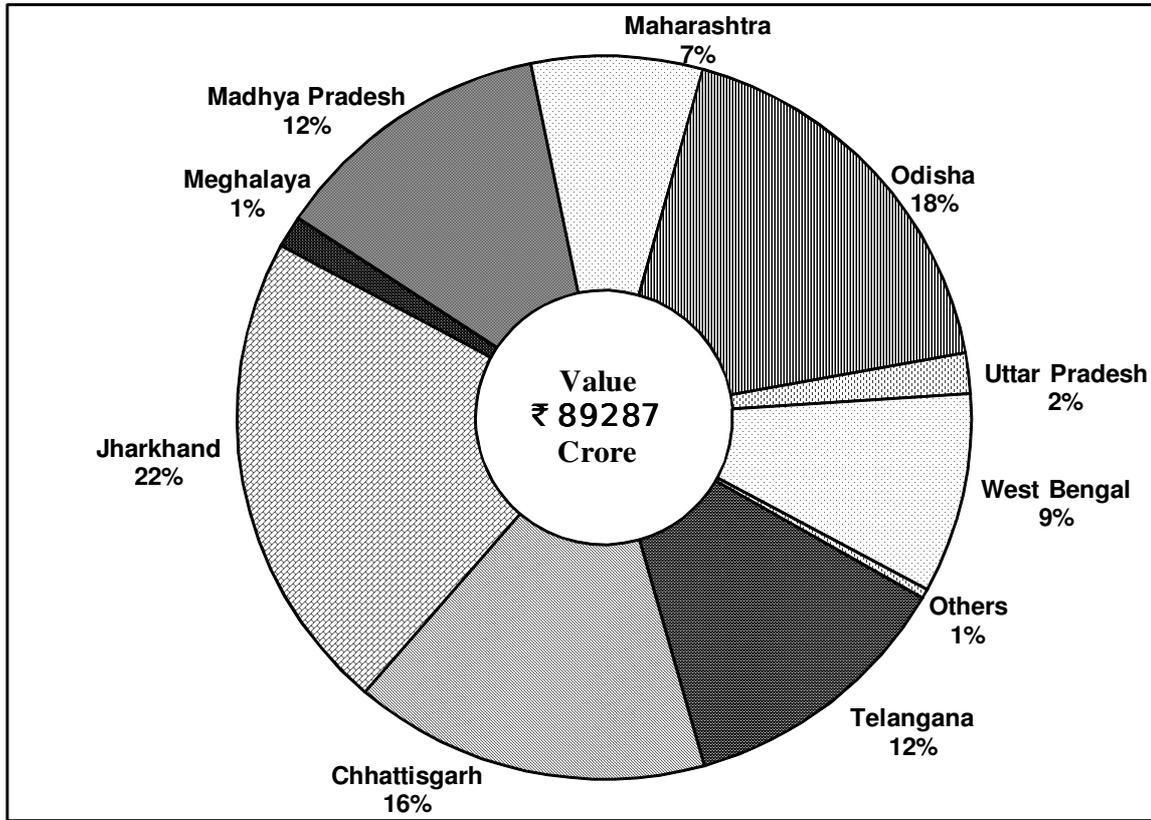
COAL & LIGNITE



Quantity of Production of Coal in Different States in 2014-15



Value of Production of Coal in Different States in 2014-15



**Table – 6 : Number of Coal Mines,
2013-14 & 2014-15
(By States)**

State	No. of Mines	
	2013-14	2014-15* (P)
India	536	539
Telangana	49	48
Arunachal Pradesh	1	1
Assam	4	4
Chhattisgarh	61	61
Jammu & Kashmir	4	4
Jharkhand	152	152
Madhya Pradesh	71	70
Maharashtra	63	66
Meghalaya	-	3
Odisha	27	27
Uttar Pradesh	4	4
West Bengal	100	99

Relates to number of mines as on 31.03.2015.

Note: Coal Mines in the state of Meghalaya operated in private sector.

COAL & LIGNITE

**Table – 7 : Production of Coal, 2012-13 to 2014-15
(By Sectors/States)**

(Quantity in '000 tonnes; Value in ₹ '000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	556400	747186600	565800	825347500	609200	892871700
Public sector	509200	629747000	528100	754795200	567032	802886105
Private sector	47200	117439600	37700	70552300	42168	89985595
Arunachal Pradesh	100	483600	-	-	-	-
Assam	600	3591200	700	3392900	800	3819900
Chhattisgarh	117900	90750800	127200	89275000	134800	139855400
Jammu & Kashmir	++	40400	++	40400	++	27600
Jharkhand	111300	175665400	113100	240509800	124100	193135100
Madhya Pradesh	75900	93737900	75600	111792700	87600	111478200
Maharashtra	39100	62356800	37200	57363500	38300	67045400
Meghalaya	5600	37365000	5700	37974500	2500	12670500
Odisha	110100	47256800	112900	150160600	123600	158984300
Telangana	53200	91695800	50500	73998000	52500	109642600
Uttar Pradesh	16100	35844200	14700	20046100	15000	16186900
West Bengal	26500	108398700	28200	40794000	30000	80025800

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

**Table – 8: Production of Coking Coal, 2014-15 (P)
(By States and Grades)**

(In '000 tonnes)

State	All-Grades	ST-I	ST-II	W-I	W-II	W-III	W-IV	SLV1	SC
India	57446	50	456	115	2228	12335	42132	-	130
Chhattisgarh	126	-	-	-	-	-	-	-	126
Jharkhand	56430	50	456	115	1566	12111	42132	-	-
Madhya Pradesh	310	-	-	-	310	-	-	-	-
West Bengal	580	-	-	-	352	224	-	-	4

COAL & LIGNITE

**Table – 9: Production of Coal, 2013-14 & 2014-15
(By Grades and Sectors)**

(In '000 tonnes)

Grade	2013-14			2014-15 (P)		
	Total	Pub. Sec.	Pvt. Sec.	Total	Pub. Sec.	Pvt. Sec.
All Grades	565765	528080	37685	609179	567032	42147
Coking	56818	49503	7315	57446	51010	6436
ST-I	61	61	–	50	50	–
ST-II	604	604	–	456	456	–
W-I	145	145	–	115	115	–
W-II	2042	1742	300	2228	1987	241
W-III	12616	11579	1037	12335	11262	1073
W-IV	40962	34984	5978	42132	37010	5122
SC-I	135	135	–	130	130	–
SLVI	253	253	–	–	–	–
Non-coking	508947	478577	30370	551733	516022	35711
G1	6130	331	5799	2740	216	2524
G2	416	416	–	565	565	–
G3	5374	5374	–	5469	5469	–
G4	21526	21526	–	19025	19025	–
G5	13236	13236	–	14789	14789	–
G6	17714	16884	830	22680	21888	792
G7	35837	35278	559	37838	37826	12
G8	28273	27767	506	30523	29401	1122
G9	57003	55680	1323	52704	51490	1214
G10	55405	53622	1783	64411	59942	8469
G11	126328	123303	3025	130703	125628	5075
G12	56372	53281	3091	79169	73771	5398
G13	68984	67076	1908	76348	76081	267
G14	4556	898	3658	5054	851	4203
G15	3858	2442	1416	3806	1784	2022
G16	3093	613	2480	2627	813	1814
G17	4786	845	3941	3258	483	2775
UNG	56	5	51	24	–	24

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: Despatches of Coal, 2013-14 & 2014-15
(By States)**

(In '000 tonnes)

State	2013-14	2014-15 (P)
India	572060	603772
Arunachal Pradesh	–	–
Assam	577	733
Chhattisgarh	124674	129392
Jammu & Kashmir	13	13
Jharkhand	116798	122044
Madhya Pradesh	63096	74243
Maharashtra	37205	38553
Meghalaya	5732	2524
Odisha	116795	125382
Telangana	47892	52662
Uttar Pradesh	30807	29021
West Bengal	28471	29205

Table – 10 : Production of Non-coking Coal, 2014-15 (P)
(By States and Grades)

(In '000 tonnes)

State	Grades																		
	All-Grades	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17UNG	
India	551733	2740	565	5469	19025	14789	22680	37838	30523	52704	64411	130703	79169	76348	5054	3806	2627	3258	24
Assam	779	216	437	-	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chhattisgarh	134638	-	-	1836	2225	4406	3030	765	1743	1882	1207	93346	13859	267	3461	2022	1814	2775	-
Jammu &																			
Kashmir	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
Jharkhand	67713	-	38	446	285	3225	9651	4031	5424	13733	8271	6379	423	15783	-	-	-	-	24
Madhya																			
Pradesh	87299	-	-	1935	1502	2298	5960	22723	3882	1033	44277	2928	-	-	761	-	-	-	-
Maharashtra	38257	-	-	-	-	195	670	866	9873	24661	1763	198	31	-	-	-	-	-	-
Meghalaya	2524	2524	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odisha	123627	-	-	-	-	100	-	-	149	1027	410	8528	64509	48162	742	-	-	-	-
Telangana	52536	-	-	-	-	740	-	7051	1458	10229	1543	15875	347	12136	90	1784	813	470	-
Uttar Pradesh	14957	-	-	-	-	82	202	-	7733	-	6940	-	-	-	-	-	-	-	-
West Bengal	29390	-	90	1252	14887	3743	3167	2402	261	139	-	3449	-	-	-	-	-	-	-

COAL & LIGNITE

**Table –12 : Despatches of Raw Coal, 2013-14 & 2014-15
(By Priorities)**

(In '000 tonnes)

Priority	2013-14	2014-15 (P)
Total	572060	603772
Steel	15276	12343
Sponge Iron	12512	12046
Chemical	351	407
Electricity	437590	485948
Cement	11636	11057
Cokeries	899	179
Paper & pulp	1906	1648
Fertilizer	2288	2293
Textile & Rayons	360	415
Other Basic metal	738	467
Others	88504	76969

Note: Steel includes direct feed & coking washery for metallurgical use and steel (boilers). Other includes non-coking washery and Bricks.

**Table – 13: Mine-head Stocks of Coal, 2014-15 (P)
(By States)**

(In '000 tonnes)

State	At the beginning of the year	At the end of the year
India	55514	59389
Arunachal Pradesh	–	–
Assam	169	215
Chhattisgarh	7186	11576
Jammu & Kashmir	13	13
Jharkhand	13987	15544
Madhya Pradesh	5756	4111
Maharashtra	5670	5370
Odisha	14293	12538
Telangana	5548	5348
Uttar Pradesh	1274	2484
West Bengal	1618	2190

COAL & LIGNITE

**Table – 14 : Production of Lignite, 2012-13 to 2014-15
(By Sector/States)**

(Quantity in '000 tonnes; Value in ₹ '000)

	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	46500	55114100	44300	59675300	48300	81627000
Public sector	46203	54762081	44110	59419356	48100	81289000
Private sector	297	352019	190	255944	200	338000
Gujarat	14500	14990900	11600	12547100	12300	17914600
Rajasthan	7100	2776600	7600	5136100	10800	12590000
Tamil Nadu	24900	37346600	25100	41992100	25200	51122400

**Table – 15 : Number of Lignite Mines
2013-14 & 2014-15
(By States)**

State	No. of Mines	
	2013-14	2014-15 (P)
India	16	19
Gujarat	7	10
Rajasthan	6	6
Tamil Nadu	3	3

**Table – 16 : Despatches of Lignite
2013-14 & 2014-15
(By States)**

(In '000 tonnes)

State	2013-14	2014-15 (P)
India	43897	46954
Gujarat	11831	12362
Rajasthan	7628	10504
Tamil Nadu	24438	24088

**Table – 17 : Mine-head Stocks of
Lignite, 2014-15 (P)
(By States)**

(In '000 tonnes)

State	At the beginning of the year	At the end of the year
India	1860	3878
Gujarat	69	23
Rajasthan	52	1013
Tamil Nadu	1739	2842

MINING & MARKETING

Coal

Coal mining in the country is carried out by both opencast and underground methods. Opencast mining contributes over 92% of total production whereas rest of the production (about 8%) comes from underground mining. Most mines are either semi-mechanised or mechanised. The machineries commonly deployed 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; and 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 yields higher output with high percentage recovery (70-80%). In opencast mines, machineries 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 CMPDIL are subsidiary companies of Coal India Ltd (CIL), a Government of India undertaking. CMPDIL is a subsidiary of CIL which is engaged in surveying, planning and designing work with a view to optimise coal production. The Singareni Collieries Company Limited (SCCL) is a joint venture between Government of India and Government of Telangana. The coal mines in Assam and its neighbouring areas are controlled directly by CIL under the unit North Eastern Coalfields Ltd (NEC).

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 & 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, Kanhan and Patharkheda Coalfields in Madhya Pradesh and Wardha Valley & Kamthi Coalfields in Maharashtra. This company largely meets the requirements of thermal power plant and industries in the western region of the country.

ECL covers Raniganj Coalfields in West Bengal and Mugma & Rajmahal Coalfields in Bihar. It produces and supplies coal to the local and other industries which require 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 Arunachal Pradesh, 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 Telangana state producing non-coking coal. The coal requirements of consumers in south are mostly met by this company.

MCL had been incorporated as another subsidiary company of CIL. Its area of jurisdiction comprises Talcher and Ib Valley Coalfields of Odisha.

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

Jharkhand State Mineral Development Corporation Ltd (JSMDCL) and Jammu & Kashmir Minerals Ltd (JKML) are the State Government undertakings and Damodar Valley Corporation (DVC) is the Central Public Sector undertaking that are engaged in coal mining. IISCO steel plant of SAIL is the only public sector steel unit operating captive mines for coal. Bengal Emta Coal Mines Ltd (BECML), Jindal Steel & Power Ltd (JSPL), Hindalco and Tata Steel are the companies operating captive mines in the private sector.

As on 31.3.2015, there were 539 operating mines for coal in the country out of which 239 were opencast, while 271 were underground mines. The remaining 29 were mixed collieries. There were 508 Public Sector mines and 31 mines in Private Sector (Table-18). Thrust is given on further increasing production from opencast mines where the gestation period is comparatively shorter. In 2014-15, the share of production of raw coal from opencast mines was 560.67 million tonnes (92%) against 48.51 million tonnes (8%) from underground mines (Table-19). Production of coal by different mining technologies employed is furnished in Table-20. The overall Output per Man Shift (OMS) in opencast and underground mines for CIL in 2014-15 was 6.50 tonnes as against

COAL & LIGNITE

5.79 tonnes in 2013-14. The overall OMS in opencast and underground mines for SCCL in 2014-15 was 4.20 tonnes as against 3.86 tonnes in the previous year.

**Table – 18 : Number* of Coal Mines, 2014-15
(By Sectors/States)**

State	No. of collieries			
	OC	UG	Mixed	Total
All India	239	271	29	539
Public sector	214	265	29	508
Private sector	25	6	–	31
Telangana	16	32	–	48
Arunachal Pradesh	1	–	–	1
Assam	3	1	–	4
Chhattisgarh	23	37	1	61
Jammu & Kashmir	–	4	–	4
Jharkhand	80	52	20	152
Madhya Pradesh	24	46	–	70
Maharashtra	44	22	–	66
Meghalaya	3	–	–	3
Odisha	17	10	–	27
Uttar Pradesh	4	–	–	4
West Bengal	24	67	8	99

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

* As on 31.3.2015

Note: OC - Opencast UG - Underground.

Table – 19 : Production of Raw Coal

(In million tonnes)

Year	Production from open-cast mines (% share)	Production from under-ground mines (% share)	Total production
2012-13	504.195 (90.6%)	52.207 (9.4%)	556.402
2013-14	516.116 (91.2)	49.649 (8.8)	565.765
2014-15	560.667 (92%)	48.512 (8%)	609.179

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

**Table – 20 : Production of Coal, 2014-15
(By Technologies)**

(In million tonnes)

Technology adopted	Production	Percentage of total
All India : Total	609.179	100
Opencast (Total)	560.667	92.00
Mechanised	560.303	99.90
Manual	0.364	0.10
Underground (Total)	48.512	8.00
Conventional B&P	2.237	4.60
Mechanised B&P	41.625	85.80
Conventional LW	0.000	0.00
Mechanised LW	1.169	2.40
Other methods	3.481	7.20

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

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

As the prices of all grades of 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 de-regulated.

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

Lignite

Out of the nineteen opencast working mines, four are owned by Neyveli Lignite Corporation (NLC), six by Gujarat Mineral Development Corporation Ltd (GMDCL), three each by Rajasthan State Mines & Minerals Limited (RSMML) & Gujarat Industries Power Co. Ltd (GIPCL), one each by Gujarat Heavy Chemicals Ltd (GHCL), Barmer Lignite Mining Company Limited (BLMCL) & V S Lignite Power Pvt. Ltd (VSLPPL). Sectorwise, seventeen mines are under Public Sector and the remaining two is under Private Sector, i.e., GHCL & VSLPPL. NLC reported maximum production during the period under review. The Neyveli Lignite Mine is the largest opencast mine in the country with eco-friendly technology. The NLC operates three opencast mines at Neyveli, Tamil Nadu and one opencast mine at

Barsingsar, Rajasthan. The present installed capacity of all NLC mines stands at 30.6 MTPA (viz. mine-I (10.5 MTPA+mine-IA in 3.0 MTPA+mine-II in 15.0 MTPA+Barsingsar in 2.1 MTPA) Bithnok lignite Mine (2.25 MTPA), Hadla Mine (1.9 MTPA) and restructuring of Mine-I and Mine-IA (1.5 MTPA) are under implementation. Further, it has also proposed to set up 9.0 MTPA Mine-III to exploit the available mineable reserves of 380 MT in the Neyveli Lignite fields for the proposed second expansion of TPS-II. The production of lignite for all mines was 265.43 lakh tonnes during 2014-15 which slightly decreased by 0.25% from 266.09 lakh tonnes in the previous year. The NLC's mines are highly mechanised. Presently, these mines are linked to three thermal power stations at Neyveli and one thermal power station at Barsingsar with a total power generation capacity of 3240 MW (viz. TPS-I in 600 MW+TPS expansion in 420 MW+TPS-II in 1470 MW & 500 MW (expansion) +Barsingsar in 250 MW). Further, NLC has also so far installed nine Wind Turbine Generators of 1.50 MW each, aggregating to 13.50 MW, thereby increasing the overall power generating capacity to 3253.50 MW. Besides, replacement of the old TPS-I of 600 MW with Neyveli New Thermal Power Project of 1000 MW capacity is in progress. It is also implementing Bithnok Power Project of 250 MW and Barsingsar Extn. Power Project of 250 MW. In terms of the commitment given to GOI for development of green energy, NLC is presently implementing 51 MW Wind Power Project at Kazhuneerkulam in Tamil Nadu, 10 MW Solar Power Project in Neyveli (in the 2nd phase proposed to add another 15 MW) and 25 MW Solar Power Project in Barsingsar.

It is also envisaged to set up Sirkali Coastal Power Project 4000 MW (in two phases) during XII and XIII Plan periods. On completion of the projects under implementation and also projects under consideration, the power generation capacity of NLC would increase to 9241 MW and mining capacity to 45.25 MT by the end of XIII Plan.

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; (c) mining of coal for production

of cement (amended on 15.3.1996) and (d) mining of coal for production of syn-gas obtained through coal gasification (underground and surface) and coal liquefaction (amended on 12.7.2007).

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.

With regard to allocation of small and isolated blocks are concerned, a new policy is being formulated in consultation with the Ministry of Law and Justice and the stakeholders for allocation of such blocks.

There has been an exponential rise in the demand for coal. With progressive allocation of coal blocks, the number of coal blocks available for allocation has considerably declined whereas, the number of applicants per block is on the rise. The processes adopted, therefore, for judicious selection of applicants in respect of coal blocks encountered inadequacies and have become vulnerable to criticism on the ground of lack of transparency and objectivity.

While efforts are on to continuously add blocks to the captive list, it is also expected that the demand for blocks would remain far ahead of supply. Therefore, there is an urgent need to bring in a process of selection that is not only objective but also transparent. Auctioning through competitive bidding is one such acceptable selection process.

With a view to bringing in more transparency, the Mines and Minerals (Development and Regulation) Amendment Act, 2010 for introduction of competitive bidding system for allocation of coal blocks for captive use has been passed by both the Houses of Parliament and it has been notified in Gazette of India (Extraordinary) on 9th September, 2010. The Amendment Act seeks to provide for grant of reconnaissance permit, prospecting licence or mining lease in respect of an area containing coal and lignite through auction by competitive bidding, on such terms and conditions as may be prescribed. This, would however, not be applicable in the following cases: where such area is considered for allocation to a Government company or corporation for mining or such other specified end use; where such area is considered for allocation to a company or corporation that has been awarded a power project on the basis of competitive bids for tariff (including Ultra Mega Power Projects).

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The Government has finalised rules for allocation of blocks through competitive bidding and the same have been notified on 2.2.2012. The commencement of the Amendment Act has been notified on 13.2.2012. Further the Government has notified the “Auction by Competitive Bidding of Coal Mines (Amendment) Rules, 2012” on 27th December, 2012 for allocation of coal blocks to Government Companies. It contains detailed terms and conditions for selection of government company for allocation of the basis of pre-determined criteria and for utilization of Coal.

As per the policy, from beginning of allocation of captive coal block till 31.3.2014, total 218 coal blocks were allocated to different companies. Out of these allocated 218 coal blocks, 87 have been de-allocated for non-performance and 7 blocks have been re-allocated making effecting allocation of 138 coal blocks as on 31.3.2014. During 2014-15, there were drastic changes in the captive coal block scenario. The Hon'ble Supreme Court of India by its judgments dated 25th August, 2014 read with order dated 24th September, 2014 cancelled allocation of 204 coal blocks and directed the government to take up fresh allocation through e-auction process. However, the producing coal blocks were permitted to continue production till 31.03.2015. Thus as on 31.03.2015, 40 coal blocks were producing.

At present, captive coal blocks are only allotted to different companies in power, iron & steel, Government commercial, private commercial &

cement and coal to oil sectors. Till 24.09.2014, a total of 138 coal blocks with 34,419.35 million tonnes geological reserves have been allotted in various states (Table 21). Of these, 78 blocks with 23,364.92 million tonnes are under Public Sector undertakings (PSU) and the remaining 60 blocks with 11,054.43 million tonnes are under Private Sector. Among these, 72 blocks (23,238.91 million tonnes) are allocated for power, 30 blocks (3,855.66 million tonnes) for iron & steel, 34 blocks (7,099.39 million tonnes) for commercial mining and 2 blocks (225.39 million tonnes) for cement. After 24.09.2014 and till 31.03.2015, 56 coal blocks (10,551.67 million tonnes) remained allocated in different sectors. Out of these, 23 blocks (4,293.23 million tonnes) in PSU and remaining 33 blocks (6,258.44 million tonnes) in Private Sector. Among these, 35 blocks (9,008.82 million tonnes) for power, 13 blocks (1062.06 million tonnes) for iron & steel and 8 blocks (480.79 million tonnes) for commercial (Govt & Pvt) mining and cement.

Similarly, 25 captive lignite blocks with 1,597.23 million tonnes geological reserves have been allocated in Gujarat (11) and Rajasthan (14) till 31.3.2015. In Gujarat, 4 blocks (404.20 million tonnes) are allocated for power generation and 7 blocks (351.50 million tonnes) for commercial end use. In Rajasthan, the allocation of 11 blocks (728.70 million tonnes) is for power and 3 blocks (118.70 million tonnes) for commercial end use.

**Table – 21 : Allotment of Captive Coal Blocks, (Till 31.3.2015)
(Statewise)**

State	Till 24.09.2014		After 24.09.2014 to till 31.03.2015	
	No. of Coal Blocks	Geological Reserves	No. of Coal blocks	Geological Reserves
Total	138	34419.35	56	10551.67
Arunachal Pradesh	1	4.79	1	4.79
Chhattisgarh	30	8973.90	11	2202.74
Jharkhand	37	10428.02	9	4354.54
Madhya Pradesh	17	2617.90	9	1121.13
Maharashtra	15	391.19	11	319.62
Odisha	21	8987.14	5	1707.55
Telangana	1	77.04	-	-
West Bengal	16	2939.37	10	841.30

Note: (i) Out of total 218 captive coal blocks, Hon'ble Supreme Court of India vide judgement dated 25th August, 2014 read with its order dated 24th September, 2014 has cancelled the allocation of 204 coal blocks (Schedule-I Coal Mines) as per the Coal Mines (Special Provisions) Ordinance, 2014 promulgated as the Coal Mines (Special Provisions) Act, 2015.

(ii) Out of 204 Schedule-I coal mines, 42 coal mines have been considered under Schedule-II coal mines for 1st April, 2015 being the date on which the allocation of coal blocks to prior allottees shall stand cancel, in pursuance of the order of the Hon'ble Supreme Court dated 24.09.2014 passed in Writ Petition (Criminal) No. 120 of 2012.

(iii) The above facts and figures are for 56 captive coal mines (14 stands allocated and 42 Schedule-II coal mines).

(iv) Geological Reserves (GR) are GR value as available with Coal Controller's Organisation, Kolkata and subject to change for few blocks with approval of mine plan.

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata (except total).

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

As per the Govt. of India, CBM Policy 1997, the 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.

CMPDI is carrying out studies related to "Assessment of Coalbed Methane Gas-in Place Resource of Indian Coalfields/Lignite fields" through boreholes being drilled under promotional exploration (XII Plan period) under Promotional Regional Exploration (PRE) funding. A total of 60 boreholes (40 by CMPDI and 20 by GSI) will be taken up for CBM specific data generation during the XII Plan. For the plan period studies have been completed by CMPDI in 24 boreholes and 11 boreholes by GSI. During 2014-15, studies have been completed in eight boreholes by CMPDI. Total eighteen reports have been submitted since April, 2007. During the year following three reports based on CBM related studies have been submitted:

- a. Dipside of Garjanbahal block, IB Valley Cf,
- b. Bhalumuda block, Mand-Raigarh Cf.
- c. Mandwa block, Bander Cf.

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. Mechanism on commercial development of UCG is under consideration at Government level. Global tendering for selection of "Developer for Commercial Development of Underground Coal Gasification (UCG)" in Kaitha Block of Central Coalfields Limited (CCL) and Thesgora 'C' Block of Western Coalfields Limited (WCL) is under consideration by CIL/CMPDI.

FOREIGN COLLABORATION

To meet the country's growing demand for coal, Coal India Limited (CIL) has expressed intent for foreign collaboration with the following objectives:

- (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.

To fulfil these objectives, a 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 through underground and opencast mining, innovative methodology for 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 & abandoned mines, coal gasification, application of geographical information system (GIS), environmental mitigation & 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, 20 coal washeries (15 in Public Sector and 5 in Private Sector) with 34.04 million tonnes per annum (MTA) capacity produced about 6.07 million tonnes of coking coal in 2014-15. Production of washed coking coal during 2014-15 was about 2.625 million tonnes in Public Sector and 3.445 million tonnes in Private Sector. In Public Sector, BCCL operates 9 coking coal washeries (Dugda II, Bhojudih, Patherdih, Sudamdih, Barora, Moonidih, Mahuda, Madhuban and Dugda-I), CCL operates 4 washeries (Kathara, Swang, Rajrappa and Kedla), WCL one (Nandan) and SAIL one (Chasnala) whereas 4 washeries (West Bokaro-II, West Bokaro-III, Jamadoba and Bhelatand) are operated by Tata Steel Ltd (TSL) and Electro Steel Castings Ltd (ESCL), in Private Sector. Similarly, 38 coal washeries with 121.14 million tonnes per annum capacity produced about 37.47 million tonnes non-coking coal during the year. Of these, 10.21 million tonnes have been under Public Sector and 27.26 million tonnes under 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, 31 non-coking coal washeries were in operation.

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 - 22 to 25, respectively.

COAL & LIGNITE

Table – 22 : Production of Washed Coking Coal, 2013-14 & 2014-15
(Sectorwise/Companywise)

	(In '000 tonnes)	
	2013-14	2014-15
All India : Total	6614	6070
Public Sector	2839	2625
BCCL	953	387
CCL	1358	1648
WCL	120	73
SAIL	408	517
Private Sector	3775	3445
Tata Steel Ltd	3656	3267
ESCL	119	178

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

Table – 23 : Capacity of Washed Coking Coal, 2014-15
(Sectorwise/Companywise)

Coalfield/Washery	State	Raw Coal Capacity (In '000 tpy)
Grand Total		34040
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
Madhuban	-do-	2500
CCL		9350
Kathara	Jharkhand	3000
Swang	-do-	750
Rajrappa	-do-	3000
Kedla	-do-	2600
WCL		1200
Nandan (Pench-Kanhan)	Madhya Pradesh	1200

(Contd.)

Coalfield/Washery	State	Raw Coal Capacity (In '000 tpy)
SAIL		2040
Chasnala	Jharkhand	2040
Private Sector	Total	6900
Tata Steel Ltd		5660
West Bokaro-II	Jharkhand	1800
West Bokaro-III	-do-	2100
Jamadoba	-do-	900
Bhelatand	-do-	860
Electro Steel Casting Ltd		
Coal Beneficiation Plant	Jharkhand	1240

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata (except totals).

Table – 24 : Production of Washed Non-coking Coal : 2013-14 & 2014-15
(Sectorwise/Companywise)

	(In '000 tonnes)	
Sector/Company	2013-14	2014-15
All India : Total	60648.68	37475.53
Public Sector	10819.00	10213.00
BCCL*	111.00	83.00
CCL	6930.00	6689.00
NCL	3778.00	3441.00
Private Sector	49829.68	27262.53
BLA Ind. Pvt. Ltd	304.68	314.47
Aryan Coal Beneficiation Pvt. Ltd	11771.87	14975.65
Aryan Energy Pvt. Ltd	283.59	441.52
Bhatia Coal Washeries Ltd	576.63	112.70
Global Coal & Mining Pvt. Ltd	33314.00	1808.71
Kartikey Coal Washeries Pvt. Ltd	10.59	47.51
Sarda Energy & Mineral Division	328.05	317.41
Jindal Power Ltd	1146.27	1261.61
Jindal Steel & Power Ltd	2094.00	2171.82
Spectrum Coal & Power Ltd	-	5811.13

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

*Note: *: Jhama is also recycled in Madhuband washery. So it is not reported.*

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**Table – 25 : Capacity of Washed Non-coking Coal, 2014-15
(Sectorwise/Companywise)**

Washery/Location	Coalfield	State	Raw Coal Capacity (In '000 tpy)
Grand Total			121140
Public Sector	Total		20200
BCCL			
Jharia Coalfield, Jharkhand			3980
Dugda-I	Jharia	Jharkhand	1000
Lodna	-do-	-do-	480
Madhuban	-do-	-do-	2500
CCL			
East Bokaro Coalfield, Jharkhand			11720
Gidi	East Bokaro	Jharkhand	2500
Piparwar	N. Karanpura	-do-	6500
Kargali	S. Karanpura	-do-	2720
NCL			
Bina Deshelling Plant	Bina	Uttar Pradesh	4500 4500
Private Sector	Total		100940
Jindal Steel & Power Ltd			6000
Pit Head Washery (JSPL)	Mand Raigarh	Chhattisgarh	6000
BLA Industries Pvt. Ltd			300
BLA Washery	Dharmasthal	Madhya Pradesh	300
Aryan Coal Beneficiation Pvt. Ltd			29960
Chakabuwa	Korba	Chhattisgarh	4000
Dipka	-do-	-do-	12000
Pander Pauni	Ballarpur	Maharashtra	3000
Gevra	Korba	Chhattisgarh	5000
Binjhri	-do-	-do-	960
Himgir	Hemgir	Odisha	5000
Aryan Energy Pvt. Ltd			2600
Indaram	Ramagundam	Andhra Pradesh	600
Talcher	Talcher	Odisha	2000
Bhatia International Ltd			10190
Wani	Wardha	Maharashtra	3730
Ghugus	-do-	-do-	4000
Jharsuguda	Chhualiberna	Odisha	1500
Pander Pauni	Pander Paunit	Maharashtra	960
Global Coal & Mining Pvt. Ltd			9960
Ib Valley	Ib Valley	Odisha	4000
Ramagundam	Ramagundam	Andhra Pradesh	1000
Talcher	Talcher	Odisha	4000
Manuguru	Manuguru	Andhra Pradesh	960
Gupta Coal field & Washeries Ltd			13920
Sasti	Wardha	Maharashtra	2400
Ramagundam	Ramagundam	Andhra Pradesh	2400
Ghugus	Wardha	Maharashtra	2400
Gondegaon	Kamptee	-do-	2400
Majri	Wardha	-do-	2400
Wani	-do-	-do-	1920
Kartikay Coal Washeries Pvt. Ltd			2500
Wani	Wardha	Maharashtra	2500
Spectrum Coal & Power Ltd			11000
Ratija	Korba	Chhattisgarh	11000
Indo Unique Flames Ltd			4800
Punwat	Wardha	Maharashtra	2400
Wani	-do-	-do-	2400
Earth Minerals Company Ltd			4000
Jharsududa	Talcher	Odisha	4000
Sarda Energy & Mineral Division			960
Karwahi Coal Washery Divn.	Raigarh	Chhattisgarh	960
Jindal Power Ltd			4750
JPL	Raigarh	Chhattisgarh	4750

Source: Coal Directory of India, 2014-15, Coal Controller's Organisation, Kolkata.

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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 reflected in Table - 26.

Table – 26 : 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 2400 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%.		
3.	Coking coal	Steel Grade I	Ash content not exceeding 15%.		
		Steel Grade II	Ash content exceeding 15% but not exceeding 18%.		
		Washery Grade I	Ash content exceeding 18% but not exceeding 21% .		
		Washery Grade II	Ash content exceeding 21% but not exceeding 24%.		
		Washery Grade III	Ash content exceeding 24% but not exceeding 28%.		
4.	Semi-coking and weakly-coking coal	Washery Grade IV	Ash content exceeding 28% but not exceeding 35%.		
		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	Ash content exceeding 27% but not exceeding 31%.		
		Beehive Ordinary	Ash content exceeding 31% but not exceeding 36%.		

In order to adopt the best international practices, India decided to switch over from the grading based on Useful Heat Value (UHV) to the grading based on Gross Calorific Value (GCV);

and, therefore, on 16.01.2011 the Ministry of Coal notified the switch over. As per the new system, the following nomenclature has been introduced for gradation of non- coking coal:

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Grades	GCV Range (kcal/kg)
G1	GCV exceeding 7000
G2	GCV exceeding 6701 and 7000
G3	GCV exceeding 6401 and 6700
G4	GCV exceeding 6101 and 6400
G5	GCV exceeding 5801 and 6100
G6	GCV exceeding 5501 and 5800
G7	GCV exceeding 5201 and 5500
G8	GCV exceeding 4901 and 5200
G9	GCV exceeding 4601 and 4900
G10	GCV exceeding 4301 and 4600
G11	GCV exceeding 4001 and 4300
G12	GCV exceeding 3701 and 4000
G13	GCV exceeding 3401 and 3700
G14	GCV exceeding 3101 and 3400
G15	GCV exceeding 2801 and 3100
G16	GCV exceeding 2501 and 2800
G17	GCV exceeding 2201 and 2500

Based on the GCV ranges of proposed gradation and erstwhile gradation, a Concordance Table has been generated for better understanding. However, it may be noted that this concordance does not depict exact one-to-one relation between the two systems.

Concordance Table

Old grading based on UHV	New grading based on GCV
A	G1, G2, G3
B	G4, G5
C	G6
D	G7, G8
E	G9, G10
F	G11, G12
G	G13, G14
Non-coking coal Un-graded	G15, G16, G17

Source: Coal Directory 2014-15, Coal Controller's Organisation, Kolkata.

CONSUMPTION

Thermal power plants, iron & steel, sponge iron and cement continued to be the major consuming industries for coal in India. Sizeable 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 depicted in Table - 27.

Table – 27 : Despatches* of Coal 2012-13 to 2014-15 (By Industries)

(In million tonnes)			
Industry	2012-13	2013-14	2014-15
Total	567.14	572.07	603.78
Iron & steel ¹	15.99	15.28	12.34
Sponge iron	14.97	12.51	12.05
Fertilizer	2.51	2.29	2.29
Cement	12.81	11.64	11.06
Electricity	433.62	437.59	485.95
Others (Chemical, base metals, cokeries, paper & pulp, textile & rayon, bricks, etc.	87.24	92.76	80.08

Source: Coal Directory, 2012-13, 2013-14 and 2014-15.

* Data on consumption is not available.

¹ Includes direct feed, coking washery and steel (boilers).

DEMAND & SUPPLY

XIIth Plan Demand Projections

(In million tonnes)		
Sl. No.	Sector	2016-17
1.	Steel & Coke Oven	67.20
2.	Power (Utility)	682.08
3.	Power (Captive)	56.36
4.	Cement	47.31
5.	Sponge Iron	50.33
6.	Others	77.22
Total		980.50

XII Plan Supply Projections

(In million tonnes)	
Source	2016-17
CIL	556.40
SCCL	57.00
Others	101.60
Total Indigenous Supply	715.00
Import - Coking	35.50
Non-coking	230.00
Total Imports	265.50

Source: Report of the Working Group for Coal & Lignite for XIIth Plan.

WORLD REVIEW

World proved coal reserves were estimated at 891.53 billion tonnes at the end of 2015 of which 403.20 billion tonnes (45%) is classified as anthracite & bituminous coal and 488.33 billion tonnes (55%) as sub-bituminous coal & lignite (Table-28). World production of coal and lignite decreased from about 8.19 billion tonnes in 2013 to 8.09 billion tonnes in 2014. China continued to be the largest producer of coal and lignite in 2014 with about 48% share in total world production, followed by USA (12%), India (7%), Australia (6%), Indonesia (5%), Russia (4%) and South Africa (3%). The remaining 15% of the total world coal production was from other countries (Table-29). Global primary energy consumption fell by 1.1% over that of the preceding year. Asia Pacific and the Middle East has increased coal consumption during the year under review.

**Table – 28 : World Proved Coal Reserves
at the end of 2015
(By Principal Countries)**

(In million tonnes)			
Country	Anthracite and bituminous coal	Sub-bituminous coal and lignite	Total
World : Total	403199	488332	891531
Australia	37100	39300	76400
Brazil	–	6630	6630
Canada	3474	3108	6582
China	62200	52300	114500
Colombia	6746	-	6746
Germany	48	40500	40548
India*	56100	4500	60600
Indonesia	-	28017	28017
Kazakhstan	21500	12100	33600
Poland	4178	1287	5465
Russian Federation	49088	107922	157010
South Africa	30156	–	30156
Turkey	322	8380	8702
Ukraine	15351	18522	33873
USA	108501	128794	237295
Other countries	8435	36972	45407

Source: BP Statistical Review of World Energy, June 2016.

* India's reserves of coal as on 1.4.2015 are estimated at about 306.60 billion tonnes to a depth of 1,200 m and those of lignite at about 44.11 billion tonnes.

**Table – 29 : World Production of Coal and Lignite
(By Principal Countries)**

(In million tonnes)			
Country	2012	2013	2014
World : Total	8199	8189	8085
Australia			
Bituminous coal	381	411	432
Brown coal	69	60	60 ^e
Bosnia & Herzegovina			
Brown coal & lignite	12	12	12
Bulgaria			
Brown Coal & lignite	34	28	31
Canada			
Bituminous coal	57	60	60
Lignite	9	9	10
China			
Hard coal	3945	3974	3874
Colombia			
Bituminous coal	89	85	89
Czech. Rep.			
Bituminous coal	11	9	8
Brown Coal	44	41	38
Germany			
Hard coal	12	8	8
Brown coal	185	183	178
Greece			
Lignite	62	55	50
India *			
Bituminous coal	556	563	541
Lignite	46	44	43
Indonesia			
Hard coal	386	378	403
Kazakhstan			
Bituminous coal	113	113	108
Lignite	8	7	7
Korea, Dem. People's Rep. of ^e			
Coal ^e	41	42 ^e	42 ^e
Mongolia			
Brown coal & lignite	29	29	29 ^e
Mexico			
Bituminous coal	16	16	16
Poland			
Hard coal	80	68	66
Lignite	64	66	64
Romania			
Hard Coal	2	2	2
Brown Coal & lignite	32	23	23
Russia			
Coal	354	347	356
Serbia			
Lignite	38	40	29
South Africa			
Hard coal	259	257	262
Thailand			
Lignite	19	18	18
Turkey			
Hard coal	7	6 ^e	6 ^e
Lignite	75	75 ^e	75 ^e
Ukraine			
Bituminous coal	66	64	45
UK			
Bituminous coal	17	13	12

(Contd.)

Table 29 (Coold.)

Country	2012	2013	2014
USA			
Hard coal	878	877 ^e	877 ^e
Lignite	72	72 ^e	72 ^e
Vietnam			
Anthracite	42	41	42
Other Countries	89	93	97

Source: World Mineral Production, 2010-2014.

Hard coal – Including anthracite, bituminous & sub-bituminous coal.

* India's production of coal and lignite during 2014-15 were 609.2 million tonnes and 48.3 million tonnes, respectively.

As estimated by the 'World Coal Association', coal provides around 30% of global primary energy needs and generates about 41.1% of the world's electricity and this proportion is expected to remain static for the next 30 years. About 70% of the world's steel production is based on coal. Without targeted global action, the International Energy Agency (IEA) estimates that in 2035 there will still be one billion people without access to electricity and 2.7 billion without access to clean cooking fuels. 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 and world's leading exporter 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. New South Wales and Queensland are its major coal exporting States. However, to sustain export growth, the country's infrastructure would require significant expansion and upgrading so that minerals for export could be transported from inland to port terminals. BHP Billiton approved funding for the development of the Caval Ridge project and the expansion of the Peak Downs Mine in the Bowen basin in Queensland. The Caval Ridge Mine would have the

capacity to produce 5.5 Mt/yr of metallurgical coal, and the capacity of the Peak Downs Mine would increase by 2.5 Mt/yr with mine life that is expected to be more than 60 years. BHP Billiton subsequently decided to defer the development of the Peak Downs Mine but the construction of the Caval Ridge Mine is reported to be on schedule and is expected to be completed in 2014. The Daunia Mine, a new open pit coal mine with coal handling preparation plant, was scheduled for completion in 2013; the plant would have the capacity to produce 4 Mt/yr of coal for 21 years.

China

China was the world's largest producer of coal. Coal was the primary source of energy and two-thirds of the country's electricity was produced by coal-fired power plants. About 50% of the country's total coal output was consumed by the Power Sector. The Government continued to close small coal mines to reduce fatalities. However, in the long-term, several large companies are expected to produce coal along with small mines. Major coal-producing provinces were located in the northern and northwestern parts of the country and coal consumers were located in the southern and in the coastal Provinces. The Government planned to develop more reliable coal transportation system to ease the constraint during the next few years.

Indonesia

Indonesia was the world's second ranked exporter and leading producer of coal. Central Kalimantan Province held reserves of 1,400 million tonnes of high-quality metallurgical coal. The Province produced 1.5 million tonnes per year of high-grade coal from 15 coal mining companies.

Russia

Russia is the leading producer of coal. The coal industry in Russia was mostly privately owned, and joint-stock companies (often consolidated into large holdings) dominated the industry. About 80% of coal was mined by 12 major companies; those companies included both "proper" coal mining corporations and metallurgical holdings companies, which included divisions specializing on coking coal mining. Siberian Coal Energy Co. (SUEK) was the largest coal producer in Russia in terms of annual production. In February 2011, Russia adopted a new program for development of the coal industry by 2030. According to forecasts by the Ministry of Energy, annual coal production could increase to about 450 Mt by 2030. The Ministry of

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Energy projected that Russia would construct more than 100 new coal enterprises within the next 20 years. Because most of the new coal mines were to be located in Siberia and the Far East, the Government considered that its main role would be to assist coal producers by providing better and less expensive infrastructure facilities, such as ports and railroads.

FOREIGN TRADE

Exports

Exports of coal (Excl. lignite) decreased considerably about 44% to 1.22 million tonnes in 2014-15 from 2.19 million tonnes in the previous year. Exports of coke also decreased about 35% to 98 thousand tonnes in 2014-15 from 151 thousand tonnes in 2013-14. Coal was mainly exported to Bangladesh (43%), Nepal (40%), UAE (12%) and Bhutan (3%). Coke was exported predominantly to Nepal (55%), Pakistan (21%), Bhutan (13%) and Bangladesh (3%). Exports of lignite maintained only one thousand tonne in both the years, while export of coal water gas was increased to 32 tonnes in 2014-15 from 9 tonnes in the previous year. Coal Water Gas was mainly exported to Netherlands (94%) (Tables - 30 to 33).

Imports

Imports of coal (Excl. lignite) increased by about 31% to about 218 million tonnes in 2014-15 from about 167 million tonnes in the previous year. Imports of coke decreased by 21% to 3.29 million tonnes in 2014-15 from 4.17 million tonnes in the previous year. Coal was mainly imported from Indonesia (57%), Australia (22%) and South Africa (14%), whereas coke was imported mainly from China (62%), Japan (10%), Ukraine (9%), Australia (7%), Russia (4%) and Colombia (3%). Imports of lignite and coal water gas was negligible quantity during both the years (Tables - 34 to 37).

**Table – 32 : Exports of Coal Water Gas, etc.
(Except Gaseous Hydrocarbons)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	9	891	32	7820
Netherlands	-	-	30	7805
Nepal	9	815	2	15
Other countries	++	76	-	-

**Table – 30 : Exports of Coal (Excl. Lignite)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	2188	10843195	1220	7112051
Nepal	377	2324215	482	3030153
Bangladesh	1631	7178113	524	2560205
UAE	89	432010	141	588608
Bhutan	69	786265	38	547507
Iran	++	56	35	372497
Saudi Arabia	-	-	++	2309
Kenya	-	-	++	2221
Malaysia	-	1384	++	2188
Italy	-	524	++	1683
Jordan	-	-	++	939
Other countries	22	120628	++	3741

**Table – 31 : Exports of Coal : Lignite
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	1	55575	1	13882
Saudi Arabia	++	8853	++	4348
Nepal	++	185	1	3799
USA	++	8764	++	3400
Thailand	-	-	++	1629
Pakistan	++	594	++	306
China	-	-	++	230
UAE	1	13749	++	161
Australia	-	-	++	8
Other countries	++	23430	++	1

**Table – 33 : Exports of Coke
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	150636	1478657	98043	1090634
Nepal	89308	422521	54197	386867
Pakistan	22972	409373	20713	328057
Bhutan	8517	166481	13095	221880
Bangladesh	1893	23176	2591	25795
Bahrain	-	-	1722	21884
UAE	1070	18411	1240	21329
Saudi Arabia	689	17590	821	19583
Oman	411	6951	1530	18701
Sri Lanka	863	22967	636	15771
Nigeria	-	-	734	12812
Other countries	24913	391187	764	17955

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**Table – 34 : Imports of Coal : Lignite
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (‘000 t)	Value (₹’000)	Qty (‘000 t)	Value (₹’000)
All Countries	++	5629	++	11131
USA	++	4421	++	10393
China	-	-	++	738
Other countries	++	1208	-	-

**Table – 37 : Imports of Coal Water Gas
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹’000)	Qty (t)	Value (₹’000)
All Countries	++	306	++	1290
USA	++	306	++	672
China	-	-	++	618

**Table – 35 : Imports of Coal (Excl. Lignite)
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (‘000 t)	Value (₹’000)	Qty (‘000 t)	Value (₹’000)
All Countries	166861	923353960	2177851045	125605
Indonesia	101877	412913502	123734	451075483
Australia	34480	316111659	47620	344560572
South Africa	20615	111251371	30730	152636452
USA	3650	32069785	4269	30000875
Canada	1247	12247579	1957	15201174
Mozambique	1498	11862671	1979	13358912
Russia	743	6116312	1333	8485569
New Zealand	1132	10729311	1025	7896790
Chile	927	3309365	1728	5549350
Unspecified	++	1098	2967	12538679
Other countries	692	6741307	443	3821749

**Table – 36 : Imports of Coke
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹’000)	Qty (t)	Value (₹’000)
All Countries	4167206	67948149	3290324	43751479
China	2028594	33093415	2026974	25468625
Japan	577516	9671787	340759	5089919
Ukraine	580758	9319761	305585	4374869
Australia	267238	4344275	214653	2767202
Russia	137777	2202442	132260	1943572
Colombia	255821	4000118	103314	1909295
Poland	170037	3097280	98000	1336722
Italy	69906	1065141	39312	590361
Venezuela	-	-	29135	260809
Germany	1	50	196	5897
Other countries	79558	1153880	136	4208

FUTURE OUTLOOK

The XII Plan Working Group for Coal & Lignite has assessed a coal demand of 980.50 million tonnes by terminal year, i.e., 2016-17. The indigenous coal supply projection in the terminal year is projected to be 715 million tonnes. The demand-supply gap emerging from these projections would be 265.50 million tonnes, which would have to be met by imports of 35.50 million

tonnes of coking coal and 230 million tonnes of non-coking coal.

To meet country's growing demand for coal, foreign collaboration with the advanced coal producing countries are also being considered by the Govt. for bringing new technologies both in underground and opencast sectors for efficient management in the coal industry and importing skill development and training.