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COAL & LIGNITE

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GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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10 Coal & Lignite

Coal is vital for 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 a long history of commercial coal mining since 1774 and nationalisation of coal mines was put to effect on 01.05.1973. As per Integrated Energy Policy Committee of erstwhile Planning Commission, coal will remain India's most important energy source till 2031-32 and possibly beyond. In India, during the year 2015-16, about 80% coal and lignite got despatched to the 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 609.2 million tonnes in 2014-15 increased by 4.9% to 639.2 million tonnes in 2015-16. The production of lignite at 43.8 million tonnes in 2015-16 decreased by 9.3% from 48.3 million tonnes in the previous year. India, in 2015 ranked 3rd in the world coal production.

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 the north-eastern part of the country mainly in Assam and Sikkim. 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, 308.802 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 1.4.2016. Out of these reserves, 138.087 billion tonnes are Proved reserves, 139.151 billion tonnes are Indicated reserves and the remaining 31.564 billion tonnes are in the Inferred category. Of the total reserves, the share of prime-coking coal is 5.313 billion tonnes, medium-coking & semi-coking is 29.090 billion tonnes and non-coking coal, including high sulphur is 274.399 billion tonnes. Statewise/coalfield-wise and statewise/typewise reserves of coal as on 1.4.2016 are furnished 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 also in Jammu & Kashmir. The total known geological reserves of lignite as on 1.4.2016 is 44.594 billion tonnes, of which 80% reserves are located in Tamil Nadu with about 35.680 billion tonnes. 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 1.4.2016 are detailed in Table - 3.

Table – 1 : Geological Reserves of Coal as on 1.4.2016
(By States/Coalfields)

(In million tonnes)

State/Coalfield	Proved	Indicated	Inferred	Total
All India : Total	**138087.20**	**139150.87**	**31563.77**	**308801.84**
Gondwana Coalfields*	**137493.39**	**139051.53**	**30764.28**	**307309.20**
Andhra Pradesh/ Godavari Valley	**0.00**	**1149.05**	**431.65**	**1580.70**
Assam/Singrimari	–	**14.49**	–	**14.49**
Bihar/Rajmahal	–	–	**160.00**	**160.00**
Chhattisgarh	**19135.75**	**34613.70**	**2286.93**	**56036.38**
Sohagpur	94.30	10.08	–	104.38
Sonhat	263.15	2401.15	1.89	2666.19
Jhilimili	228.20	38.90	–	267.10
Chirimiri	320.33	10.83	31.00	362.16
Bisrampur	1141.94	506.91	1.82	1650.67
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.)

Table - 1 (Contd.)

State/Coalfield	Proved	Indicated	Inferred	Total
Sendurgarh	152.89	126.32	–	279.21
Korba	5877.26	5783.70	168.02	11828.98
Mand-Raigarh	8519.09	19456.94	1651.40	29627.43
Tatapani-Ramkola	50.43	2826.28	209.68	3086.39
Jharkhand	**42322.68**	**32300.96**	**6548.38**	**81172.02**
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	10309.64	6169.37	1864.96	18343.97
South Karanpura	3279.63	1887.48	1469.13	6636.24
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	**10917.99**	**12695.98**	**3239.09**	**26907.06**
Johilla	185.08	104.09	32.83	322.00
Umaria	177.70	3.59	–	181.29
Pench-Kanhan	1476.88	970.34	733.05	3180.27
Patharkhera	290.80	88.13	68.00	446.93
Gurgunda	–	84.92	53.39	138.31
Mohpani	7.83	–	–	7.83
Sohagpur	1751.56	5744.36	319.42	7815.34
Singrauli	7028.14	5700.55	2086.40	14815.09
Maharashtra	**6207.93**	**3151.10**	**2076.67**	**11435.70**
Wardha Valley	3756.78	1529.55	1481.36	6767.69
Kamthi	1530.68	1129.37	414.61	3074.66
Umrer Makardhokra	308.41	–	160.70	469.11
Nand Bander	602.06	492.18	–	1094.24
Bokhara	10.00	–	20.00	30.00
Odisha	**34294.51**	**33283.57**	**8317.59**	**75895.67**
Ib-River	11193.68	9324.24	4312.62	24830.54
Talcher	23100.83	23959.33	4004.97	51065.13
Telangana	**10128.45**	**8586.16**	**2700.20**	**21414.81**
Godavari Valley	10128.45	8586.16	2700.20	21414.81
Sikkim/Rangit Valley	**–**	**58.25**	**42.98**	**101.23**
Uttar Pradesh/Singrauli	**884.04**	**177.76**	–	**1061.80**
West Bengal	**13602.04**	**13020.51**	**4906.79**	**31529.34**
Raniganj	13401.25	7277.01	4027.22	24705.48
Barjora	200.79	–	–	200.79
Birbhum	–	5743.50	864.57	6608.07
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.)

Table - 1 (Concld.)

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, 2015-16, Coal Controller's Organisation, Kolkata.*
** Including Sikkim.*

Table – 2 : Geological Reserves of Coal as on 1.4.2016 (By States/Types)

(In million tonnes)

State/Type of coal	Proved	Indicated	Inferred	Total
All India : Total	**138087.20**	**139150.87**	**31563.77**	**308801.84**
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	119007.98	125235.58	28663.13	272906.69
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**	**57.21**	**3.02**	**525.01**
Non-coking	–	14.49	–	14.49
High sulphur	464.78	42.72	3.02	510.52
Bihar/Non-coking	–	**–**	**160.00**	**160.00**
Chhattisgarh	**19135.75**	**34613.70**	**2286.93**	**56036.38**
Semi-coking	70.77	99.25	–	170.02
Non-coking	19064.98	34514.45	2286.93	55866.36
Jharkhand	**42322.68**	**32300.96**	**6548.38**	**81172.02**
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	25001.00	20577.25	4888.29	50466.54
Madhya Pradesh	**10917.99**	**12695.98**	**3293.09**	**26907.06**
Medium-coking	354.49	1560.11	272.83	2187.43
Non-coking	10563.50	11135.87	3020.26	24719.63
Maharashtra/Non-coking	**6207.93**	**3151.10**	**2076.67**	**11435.70**
Meghalaya/High sulphur	**89.04**	**16.51**	**470.93**	**576.48**
Nagaland/High sulphur	**8.76**	**–**	**306.65**	**315.41**
Odisha/Non-coking	**34294.51**	**33283.57**	**8317.59**	**75895.67**
Sikkim/Non-coking	**–**	**58.25**	**42.98**	**101.23**
Telangana/Non-coking	**10128.45**	**8586.16**	**2700.20**	**21414.81**
Uttar Pradesh/Non-coking	**884.04**	**177.76**	**–**	**1061.80**
West Bengal	**13602.04**	**13020.51**	**4906.79**	**31529.34**
Medium-coking	550.42	–	–	550.42
Semi-coking	188.05	432.49	168.23	788.77
Non-coking	12863.57	12588.02	4738.56	30190.15

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

Table – 3 : Geological Reserves of Lignite as on 1.4.2016 (By States/Districts)

(In million tonnes)

State/District	Area/Lignite field	Proved	Indicated	Inferred	Total
All India : Total		**6182.41**	**26372.70**	**12039.42**	**44594.53**
Gujarat		**1278.65**	**283.70**	**1159.70**	**2722.05**
Kachchh	Panandhro & Panandhro Extn., Barkhan Dam, Kaiyari Block-A & B, Mata-No-Madh, Umarsar, Lakhpat-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**	**1896.60**	**5735.97**
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-Abhaysingpura. 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 & Charanwala	–	–	11.47	11.47
Jaisalmer	Bhanda, 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.)

Table - 3 (Concld.)

State/District	Area/Lignite field	Proved	Indicated	Inferred	Total
Tamil Nadu		**3735.23**	**22991.17**	**8953.53**	**35679.93**
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	2621.86	1199.78	6652.64
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-Anaikkadu 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
Ramanathapuram	Rajasing Mangalam of Mannargudi Lignite Field	–	–	964.97	964.97
	Misal, Bogalur, Bogalur (East) & Tiyanur of Ramanathapuram Lignite Field	–	168.83	1590.68	1759.51
Ramanathapuram & Sivaganga	Settanur of Mannargudi Lignite Field	–	–	20.24	20.24
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, 2015-16, Coal Controller's Organisation, Kolkata.*

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

EXPLORATION & DEVELOPMENT

The agencies engaged in exploration for coal during 2015-16 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 Chhattisgarh, Madhya Pradesh, Odisha and Telangana 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 coal and lignite were estimated. In 2015-16, GSI carried out the CBM-related desorption studies which comprised studies conducted in six boreholes from GSI blocks viz. TRP-10 of Pipraul Block in Tatapani-Ramkola CF, IBUS-1 of Ustali Sector and IBBR-7 of Bartap Block in Ib River CF, RBRG-3 of Rajgaon Block and RBGP-6 of Gobindpur Block of Rajmahal CF and Pachur Block in Singrauli CF. In general, the in situ gas content is less than 1 cu cm/g of coal samples collected from these blocks. Details of exploration activities for coal by GSI are furnished in Table - 4.

MECL carried out exploration in the State of Chhattisgarh during 2015-16. A total of 1,849 million tonnes resources of coal has been established at Mand-Raigarh, Sonhat and Bisrampur coalfields in Chhattisgarh. MECL also

carried out exploration for lignite in Tamil Nadu during 2015-16. A total of 91 million tonnes of lignite resources was established in Tamil Nadu.

DGM, Chhattisgarh and Maharashtra did not report any exploration activity for coal during 2015-16. GMDC conducted exploration for lignite during 2015-16 in Bhavnagar, Surat and Kachchh districts in Gujarat but did not report any estimation of lignite resources. DMG, Rajasthan carried out exploration for lignite during 2015-16 in district Bikaner and estimated 2.86 million tonnes of lignite resources. RSMML also carried out exploration for lignite during 2015-16 in Barmer and Nagaur districts. Details on exploration carried out by the various State Directorates and State Undertakings are furnished in Table-5.

CMPDIL in its exploration programme for 2015-16 laid emphasis on proving Power-grade and Superior-grade non-coking coal in CIL and non-CIL blocks.

A total of 9.94 lakh m exploratory drilling was achieved during 2015-16, a registered growth of 20% in comparison to 8.28 lakh m of drilling in 2014-15 through departmental resources and outsourcing. Out of these, 7.07 lakh m have been drilled in CIL blocks and remaining 2.87 lakh m in Non-CIL blocks. Out of 9.94 lakh m drilling, 4.08 lakh m were through departmental resources while 5.86 lakh m were by outsourcing. Out of drilling executed by outsourcing, 0.05 lakh m were through State Governments while 2.47 lakh m were through MOU with MECL, 2.21 lakh m were through tendering in CIL blocks and 1.13 lakh m were through tendering 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 2015-16 out of which 62 were departmental drills.

Besides, CMPDIL continued the technical supervision of promotional exploration work undertaken by GSI, MECL and DGM (Nagaland) that achieved drilling of about 0.521 lakh m in the Coal Sector during 2015-16. MECL in 7 blocks achieved 0.352 lakh m drilling, GSI in 9 blocks achieved 0.161 lakh m drilling and DGM Nagaland in one block achieved 0.008 lakh m drilling. The 7 blocks where MECL (CIL & SCCL areas) undertook exploratory works included Mand Raigarh (3), Singrauli (2), Baner (1) and Godavari valley (1). The 9 blocks that GSI undertook exploratory works included Raniganj CF (1), Talcher CF (1), Ib Valley (3) and Sohagpur (4). DGM (Nagaland) undertook exploratory work in one block in Northern Khar in Coal Sector on behalf of Ministry of Coal.

In the Lignite Sector, under promotional exploration work undertaken by GSI and MECL 0.602 lakh m of drilling were achieved during 2015-16. Of these, GSI in 4 blocks achieved 0.079 lakh m drilling while MECL in 8 blocks achieved 0.523 lakh m drilling on behalf of Ministry of Coal.

During 2015-16, CMPDIL and its contractual agencies conducted exploration in 113 blocks/ mines spread over 22 coalfields situated in 6 states. Out of the 113 blocks/mines, 35 were Non-CIL/Captive blocks and 78 in CIL blocks/mines. These coalfields are Raniganj (10), Rajmahal (2), Jharia (2), Auranga (2), East Bokaro (1), West Bokaro (2), Ramgarh (1), South Karanpur (2), North Karanpura (5), Kamthi (5), Wardha Valley (6), Pench-Kanhan (2), Sohagpur (12), Mand Raigarh (17), Korba (4), Bisrampur (7), Sonhat (2), Tatapani-Ramkola (4), Singrauli (6), Talcher (14), Ib Valley (5) and Godavary Valley (2). Departmental drills of CMPDIL took up drilling activity in 50 blocks/mines whereas contractual agencies drilled in 63 blocks/mines.

CMPDIL had entered into a long term MoU with MECL on 6th January, 2009 for upto one lakh m of exploratory drilling per annum in different coal blocks. The annual limit has further been enhanced to 4.00 lakh m in 2015-16. Six rounds of National/Global tendering and nine rounds of e-tendering have been done since 2007-08 (till 2015-16) and work orders have been placed for 65 blocks involving 24.44 lakh m.

CMPDIL continued its efforts for facilitating commercial development of coal-based non-conventional energy resources and is pursuing commercial and R&D projects with national/ international organisations.

CMPDIL is pursuing envisaged activities on behalf of CIL for Coal Bed Methane (CBM) development in two blocks, namely, Jharia and Raniganj North, allotted to the consortium of ONGC-CIL and is also extending support to CIL in taking up administrative and other issues viz. Contractual, Operational, etc.

Table – 4: Details of Exploration Activities conducted by GSI for Coal & Lignite, 2015-16

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
COAL		
Andhra Pradesh		
Godavari Valley Coalfield	Sonavaram block, Krishna district	A total area of about 300 sq km was covered by large scale mapping along with scout drilling. Out of these, 108 sq km was geologically mapped. Three boreholes were drilled. The first borehole (total depth of 270.75 m) intersected both Gollapalle Formation and Kamthi Formation the metamorphics. The second borehole was closed at a shallow depth of 97 m after intersected Gollapalle Formation that was followed downwards by basement metamorphics. The third borehole was closed within the Gollapalle Formation at the depth of 215 m and produced ot non-encouraging results.
Assam		
Singrimari Coalfield	Around Bhutidanga area Dhubri district of Assam & Meghalaya	An area of 2.5 sq km has been covered by large scale mapping and 570.35 m was drilled. One carbonaceous zone of thickness 3.21 m having two split sections of 1.55 m and 1.65 m thickness occurring at 238 m and 241.20 m depths respectively has been identified. In borehole SB-02, a thin coal band of 0.48 m was intersected at 178.58 m depth.
Chhattisgarh		
Mand-Raigarh Coalfield	Purunga block Raigarh district	During the period, twelve boreholes of cumulative length 6,018.45 m have been drilled, while one borehole is in progress. Twelve regional Barakar coal seams/zones (seam I to X, XII and XIII in ascending order) have been intersected between the depths of 48.10 m and 756.36 m. Thickness of individual coal seam/zone varied from 0.51 m to 12.85 m. Seam IV was the thickest one with cumulative thickness that ranged from 8.15 m (in split sections) to 12.85 m (in 5 split sections). It has been intersected between depth range of 229.94 m (MRPR-11) and 525.36 m (MRPR-12). An area of 8 sq km was geologically mapped on 1: 10000 scale. A total of 3,638.52 m geophysical logging has been carried out.
Tatapani-Ramkola Coalfield	Pipraul block, Surguja district	Five boreholes of cumulative length 2,795.40 m have been drilled. Eight regional Barakar coal seams (Seam-I to VI & Seam-XII & XIII in ascending order) and a few local seams with thickness ranging from less than a metre (0.50 m, Seam XII) to 20.88 m (Seam-III) have been intersected between the depth of 179.89 m (Seam-XIII) and 894.15 m (Seam-III). Seam-III which occurs in two splits, is most important regional Barakar coal seam in terms of thickness (cumulative thickness 20.88 m) and regional persistency. Large-scale mapping (1: 10000 scale) of 4 sq km has been carried out.
	Sendur block, Surguja district	Two boreholes of cumulative length of 981.25 m drilling have been drilled. Three regional Barakar coal seams (Seam-I to III in ascending order) with thickness ranging from 1.65 m (Seam-II) to 19.27 m (Seam-III) have been intersected between the depths of 657.83 m (Seam-III) and 745.98 m (Seam-I). Large-scale mapping (1:10000) of 2 sq km has been completed.
Madhya Pradesh		
Pench Valley Coalfield	Dhorakuhi Sector Chhindwara district	Exploration of coal in large-scale mapping (1:10000) of 5 sq km area has been completed. Five boreholes of cumulative length 1,398.90 m have been drilled. The thickness of Deccan trap intersected in different boreholes varied from 187.75 m to 277.85 m and the thickness of Jabalpur Formation intersected in the different boreholes varied from 6.15 m to 17.10 m. The total thickness of Motur Formation intersected in PDK-2A is 154.50 m, however, it got drastically reduced to 21.88 m in Borehole PDK-4. Sudden reduction of Motur Formation in this borehole indicates proximity of peripheral part of the basin. The thickness of Barakar Formation varied from 65.76 m to 93.62 m while intersected thickness of Talchir Formation varied from 4.24 m+ to 23.60 m+. Five regional Barakar coal seams (I to V in descending order) have been intersected in four boreholes between the depths of 324.21 m and 436.70 m. The cumulative thickness of coal seam varied from 16.14 m to 13.02 m. Thickness of individual coal seam varied from 0.64 m (Seam-II) to 6.53 m (Seam-IV).

(Contd.)

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
Singrauli Coalfield	Sarai (west) Sector Singrauli district	A total of 350.30 m drilling has been achieved in one borehole (SSW-12A). Borehole SSW-11 was closed at 484.10 m depth. Both the drill units *viz*. Units 486 and 484 have been shifted to Pachaur Block of the same coalfield. Four regional Barakar coal seams (Seam-I to IV, in ascending order) have been intersected within the depth range of 403.99 m (Seam-IV) to 492.12 m (Seam-I). The thickness of the coal seam/zone varied from 2.35 m (Seam-I) to 6.84 m (Seam-III). Cumulative thickness of coal seam/zone is 13.08 m.
	Pachaur block, Singrauli district	Five boreholes of cumulative length of 2,691.35 m have been drilled. Four regional (R-I to R-IV) and a few local Raniganj coal seams of thickness ranging from less than a metre (0.52 m) to 5.56 m were intersected within depth range of 17.38 m to 149.27 m. Seam R-II (3.15 m to 5.56 m) is the most important amongst the Raniganj coal seams in terms of thickness and regional persistency. Seven regional (Seam I to VII) and a few local Barakar coal seams ranging in thickness from less than a metre to 14.40 m were intersected between depth range of 419.78 m and 714.44 m. Barakar Seam-VI is the thickest seam (14.40 m) and occurs in three split sections. Large-scale mapping (on 1: 10000 scale) of 4 sq km area has been carried out in this block. Geophysical logging of 1,493.77 m has been done.
Sohagpur Coalfield	Harri block, Shahdol district	Seven boreholes of cumulative length of 3,186.35 m drilling have been drilled. Large-scale mapping (1: 10000 scale) of 4 sq km has been carried out in the area. Five regional Barakar coal seams (Seam-I to V in ascending order) along with a few local seams, with thickness ranging from 0.50 m to 7.60 m (cumulative) have been intersected between the depths of 222.75 m and 528.20 m. Regional Seam III is the thickest seam. Besides these, five to seven Raniganj coal seams, with individual thickness ranging from 0.50 to 4.60 m have also been intersected between the depths of 14.00 and 118.65 m.
	Bandhawa Bara block Shahdol district	Regional exploration of coal by the initiation of large-scale mapping (1:10000 scale) of 8 sq km has been carried out. Eleven boreholes of cumulative length 3,188.60 m have been drilled. Four regional Barakar coal seams (Seam-I to IV in ascending order) and two local seams, with thickness ranging from 0.50 m to 7.45 m (cumulative) have been intersected between 94.45 m and 264.60 m. Seam-III is the thickest seam in the studied area which is interbanded in nature and whose occurrence has been in two to three split sections.
	Kirhai block Shahdol district	Three boreholes of cumulative length of 547.20 m have been drilled. Large-scale mapping (1:10000 scale) over 2 sq km has been completed. One regional Barakar coal seam (Seam-III) with thickness of 3.95 m and one local seam (L2) of 1.15 m thickness have been intersected between the depths of 135.40 m and 190.60 m. Seam-III occurs as the thickest seam in the studied area.
	Lamru block Shahdol district	Three boreholes of cumulative length 582.95 m have been drilled. Large-scale mapping (1:10000 scale) of 2 sq km has been completed. Four regional Barakar coal seams (Seam-I to IV in ascending order) and a few local seams, (with thickness ranging from 0.50 m to 3.30 m), have been intersected between the depths of 119.55 m and 269.25 m. Seam-III occurs as the thickest seam in the studied area.
Odisha		
Ib-River Coalfield	Bandbahal block, Jharsuguda district	Two boreholes *i.e*. IBBA-7 and IBBA-8 of cumulative length of 691.60 m were drilled from April 2015 to 30th August, 2015. Three regional coal seams of Barakar Formation (Parkhani, Lajkhura and Rampur from top to bottom) were intersected between 481.92 m and 836.50 m. The Lajkhura seam having the maximum cumulative thickness of 72.05 m (IBBA-7) with ten splits is most important for its regional persistence and thickness. The other seams Parkhani (maximum cumulative thickness of 16.36 m in seven splits in IBBA-8) and Rampur (maximum cumulative thickness of 32.58 m in nine splits in IBBA-7) too have regional persistency were intersected during the drilling of the two boreholes. The important achievement in the Bandbahal Block is the increase in cumulative coal thickness of Lajkura seam zone. Geophysical logging of 1,622 m was carried out. The exploration work was completed.

(Contd.)

Table - 4 (Contd.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
Ib-River Coalfield	Bartap block, Jharsuguda district	An area of 3 sq km was mapped on 1:10000 scale and 2,923.80 m drilling was carried out and a cumulative coal thickness of 654.28 m has been intersected in five boreholes (IBBR- 4, 5, 6, 7 & 8). Formational thickness of Kamthi Formation varied from 0 m to 10 m, thickness of Raniganj Formation varied from 30.83 m to 158.19 m, thickness of Barren Measures Formation varied from 28.51 m to 50.94 m and thickness of Barakar Formation varied from 554.72 m to 582.87 m. Four coal seams of Raniganj Formation (R-IV, R-III, R-II, and R-I from top to bottom) and five coal seams of Barakar Formation (Belpahar, Parkhani, Lajkura, Rampur and Ib from top to bottom) have been established. R-I (cumulative thickness 16.91 m in IBBR-7) among Raniganj coal seams and Lajkura (cumulative thickness 62.77 m in IBBR-6) among Barakar coal seams are the thickest. All the coal seams of Raniganj Formation and Belpahar seam zone of Barakar Formation are within 300 m. Remaining coal seams of Barakar Formation continue beyond 600 m. Geophysical logging of 3,532 m was carried out in five boreholes. Three PCS and 3 petrological samples were collected for analysis. The exploration work was completed.
	Ustali block Sundargarh district	Four boreholes (two completed *i.e.* IBUS-1, 2 and two in progress *i.e.* IBUS-3,4) with cumulative length of 1,915.15 m were drilled. Four regional coal seams of Barakar Formation (Belpahar, Parkhani, Lajkura, Rampur from top to bottom) and Karharbari seam of Karharbari Formation were intersected between 50.91 m and 570.78 m depth. Amongst the Barakar seams Rampur (14 to 16 splits) was the most important seam and was intersected at 392.64 m in IBUS-1 and the thickness of which was the maximum at of 98.07 m in IBUS-2. The other seams Belpahar (maximum cumulative thickness of 6.42 m in six splits in IBUS-3), Parkhani (maximum cumulative thickness of 21.12 m in nine splits in IBUS-1), Lajkura (maximum cumulative thickness of 44.14 m in seven splits in IBUS-2) have regional persistency and were intersected in all boreholes. A total of 6 sq km area has been mapped on 1:10000 scale. Karharbari seam of Karharbari Formation has been intersected at a depth of 547.88 m in IBUS-1 and it has a maximum thickness of 8.04 m in IBUS-2.
Talcher Coalfield	Kantaikoliya area, Angul district	Exploration of coal (G3 stage) in this area included drilling of three boreholes [TKK-4, 5 & 6) of cumulative length i.e. 1218.50 m. Coal samples were collected and coalfield map (covering an area of 9 sq km) was updated on 1: 50000 scale. Three regional coal seams (IX, III and II) of Barakar Formation have been intersected between the depth range of 69.00 m and 334.20 m and no coal seam was intersected in the Karharbari Formation.
Telangana		
Godavari Valley Coalfield	Pagaderu (east) Sector, Khammam district	Exploration activities for coal in Pagaderu (East) sector were to explore and evaluate coal potentiality of Lower Kamthi and Barakar coal seams in the down-dip side of adjoining Manuguru mining blocks and trace its continuation in the adjacent Pagaderu (West) sector. The regional exploration in Pagaderu (East) sector involved mapping an area of about 6 sq km on 1: 10000 scale. Out of the six boreholes, two boreholes GPDE-1 (631.00 m) and GPDE-2 (825.50 m) were drilled in FS 2014-15. Four boreholes of cumulative length of 1,708.15 m were also drilled. A total of 58.78 m coal was collected and sampled; Geophysical logging was carried out for 762 m. Petrography samples (2 nos) for coal were collected; and updating of coalfield geological map was done for 3.0 sq km. The work is under progress.
	Esterrn extension of Pagadeur (East), Khammam district	Regional exploration of coal by scout drilling was undertaken. A total of 200 sq km was geologically mapped on 1: 25000 scale and 15 petrographic samples were collected to identify the various formations. The regional strike varied from 200 m in the north to 800 m in the east with 60 to 150 NW dipping .
Godavari Valley Coalfield	North of Medaram area, Khammam district	Regional investigation was taken up with the purpose to update the lithostratigraphy and delineate coal-bearing formations and also to explore and evaluate coal potentiality of Barakar and Lower Kamthi formations established in the Palampet-Venkatapuram block of GSI which lies in the up dip side of the study area and to decipher the structural and stratigraphic setup. Drilling was not carried out and further investigation was suspended due to non-grant of forest permission.

(Contd.)

Table - 4 (Concld.)

State/Coalfield/ Lignite Field	Area/Block	Exploration Activities
	Mangrudu village, Adilabad district	Preliminary investigation by large-scale mapping and scout borehole have been carried out. An area of 10 sq km was geologically mapped on 1:10000 scale. Seven boreholes of cumulative length of 1,083 m were drilled [TSABM-1 (180 m), TSABM-2 (321 m), TSABM-3 (108 m), TSABM-4 (135 m), TSABM-5 (110 m), TSABM-6 (130 m) and TSABM-7 (99 m)]. The borehole TSABM-1 intersected Barakar Formation from 0 to 145.70 m (145.70 m), Talchir Formation from 145.70 m to 168.88 m (23.18 m) and Mangruda Limestone from +168.88 m. The borehole TSABM-2 intersected Bela Formation from 0 m to 310.10 (310.10 m) and limestone from 310.10 m downwards. TSABM-3 borehole was initiated within the Barakar Formation and continued down to 69 m (69 m); Talchir Formation was intersected from 69 m to 87.50 m (18.5 m) and Mangruda Limestone from 87.50 m downwards. No coal seam was intersected in borehole TSABM-3. The borehole TSABM-4 intersected Barakar Formation from 0 m to 113.54 m (113.54 m), Talchir Formation from 113.54 m to 125.34 m (11.80 m) and Mangruda Limestone from 125.34 m downwards (9.64 m). The boreholes TSABM-5, 6 and 7 intersected coal seams within the Barakar Formation which were classified as Coal seam-I, II and III respectively. These boreholes intersected Penganga Limestone at about 310 m depth below the adjacent Bela Shale. About 8.0-m-thick coal has been proved from this sandstone at a very shallow depth of about 20-25 m from the surface.
LIGNITE		
Rajasthan		
West Coast Lignite field	Panna area, Jaisalmer & Bikaner districts	Sixteen boreholes of cumulative length 4,138.00 m have been drilled. Lignite seams have been intersected in the central and western parts of the area. Thickness of individual lignite seams varied from 0.10 m to 3.50 m in the depth range of 109.90 m to 196.30 m. The lignite seam is hosted within the Lower Tertiary Palana Formation.
Tamil Nadu		
Ramnad Sub-Basin	Kalari (west) sector Ramanathapuram district	Fourteen boreholes of cumulative length 6,254.15 m have been drilled. A total of 1,530.00 m has been drilled in Quaternary formation, 3,078.00 m in Cuddalore/Tittacheri Formation and 1646.15 m in Neyveli Formation. The investigation has been closed. The study area is completely covered by recent alluvium. The thickness of these Quaternary sediments including alluvium ranged between 95.00 m (TRKW-3) and 126.00 m (TRKW-14). Its thickness gradually increased towards the central and eastern parts of the exploration block. Maximum intersected thickness of the Cuddalore/Tittacheri Formation is 238.00 m (TRKW-13).
	Kalari (north) Sector Ramanathapuram district	A total of 914.75 m has been drilled in two boreholes. The study area is completely covered by recent alluvium. A total of 110.00-m-thick and 119.00-m-thick Quaternary sediments including alluvium were intersected in boreholes TRKN-3 and TRKN-2 respectively. Its thickness gradually increased towards the central and eastern parts of the exploration block. A total of 214.00-m-thick and 229.00-m-thick Cuddalore/Tittacheri sediments were intersected in boreholes TRKN-3 and TRKN-2 respectively. Lignite seams are present in the upper part of Neyveli Formation. Lignite seam was intersected in both the boreholes TRKN-3 and TRKN-2 between 413.00 m and 447.50 m. The cumulative thickness of the seams is 6.50 m and 8.50 m in boreholes TRKN-3 and TRKN-2 respectively.

Table – 5 : Details of Exploration for Coal and Lignite by State Directorates of Geology & Mining and State Undertakings, 2015-16

Agency/State/ District	Location	Geological mapping		Drilling		Remarks Reserves/Resources estimated
		Area (sq km)	Scale	Boreholes	Meterage (mts)	
LIGNITE						
DMG, Rajasthan						
Bikaner	Diyatra village	-	-	11	1843.80	2.86 million tonnes of resources.
-do	Gap area between Ambasar, Barsinghsar, Halda	-	-	-	-	-
GMDC, Gujarat						
Bhavnagar	Tagdi village	–	–	-	-	The total geological reserves (111) was estimated at 114.72 million tonnes as on 31.03.2016.
Kachchh	N/v Panandhro	-	1:5000	-	-	Balance reserves of lignite at the end of March, 2016 were estimated at 2.06 million tonnes.
Kachchh	N/v Mata No Madh	-	-	-	-	Balance reserves of lignite at the end of March, 2016 were estimated at 35.88 million tonnes.
Surat	N/v Tadkeshwar	-	-	-	-	-
RSMML						
Barmer	Giral mine	-	-	-	-	The total geological reserves (111) of lignite was at 26.553 million tonnes as on 31.03.2016.
-do-	Sonari mine	-	-	-	-	The total geological reserves (111) of lignite was at 27.485 million tonnes as on 31.03.2016.
Nagaur	Kashnau-Matasukh	-	-	-	-	The total geological reserves (111) mine of lignite was at 15.547 million tonnes as on 31.03.2016.

To expedite commercial development of Coal Mine Methane (CMM) within CIL areas, MoP & NG have granted right to exploration and exploitation of CBM to CIL and its subsidiaries on nomination basis from coal bearing areas for which they possess mining lease for coal. To expand the scope of development of CMM in CIL areas, further studies for "Assessment of CMM Potentiality in CIL Command Area" have been undertaken.

CMPDIL is carrying out studies related to "Assessment of Coalbed Methane Gas-in-Place Resource of Indian Coalfields/Lignite fields" through boreholes that are being drilled under promotional exploration. Assessment reports on CBM Gas-in-Place for three (3) blocks (Subhadra West block, Dolesra block, & Brahmanbill block) have been submitted.

The Singareni Collieries Company Limited (SCCL) in its detailed exploration undertaken during 2015-16, established proved reserves of coal of 325.97 million tonnes as against 89.86 million tonnes reported in the previous year. The total proved reserves has now risen to 10,528 million tonnes as on 31.3.2016 in Godavari Valley Coalfield, Telangana.

PRODUCTION AND STOCKS
COAL

Production

The provisional total production of coal in 2015-16 was 639.2 million tonnes which was higher by 4.9% in comparision to that of the previous year. Odisha is the largest coal producing State with a share of about 21.7% followed by Chhattisgarh with contributions of 20.4% to the national output. States next in order of share in the total production were Jharkhand (18.9%), Madhya Pradesh (16.9%), Telangana (9.4%), Maharashtra (6%), West Bengal (4%) and Uttar Pradesh 2 %. The remaining 0.7% of coal production was accounted for from Assam, Jammu & Kashmir and Meghalaya.

As a comparision, the production of coal in 2014-15 was around 609.2 million tonnes which was higher by 7.7% from that of 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. States 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 Assam, Jammu & Kashmir and Meghalaya (Table-7).

During the year 2015-16, coal mining was confined mainly to the Public Sector which contributed 94.9% to the national production. In 2015-16, out of the total production of coal, 9.5% was coking coal and the rest 90.5.% was non-coking coal. As in the earlier years, bulk of the coking coal production, i.e., about 89.8% was reported from the Public sector. Gradewise analysis of coking coal in 2015-16 revealed that Washery Grade IV had the maximum share at 71.9%, followed by Washery Grade III (21.3%), Washery Grade II (4.1%) and Steel Grade II (1.7%). The remaining 1% production of coking coal was of Washery Grade I, Semi-coking Grade I and Steel Grade I. In coking coal, Metallurgical Grade accounts for 14.339 million tonnes (23.6%) and remaining 46.548 million tonnes (76.4%) for non-metallurgical grade. Out of the total production of coking coal in India, bulk quantity, i.e., 96.2% was produced in Jharkhand followed by West Bengal with 3.3 percent. The remaining 0.5% was contributed by Chhattisgarh and Madhya Pradesh.

During 2015-16, except for a nominal quantity (4.55%), the balance production of non-coking coal (95.45%) came from the Public Sector. Out of the total production of non-coking coal grades, G11 grade accounted for 25.5% followed by G12 (15.7%), G10 (14.3%), G13 (13.4%), G9 (7.7%), G7 (6.7%), G8 (5.7%), G4 (3.1%), G5 (2.8%) and G6 (2.3%). The remaining 2.8% production was accounted for G1, G2, G3, G14, G15, G16, G17 and UNG grades of non-coking coal. Odisha was the largest producing State of non-coking coal in 2015-16 which alone accounted for 23.9% of the national output. States next in order were Chhattisgarh with a contribution of (22.6%), Madhya Pradesh (18.6%), Jharkhand (10.8%), Telangana (10.4%), Maharashtra (6.6%), West Bengal (4.1%) and Uttar Pradesh (2.2%). The remaining 0.8% production came from Assam, Jammu & Kashmir and Meghalaya (Tables-8 to10).

A total of 493 coal mines (as on 31.03.2016) in India reported production in 2015-16. Out of these, Jharkhand accounted for 140 mines while West Bengal 75 mines, Madhya Pradesh 70, Maharashtra 60, Chhattisgarh 57, Telangana 47 and Odisha 29. The remaining 15 mines were from Assam, Jammu & Kashmir, Meghalaya and Uttar Pradesh (Table - 6).

Despatches

Despatches of coal at about 632.4 million tonnes in 2015-16 were higher by around 4.7% as compared to that in the previous year. Odisha was the leading State in the despatches in 2015-16 and accounted for 22.2% of the total despatches. States next in order were Chhattisgarh (20.9%), Jharkhand (18.7%), Madhya Pradesh (13.5%), Telangana (9.3%), Maharashtra (5.8%), Uttar Pradesh (5%) and West Bengal 4 percent. The remaining 0.6% despatches were from the States of Assam, Jammu & Kashmir and Meghalaya.

During the year 2015-16, statewise analysis revealed that there was increase in the despatches of coal from the States of Chhattisgarh, Madhya Pradesh, Meghalaya, Odisha, Telangana and Uttar Pradesh while the States of Assam, Jammu & Kashmir, Jharkhand, Maharashtra and West Bengal showed fall in despatches as against that of the previous year.

Of the total despatches of raw coal effected in 2015-16, a sizeable share of 79.4% was made to the Electricity Sector. As much as 2% was made to the Steel Industry, 1.4% to the Cement Industry, 1.2% to the Sponge Iron Industry, 0.4% to the Fertilizer and 0.3% to the Paper & Pulp Industry . The remaining 15.4% was made for other priority sectors including Textile & Rayons, Cokeries, Chemical and Other Basic Metals.

From the total despatches of raw coal effected in 2014-15, a sizeable share of 80.5% was made to the Electricity Sector, 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, Cokeries, Chemical and Other Basic Metals (Tables-11 & 12).

Stocks

The mine-head stocks of coal at the end of the year 2015-16 were 65.4 million tonnes which increased by about 10.1 % from that of the stocks that were available at the beginning of the year. Bulk of the coal stocks (about 99.4%) at the end of the year was accounted for by the mines located in the states of Jharkhand, Odisha, Chhattisgarh, Maharashtra, Telangana, Madhya Pradesh, Uttar Pradesh and West Bengal (Table-13).

LIGNITE

Production

During the year 2015-16, the production of lignite at 43.8 million tonnes decreased by about 9.2% in comparison to that of the previous year. The production from Tamil Nadu alone accounted for 55.3%. The share of Gujarat in lignite production was 23.1% and that of Rajasthan was 21.6 % (Table-14).

Out of the total 19 mines that reported lignite production in 2015-16, ten are located in Gujarat, six inRajasthan and the remaining three in Tamil Nadu (Table - 15).

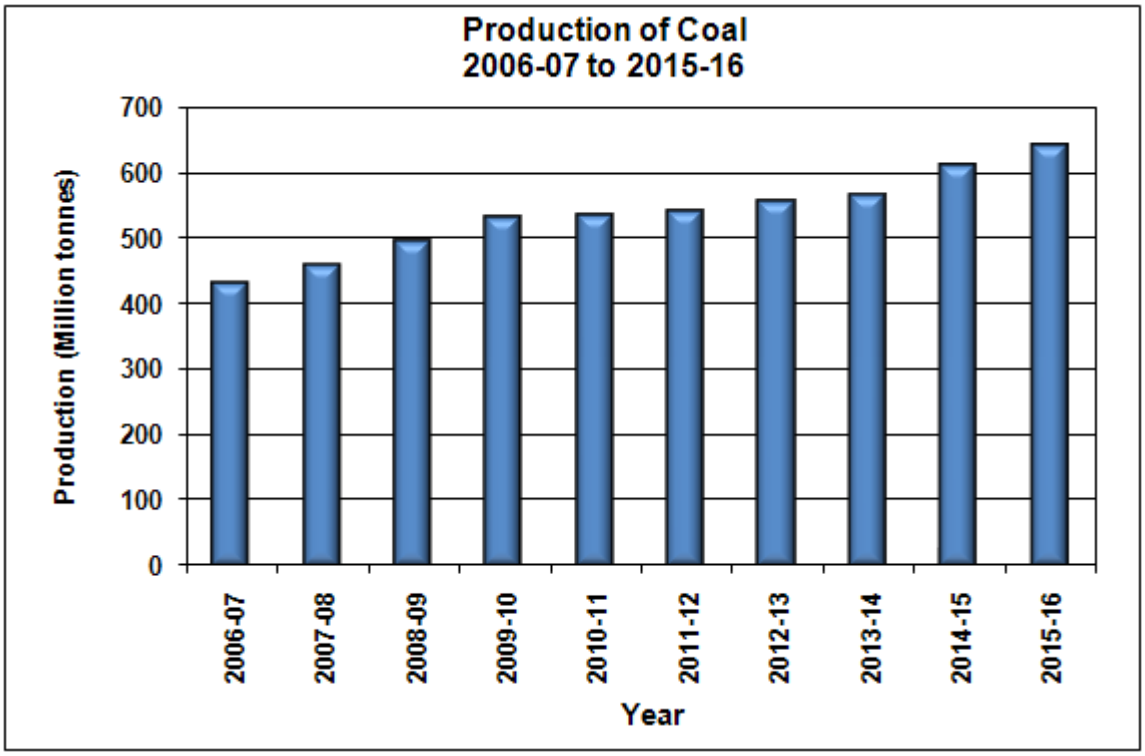
Despatches

The quantum of despatches of lignite was 42.2 million tonnes during the year 2015-16, which decreased by 10.1% as compared to that in the previous year (Table-16).

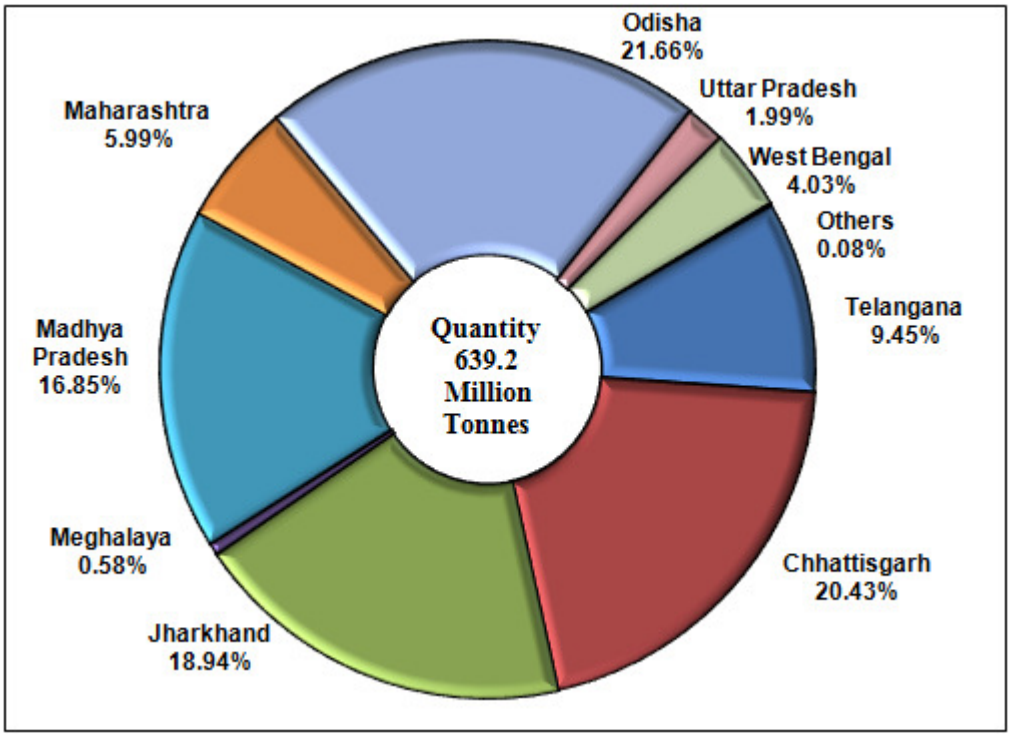
Of the total despatches of lignite effected in 2015-16, a sizeable share of 89% was made to the Electricity Sector. As much as 4.1% to the Textile & Rayons industry and 2.4% to the Other Basic Metals. The remaining 4.5% was made for other priority sectors including Pulp & Paper, Bricks, Chemical and Cement (Table-17).

Stocks

The mine-head stocks of lignite at the end of 2015-16 were 4,809 thousand tonnes which steeply increased by 24% from that of the stocks that were available at the beginning of the year. The bulk of the coal stocks (95.1%) at the end of the year was accounted for by the mines located in the State of Tamil Nadu (Table- 18).



Quantity of Production of Coal in Different States in 2015-16



Value of Production of Coal in Different States in 2015-16

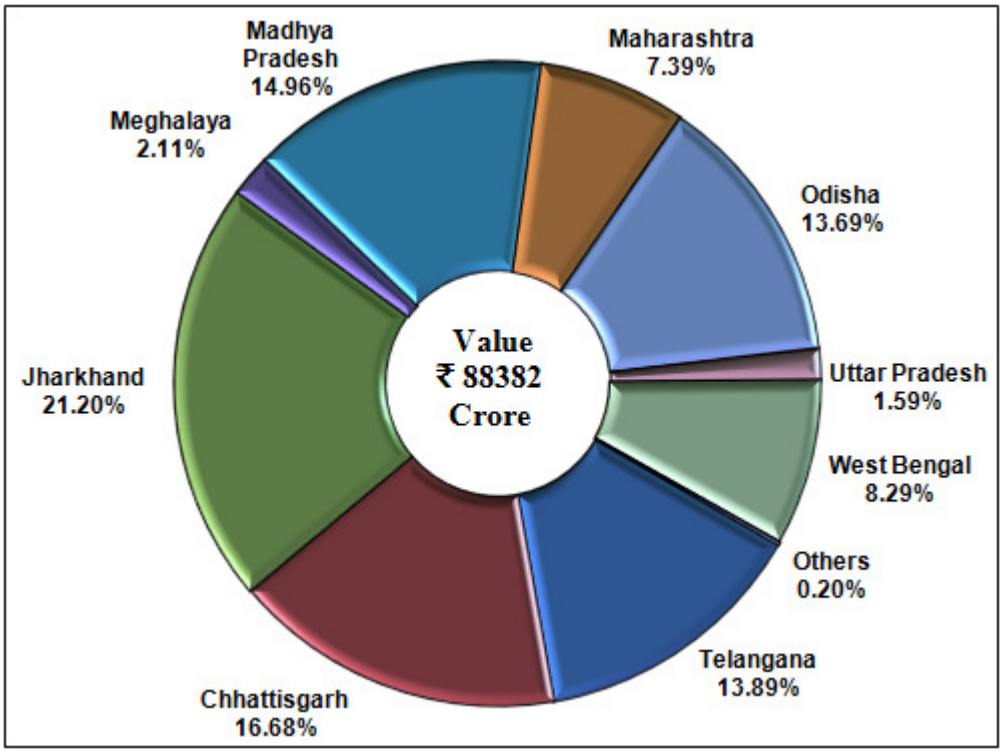


Table – 6 : Number of Coal Mines, 2014-15 & 2015-16 (By States)

State	No. of Mines	
	2014-15 #	2015-16# (P)
India	**539**	**493**
Arunachal Pradesh	1	-
Assam	4	4
Chhattisgarh	61	57
Jammu & Kashmir	4	4
Jharkhand	152	140
Madhya Pradesh	70	70
Maharashtra	66	60
Meghalaya	3	3
Odisha	27	29
Telangana	48	47
Uttar Pradesh	4	4
West Bengal	99	75

 # Relates to number of mines as last day of financial year.
***Note**: Coal Mines in the State of Meghalaya operate under the Private Sector.*

Table – 7 : Production of Coal, 2013-14 to 2015-16 (By Sectors/States)

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

State	2013-14		2014-15		2015-16 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**565765**	**825347500**	**609179**	**892871700**	**639230**	**883822100**
Public Sector	**528100**	**754795200**	**567032**	**802886105**	**606677**	**833320400**
Private Sector	**37665**	**70552300**	**42147**	**89985595**	**32553**	**50501700**
Assam	664	3392900	779	3819900	487	1711300
Chhattisgarh	127095	89275000	134764	139855400	130605	147436800
Jammu & Kashmir	19	40400	13	27600	13	27600
Jharkhand	113091	240509800	124143	193135100	121067	187369900
Madhya Pradesh	75590	111792700	87609	111478200	107714	132254900
Maharashtra	37223	57363500	38257	67045400	38351	65340300
Meghalaya	5732	37974500	2524	12670500	3712	18634200
Odisha	112917	150160600	123627	158984300	138461	121010100
Telangana	50469	73998000	52536	109642600	60380	122753500
Uttar Pradesh	14721	20046100	14957	16186900	12689	14028100
West Bengal	28244	40794000	29970	80025800	25751	73255400

***Source:** Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

Table – 8: Production of Coking Coal, 2015-16 (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	**60887**	**37**	**1051**	**415**	**2493**	**12968**	**43788**	**-**	**135**
Chhattisgarh	135	-	-	-	-	-	-	-	135
Jharkhand	58548	37	1051	415	1859	11398	43788	-	-
Madhya Pradesh	209	-	-	-	209	-	-	-	-
West Bngal	1995	-	-	-	425	1570	-	-	-

Table – 9: Production of Coal, 2014-15 & 2015-16 (By Grades and Sectors)

(In '000 tonnes)

Grade	2014-15			2015-16 (P)		
	Total	Pub. Sec.	Pvt. Sec.	Total	Pub. Sec.	Pvt. Sec.
All Grades	**609179**	**567032**	**42147**	**639230**	**606677**	**32553**
Coking	**57446**	**51010**	**6436**	**60887**	**54662**	**6225**
ST-I	50	50	-	37	37	-
ST-II	456	456	-	1051	1051	-
W-I	115	115	-	415	415	-
W-II	2228	1987	241	2493	2359	134
W-III	12335	11262	1073	12968	11919	1049
W-IV	42132	37010	5122	43788	38746	5042
SC-I	130	130	-	135	135	-
SLV1	-	-	- -	-	-	-
Non-coking	**551733**	**516022**	**35711**	**578343**	**552015**	**26328**
G1	2740	216	2524	3831	119	3712
G2	565	565	-	341	341	-
G3	5469	5469	-	5189	5189	-
G4	19025	19025	-	17665	17665	-
G5	14789	14789	-	16302	16302	-
G6	22680	21888	792	13114	13114	-
G7	37838	37826	12	39038	39038	-
G8	30523	29401	1122	33150	32985	165
G9	52704	51490	1214	44579	44459	120
G10	64411	55942	8469	82855	72117	10738
G11	130703	125628	5075	147460	136431	11029
G12	79169	73771	5398	90578	90575	3
G13	76348	76081	267	77619	77448	171
G14	5054	851	4203	1439	1049	390
G15	3806	1784	2022	4073	4073	-
G16	2627	813	1814	418	418	-
G17	3258	483	2775	666	666	-
UNG	24	-	24	26	26	-

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

Table – 10 : Production of Non-coking Coal, 2015-16
(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	G17	UNG
India	**578343**	**3831**	**341**	**5189**	**17665**	**16302**	**13114**	**39038**	**33150**	**44579**	**82855**	**147460**	**90578**	**77619**	**1439**	**4073**	**418**	**666**	**26**
Assam	487	119	247	-	121	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chhattisgarh	130470	-	-	1696	1761	6172	2035	755	1034	1141	1767	101011	10819	1	1049	1229	-	-	-
Jammu & Kashmir	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-
Jharkhand	62519	-	-	663	392	3693	2877	2546	4027	11820	12950	5981	2155	15401	-	-	-	-	14
Madhya Pradesh	107505	-	-	1837	1258	1523	6759	23496	5736	2171	54279	9129	1317	-	-	-	-	-	-
Maharashtra	38351	-	-	-	-	168	516	678	12845	20291	3853	-	-	-	-	-	-	-	-
Meghalaya	3712	3712	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odisha	138461	-	-	-	-	73	-	-	130	921	-	11737	75265	49945	390	-	-	-	-
Telangana	60380	-	-	-	-	786	-	9387	2384	8235	4642	17725	1022	12272	-	2844	418	653	12
Uttar Pradesh	12689	-	-	-	-	119	212	-	6994	-	5364	-	-	-	-	-	-	-	-
West Bengal	23756	-	94	993	14133	3768	715	2176	-	-	-	1877	-	-	-	-	-	-	-

Note: Meghalaya coal has not been graded. For Statistical purpose grade may be treated as "A"/"B" non-coking coal.

Table – 11: Despatches of Coal, 2014-15 & 2015-16 (By States)

(In '000 tonnes)

State	2014-15	2015-16 (P)
India	**603772**	**632442**
Assam	733	342
Chhattisgarh	129392	132040
Jammu & Kashmir	13	12
Jharkhand	122044	118072
Madhya Pradesh	74243	85205
Maharashtra	38553	36444
Meghalaya	2524	3712
Odisha	125382	140639
Telangana	52662	58687
Uttar Pradesh	29021	31815
West Bengal	29205	25474

Table –12 : Despatches of Raw Coal, 2014-15 & 2015-16 (By Priorities)

(In '000 tonnes)

Priority	2014-15	2015-16 (P)
Total	**603772**	**632442**
Steel	12343	12358
Sponge Iron	12046	7763
Chemical	407	325
Electricity	485948	502278
Cement	11057	8985
Cokeries	179	164
Paper & pulp	1648	1211
Fertilizer	2293	2296
Textile & Rayons	415	267
Other Basic metal	467	440
Others	76969	96355

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

Table – 13: Mine-head Stocks of Coal, 2015-16
(By States)

(In '000 tonnes)

State	At the beginning of the year	At the end of the year
India	**59389**	**65361**
Assam	215	359
Chhattisgarh	11576	9444
Jammu & Kashmir	13	13
Jharkhand	15544	18355
Madhya Pradesh	4111	6854
Maharashtra	5370	7170
Odisha	12538	10330
Telangana	5348	7025
Uttar Pradesh	2484	3570
West Bengal	2190	2241

Table – 14 : Production of Lignite, 2013-14 to 2015-16
(By Sector/States)

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

	2013-14		2014-15		2015-16 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**44271**	**59675300**	**48270**	**81627000**	**43842**	**74994800**
Public Sector	**43191**	**58866199**	**47065**	**80160511**	**43133**	**74139252**
Private Sector	**1080**	**809101**	**1205**	**1466489**	**709**	**855548**
Gujarat	11588	12547100	12317	17914600	10123	14723500
Rajasthan	7627	5136100	10763	12590000	9492	11103300
Tamil Nadu	25056	41992100	25190	51122400	24227	49168000

Table – 15 : Number of Lignite Mines 2014-15 & 2015-16
(By States)

State	No. of Mines	
	2014-15	2015-16 (P)
India	**19**	**19**
Gujarat	10	10
Rajasthan	6	6
Tamil Nadu	3	3

Table – 16 : Despatches of Lignite 2014-15 & 2015-16
(By States)

(In '000 tonnes)

State	2014-15	2015-16 (P)
India	**46954**	**42211**
Gujarat	12362	10135
Rajasthan	10504	9583
Tamil Nadu	24088	22493

Table – 17: Despatches of Lignite, 2014-15 & 2015-16 (By Priorities)

(In '000 tonnes)

Priority	2014-15*	2015-16 (P)@
Total	**46954**	**42211**
Electricity	39473	37555
Textile & Rayons	2887	1728
Other Basic metal	-	1020
Paper & pulp	650	427
Bricks	671	392
Chemical	333	227
Cement	1274	225
Others	1666	637

*Source: *: Coal Directory of India, 2014-15.*
@: Coal Directory of India, 2015-16.

Table – 18 : Mine-head Stocks of Lignite, 2015-16 (By States)

(In '000 tonnes)

State	At the beginning of the year	At the end of the year
India	**3878**	**4809**
Gujarat	23	11
Rajasthan	1013	225
Tamil Nadu	2842	4573

MINING & MARKETING

Coal

Coal mining in the country is carried out by both opencast and underground methods. Opencast mining contributed about 93% of the total production whereas the rest of the production (7%) came from underground mining during 2015-16. Most of mines are either semi-mechanised or mechanised. Machinery 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, machinery like draglines, dozers, shovels, dumpers and graders are deployed for various operations.

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

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 NEC (North Eastern Coalfield) are subsidiary companies of Coal India Ltd (CIL), a Government of India undertaking. The coal mines in Assam and its neighbouring areas are controlled directly by CIL under the unit North Eastern Coalfields Ltd (NEC). 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.

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 which produces 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), Jammu & Kashmir Minerals Ltd (JKML) and Rajasthan Rajya Vidyut Utpadan Nigam Limited (RVUNL) 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 31.3.2016, there were 493 operating mines for coal in the country out of which 210 were opencast while 252 were underground mines. The remaining 31 were mixed collieries. There were 473 Public Sector mines and 20 mines in Private Sector (Table-19). Thrust is given on further increasing production from opencast mines where the gestation period is comparatively shorter. In 2015-16, the share of production of raw coal from opencast mines was 592.82 million tonnes (93%) against 46.41 million tonnes (7%) from underground mines (Table-20). Production of coal by different mining technologies employed is furnished in Table-21. The overall Output per Man Shift (OMS) in opencast and underground mines for CIL in 2015-16 was 7.15 tonnes as against 6.50 tonnes in 2014-15. The overall OMS in opencast and underground mines for SCCL was maintained at 4.20 tonnes in both the years i.e. 2014-15 and 2015-16.

Under the Colliery Control Order, 1945, the Central Government was empowered to fix the prices of coal gradewise and collierywise. As per recommendations of the Bureau of Industrial Costs and Prices and the Committee on Integrated Coal Policy, prices of different grades of coal had been subjected to de-regulation since 22.3.1996 in a phased manner. As the prices of all grades of coking coal were 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 was achieved through railways, followed by roads, Merry-Go-Round System, belt conveyor, ropeways and sea route.

Table – 19 : Number* of Coal Mines, 2015-16 (By Sectors/States)

State	No. of collieries			
	OC	UG	Mixed	Total
All India	**210**	**252**	**31**	**493**
Public Sector	198	244	31	473
Private Sector	12	8	–	20
Assam	3	1	–	4
Chhattisgarh	20	36	1	57
Jammu & Kashmir	–	4	–	4
Jharkhand	72	47	21	140
Madhya Pradesh	22	46	2	70
Maharashtra	38	22	–	60
Meghalaya	3	–	–	3
Odisha	19	10	–	29
Telangana	16	31	–	47
Uttar Pradesh	4	–	–	4
West Bengal	13	55	7	75

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*
** Relates to no. of mines as last day of financial year (As on 31.3.2016)*
Note: *OC - Opencast UG - Underground.*

Table – 21 : Production of Coal, 2015-16 (By Technologies)

(In million tonnes)

Technology adopted	Production	Percentage of total
All India : Total	**639.23**	**100**
Opencast (Total)	***592.822***	***92.70***
Mechanised	592.582	99.96
Manual	0.240	0.04
Underground (Total)	***46.408***	***7.30***
Conventional B&P	1.584	3.40
Mechanised B&P	38.867	83.80
Conventional LW	0.021	0.00
Mechanised LW	1.868	4.00
Other methods	4.068	8.80

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*
Note: *B&P - Board-and-pillar; LW - Longwall*

Table – 20 : Production of Raw Coal

(In million tonnes)

Year	Production from open-cast mines (% share)	Production from under-ground mines (% share)	Total production
2013-14	516.116 (91.2%)	49.649 (8.8%)	565.765
2014-15	560.667 (92%)	48.512 (8%)	609.179
2015-16	592.822 (92.7%)	46.408 (7.3%)	639.230

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

Lignite

As on 31.03.2016, the total number of operating lignite mines was 19 and all are worked by opencast method. Out of these, fifteen are captive and the remaining four are non-captive. Four mines are owned by Neyveli Lignite Corporation (NLC), six by Gujarat Mineral Development Corporation Ltd (GMDCL), three each by Rajasthan State Mines & Minerals Limited (RSMML) and 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 are 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. To increase the power demand and to manage both social and environmental externalities, NLC has now diversified into coal mining, coal-based power generation and green energy. 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 with 10.5 MTPA, Mine-IA with 3.0 MTPA, Mine-II with 15.0 MTPA, Barsingsar with 2.1 MTPA. Besides, Bithnok Lignite Mine (2.25 MTPA), Hadla Mine (1.9 MTPA), Barsingsar expansion (0.40 MTPA) and expansion of Mine-I A (4.0 MTPA) are under implementation. In addition to the above, augmentation of Mine-II by 3.75 MTPA and setting up of Mine-III of 9.0 MTPA capacities to exploit 380 MT of lignite reserves available to the south of

Mine-II as fuel linkage to the second expansion of TPS-II are in pipeline. Further, it has also plans to develop a lignite mine of 5.0 MTPA at Jayamkondam,Tamil Nadu. The total lignite mining capacity of all NLC mines would increase to 56.9 MTPA at the end of the year 2022. The production of lignite for all NLC mines was 254.51 lakh tonnes during 2015-16 which decreased by 4.1% from 265.43 lakh tonnes in the previous year. The NLC's mines are highly mechanised. Presently, these mines are linked to three thermal power stations.

In Power Sector, with the commissioning of TPS-II expansion in June 2015, NLC has presently five thermal power stations, four at Neyveli, Tamil Nadu and one thermal power station at Barsingsar, Rajasthan with a total power generation capacity of 3240 MW (viz. TPS-I with 600 MW, TPS expansion with 420 MW, TPS-II with 1470 MW & 500 MW (expansion), Barsingsar with 250 MW). In addition, NLC's wind power unit of 51 MW is under construction and solar power generation of 10 MW is under implementation. The total installed capacity would then rise to be 3,301 MW. The project proposals of NLC that are at various stages of implementation include a 1000 MW of Neyveli New thermal power project (in replacement of the existing TPS-I of 600 MW), 250 MW Barsingsar Extension TPS and 250 MW Bithnok TPS. Besides, solar power project of 130 MW each in Neyveli and Barsingsar is under active consideration. These projects which are presently under implementation, when completed would enhance NLC's power generating capacities to 4,461 MW. Further, powere generation capacity building plans of NLC over a period of next 10 years include setting up of 100 MW TPS-II second expansion project, Jayamkondam project of 500 MW, coal-based power generation of 3,960 MW in Sirkali in phases, acquisition of power assets of 3000 MW and green energy projects such as solar and wind based power generation projects that include 51 MW solar project at Andaman and Nicobar Islands aggregating to 3,930 MW. All these projects would increase the power generating capacity to 16851 MW at the end of year 2025 and taking into account the generation capacity of NLC subsidiaries viz., NTPL (1,000 MW) & NUPPL (1,980 MW), the total power generating capacity would be 19,831 MW.

As regards coal mining, Talabira-II & III (containing mineable coal reserves of about 550 million tonnes) with coal mine capacity of 20.5 MTPA in Odisha state has been allotted to NLC while Pachwara south block in Jharkhand with a capacity of 11.0 MTPA has been allotted to Neyveli Uttar Pradesh Power Ltd (NUPPL), a subsidiary of NLC. The total coal mine capacity of these projects would add upto 31.5 MTPA at the end of the year 2022.

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-Govermental body called Screening Committee.

With regard to small and isolated blocks, 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 the amendment 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).

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 on the basis of pre-determined criteria for utilisation of Coal.

Coal mining is kept under the purview of Public Sector except captive mining for the approved end use industries viz. Iron & Steel, Power, Cement, Washing of Coal and Coal Gasification & liquefaction. Further, the Government decided in its new mining policy to allow the State Government companies and undertakings to go for coal and lignite mining without the earlier restriction of isolated small pockets only.

The policy in respect of allotment of Captive Coal blocks was adopted by the Government of India in 1993 and accordingly, 218 coal blocks were allocated during 2013-14. Out of these, 80 coal blocks were de-allocated. During the year 2014-15 in terms of the Hon'ble Supreme Court's judgement dated 25th August, 2014 read with Order dated 24.09.2014, out of 218 coal blocks, allocation of 204 coal blocks was cancelled while allocation of 12 coal blocks for UMPPS and one coal block each allocated to NTPC and SAIL was exempted.

During 2015-16, captive coal blocks have only been allotted to different companies in Power, Iron & Steel, Government Commericial, Private Commercial & Cement and Coal to Oil Sectors. As per Coal Mines (Special Provisions) Act, 2015, allocation of Schedule-I coal mines started by way of Public Auction or on the basis of Competitive Bids for Tariff. Out of the total of 94 coal blocks made available till 2015-16, 66 coal blocks were re-allocated (either vested or alloted), 8 coal blocks were for custodian, 10 coal blocks have been placed for Auction by Competitive Bidding Rules, 2015 and 10 coal blocks have not been cancelled. Out of 66 coal blocks re-allocated, 7 coal blocks have been given to CIL and one block to OCL Iron & Steel Ltd as custodian, only 2 blocks (Gare Palma IV/2 & 3) have started production. The production of coal from these12 coal blocks (Moher, Moher Amlori block that were not cancelled continued production, 8 blocks vested/ allotted started production and 2 blocks under custodian of CIL also started production) was 31.101 million tonnes during the period.

Till 31.03.2016, a total of 94 coal blocks with 13,249.60 million tonnes geological reserves have been allotted in various States (Table 22). Of these, 57 blocks (including Auction by Competitive Bidding Rules, 2012) with 8,614.02 million tonnes are under Public Sector Undertakings (PSU) and the remaining 37 blocks with 4,635.58 million tonnes are under Private Sector. Among these, 53 blocks (including Auction by Competitive Bidding Rules, 2012) with 8,244.83 million tonnes have been allocated for power, 26 blocks (909.37 million tonnes) for non-regulated sector, 8 blocks (3,730.54 million tonnes) for UMPP and 7 blocks (364.86 million tonnes) for commercial mining.

Similarly, 25 captive lignite blocks with 1,603.10 million tonnes geological reserves have been allocated till 31.3.2016. Of these, 11 blocks with 755.70 million tonnes are in Gujarat while 14 blocks with 847.40 million tonnes are in Rajasthan. By sectors, in Gujarat, 4 blocks (404.20 million tonnes) have been 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 – 22 : Allotment of Captive Coal Blocks as Allocated/Vested/Under Custodian excluding Blocks Allotted Under Auction by Competitive Bidding Rules, 2012 till 2015-16 (Statewise)

(In million tonnes)

State	No. of blocks	Geological Reserves
Arunachal Pradesh	1	4.79
Andhra Pradesh	1	45.36
Chhattisgarh	19	4360.13
Jharkhand	25	6116.11
Madhya Pradesh	9	789.11
Maharashtra	13	247.93
Odisha	6	1384.96
West Bengal	10	301.21
	84	**13249.60**
Power (Auction by Competitive Bidding Rules, 2012)	10	-
Total	**94**	**13249.60**

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

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 appropriate training for development of necessary skills for efficient management of the Indian Coal Industry;

(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 undergound mining in difficult Geological conditions including steep seams, fire & 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 (16 in Public Sector and 4 in Private Sector) with 35.90 million tonnes per annum (MTPA) capacity produced about 6.179 million tonnes of coking coal in 2015-16. Production of washed coking coal during 2015-16 was about 2.732 million tonnes in Public Sector and 3.447 million tonnes in Private Sector. Under Public Sector, BCCL operates 9 coking coal washeries (Dugda II, Bhojudih, Patherdih, Sudamdih, Barora, Moonidih, Mahuda, Madhuban and Dugda-I), CCL operates 5 washeries (Kathara, Swang, Rajrappa, Kedla and Kargali), WCL operates one (Nandan) and SAIL too has one (Chasnala) whereas 4 washeries (West Bokaro-II, West Bokaro-III, Jamadoba and Bhelatand) are operated by Tata Steel Ltd (TSL) in Private Sector. Similarly, 39 coal washeries with 137.92 million tonnes per annum capacity produced about 42.89 million tonnes non-coking coal during the year. Of these, about 11.77 million tonnes have been under Public Sector and 31.12 million tonnes under Private Sector. Under Public Sector, 5 non-coking coal washeries (two each in BCCL & CCL and one in NCL) were operational, whereas under Private Sector, 34 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 are shown in Tables - 23 to 26.

Table – 23 : Production of Washed Coking Coal, 2014-15 & 2015-16 (Sectorwise/Companywise)

(In '000 tonnes)

	2014-15	2015-16
All India : Total	**6072**	**6179**
Public Sector	**2627**	**2732**
BCCL	387	599
CCL	1648	1471
WCL	75	81
SAIL	517	581
Private Sector	**3445**	**3447**
Tata Steel Ltd	3267	3447
ESCL	178	-

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

Table – 24 : Capacity of Washed Coking Coal, 2015-16 (Sectorwise/Companywise)

Coalfield/Washery	State	Raw Coal Capacity (In '000 tpy)
Grand Total		**35900**
Public Sector	**Total**	**29700**
BCCL		**15030**
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		**12070**
Kathara	Jharkhand	3000
Swang	-do-	750
Rajrappa	-do-	3000
Kedla	-do-	2600
Kargali	-do-	2720
WCL		**1200**
Nandan (Pench-Kanhan)	Madhya Pradesh	1200
SAIL		**1400**
Chasnala	Jharkhand	1400

(Contd.)

Table -24 (Concld.)

Coalfield/Washery	State	Raw Coal Capacity (In '000 tpy)
Private Sector	**Total**	**6200**
Tata Steel Ltd		**6200**
West Bokaro-II	Jharkhand	1800
West Bokaro-III	-do-	2100
Jamadoba	-do-	1300
Bhelatand	-do-	1000

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata (except totals).*
 # : Total may not tally.

Table – 25 : Production of Washed Non-coking Coal : 2014-15 & 2015-16 (Sectorwise/Companywise)

(In '000 tonnes)

Sector/Company	2014-15	2015-16
All India : Total	**41072.09**	**42887.84**
Public Sector	**10805.00**	**11767.61**
BCCL*	83.00	-
CCL	6689.00	8652.57
NCL	3441.00	3115.04
Private Sector	**30267.09**	**31120.23**
Adani Enterprises Ltd	3004.57	5351.11
BLA Ind. Pvt. Ltd	314.47	-
Aryan Coal Beneficiation Pvt. Ltd	14975.65	14343.53
Aryan Energy Pvt. Ltd	441.52	860.21
Bhatia Coal Washeries Ltd	112.70	-
Global Coal & Mining Pvt. Ltd	1808.71	1833.81
Kartikey Coal Washeries Pvt. Ltd	47.51	-
Sarda Energy & Minerals Ltd	317.41	-
Jindal Power Ltd	1261.61	259.59
Jindal Steel & Power Ltd	2171.82	-
Spectrum Coal & Power Ltd	5811.13	8471.98

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

*Note: *Jhama is also recycled in Madhuband washery. So it is not reported.*
 # Total may not tally.

Table – 26 : Capacity of Washed Non-coking Coal, 2015-16 (Sectorwise/Companywise)

Washery/Location	Coalfield	State	Raw Coal Capacity (In '000 tpy)
Grand Total			**137920**
Public Sector	**Total**		**14980**
BCCL			
Jharia Coalfield, Jharkhand			**1480**
Dugda-I	Jharia	Jharkhand	1000
Lodna	-do-	-do-	480
CCL			
East Bokaro Coalfield, Jharkhand			**9000**
Gidi	East Bokaro	Jharkhand	2500
Piparwar	N. Karanpura	-do-	6500
NCL			**4500**
Bina Deshelling Plant	Bina	Uttar Pradesh	4500
Private Sector	**Total**		**122940**
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			**3600**
Indaram	Ramagundam	Andhra Pradesh	600
Talcher	Talcher	Odisha	2000
RKP	Mandamarri	Telangana	1000
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

(Contd.)

Table - 26 (Concld.)

Washery/Location	Coalfield	State	Raw Coal Capacity (In '000 tpy)
Spectrum Coal & Power Ltd			**22000**
Ratija	Korba	Chhattisgarh	11000
Talcher	Bharatpur	Odisha	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
Adani Enterprises Ltd			**10000**
AEL	Parsa	Chhattisgarh	10000

Source: *Coal Directory of India, 2015-16, Coal Controller's Organisation, Kolkata.*

Import Policy of Coal

The present import policy of coal allows imports to be carried out freely under Open General Licence by the consumers themselves considering their needs. Coking coal is imported by Steel Sector and coke manufacturers mainly on availability and quality consideration. Coal-based power stations and cement plants are also importing non-coking coal on consideration of transport logistics and commercial precedence. In spite of hardening prices of both coking and non-coking coal internationally and increase in ocean freight, large amounts of coal continue to be imported.

FDI Policy

Indian Government permits 100% automatic FDI approval for coal & lignite mining only for captive consumption by power projects, iron & steel and cement units and other eligible activities permitted under and subject to the provisions of Coal Mines (Nationalisation) Act, 1973. This is in addition to the existing stipulated policy applied for the Power Sector.

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 - 27.

Table – 27 : 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 6,200 kcal per kg.
		B	Useful Heat Value exceeding 5,600 kcal per kg but not exceeding 6,200 kcal per kg.
		C	Useful Heat Value exceeding 4,940 kcal per kg but not exceeding 5,600 kcal per kg.
		D	Useful Heat Value exceeding 4,200 kcal per kg but not exceeding 4,940 kcal per kg.
		E	Useful Heat Value exceeding 3,360 kcal per kg but not exceeding 4,200 kcal per kg.
		F	Useful Heat Value exceeding 2,400 kcal per kg but not exceeding 3,360 kcal per kg.
		G	Useful Heat Value exceeding 1,300 kcal per kg but not exceeding 2,400 kcal per kg.
2.	Non-coking coal produced in Arunachal Pradesh, Assam, Meghalaya and Nagaland	A	Useful Heat Value between 6,200 and 6,299 kcal per kg and corresponding ash plus moisture content between 18.85 and 19.57%.
		B	Useful Heat Value between 5,600 and 6,199 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%.
		Washery Grade IV	Ash content exceeding 28% but not exceeding 35%.
4.	Semi-coking and weakly-coking coal	Semi-coking Grade I	Ash plus moisture content not exceeding 19%.
		Semi-coking Grade II	Ash plus moisture content exceeding 19% but not exceeding 24%.
5.	Hard coke	By-product Premium	Ash content not exceeding 25%.
		By-product Ordinary	Ash content exceeding 25% but not exceeding 30%.
		Beehive Premium	Ash content not exceeding 27%.
		Beehive Superior	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:

Grades	GCV Range (kcal/kg)
G1	GCV exceeding 7,000
G2	GCV exceeding 6,701 but not above 7,000
G3	GCV exceeding 6,401 but not above 6,700
G4	GCV exceeding 6,101 but not above 6,400
G5	GCV exceeding 5,801 but not above 6,100
G6	GCV exceeding 5,501 but not above 5,800
G7	GCV exceeding 5,201 but not above 5,500
G8	GCV exceeding 4,901 but not above 5,200
G9	GCV exceeding 4,601 but not above 4,900
G10	GCV exceeding 4,301 but not above 4,600
G11	GCV exceeding 4,001 but not above 4,300
G12	GCV exceeding 3,701 but not above 4,000
G13	GCV exceeding 3,401 but not above 3,700
G14	GCV exceeding 3,101 but not above 3,400
G15	GCV exceeding 2,801 but not above 3,100
G16	GCV exceeding 2,501 but not above 2,800
G17	GCV exceeding 2,201 but not above 2,500

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 table 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 2015- 16,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 - 28.

Table – 28 : Despatches* of Coal 2013-14 to 2015-16 (By Industries)

(In million tonnes)

Industry	2013-14	2014-15	2015-16
Total	**572.06**	**603.77**	**632.44**
Iron & steel[1]	15.27	12.34	12.36
Sponge iron	12.51	12.05	7.76
Fertilizer	2.29	2.29	2.30
Cement	11.64	11.06	8.98
Electricity	437.59	485.95	502.28
Others (Chemical, base metals, cokeries, paper & pulp, textile & rayon, bricks, etc.	92.76	80.08	98.76

Source: *Coal Directory, 2013-14, 2014-15 and 2015-16*

** Data on consumption is not available*

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

DEMAND & SUPPLY

As per the Report of the Working Group for coal & lignite in the terminal year of XII Plan (2016-17), the total demand of coal in different projections was at 980.50 million tonnes. Of these, the demand for non-coking is assessed at 913.30 million tonnes and coking coal at 67.20 million tonnes. As against these demands, the production of non-coking is projected at 683.30 million tonnes and coking coal at 31.70 million tonnes in the terminal year of XIIth Plan. The total supply projection of coal through various sources i.e. CIL in 556.40 million tonnes (coking coal are in 15.74 million tonnes and non-coking in 540.66 million tonnes); SCCL in 57 million tonnes under non-coking coal and others are in 101.60 million tonnes (15.96 million tonnes are in coking coal and 85.64 million tonnes in non-coking coal). This leaves a gap of 265.50 million tonnes between demand and indigenous availability comprising of 35.50 million tonnes of coking coal and 230.00 million tonnes of non-coking coal is to be met through imports.

In sectorwise demand projection of coal in the terminal year of XII Plan (2016-17), a sizeable share of 738.44 million tonnes is in power sector (682.08 million tonnes in power utility and 56.36 million tonnes in power captive) followed by 67.20 million tonnes are in Steel sector, 50.33 million tonnes are in sponge iron, 47.31 million tonnes are in cement industry. The remaining 77.22 million tonnes are others in e-auction, open to all consuming sector including power, CPP, sponge iron, etc.

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 1,139.331 billion tonnes at the end of 2016 of which 816.214 billion tonnes (72%) is classified as anthracite & bituminus coal and 323.117 billion tonnes (28%) as sub-bituminous coal & lignite (Table-29). World production of coal and lignite decreased from about 8.17 billion tonnes in 2014 to 7.86 billion tonnes in 2015. China continued to be the largest producer of coal & lignite in 2015 with about 47% share in total world production, followed by USA (10%), India (9%), Australia & Indonesia (6% each), Russia (5%) and South Africa (3%). The remaining 14% of the total world coal production was from other countries (Table-30). Global primary energy consumption fell by 1.1% over that of the preceding year. Countries of the Asia Pacific Region and the Middle East have increased coal consumption during the year under review.

Table – 29 : World Proved Coal Reserves at the end of 2016 (By Principal Countries)

(In million tonnes)

Country	Anthracite and bituminous coal	Sub-bituminous coal and lignite	Total
World : Total	**816214**	**323117**	**1139331**
Australia	68310	76508	144818
Brazil	1547	5049	6596
Canada	4346	2236	6582
China	230004	14006	244010
Colombia	4881	-	4881
Germany	12	36200	36212
India*	89782	4987	94769
Indonesia	17326	8247	25573
Kazakhstan	25605	-	25605
Poland	18700	5461	24161
Russian Federation	69634	90730	160364
Serbia	402	7112	7514
South Africa	9893	-	9893
Turkey	378	10975	11353
Ukraine	32039	2336	34375
USA	221400	30182	251582
Other countries	21955	29088	51043

Source: *BP Statistical Review of World Energy, June 2017.*

* *India's reserves of coal as on 1.4.2016 are estimated at about 308.80 billion tonnes to a depth of 1,200 m and those of lignite at about 44.59 billion tonnes.*

Table – 30 : World Production of Coal and Lignite (By Principal Countries)

(In million tonnes)

Country	2013	2014	2015
World : Total	**8226**	**8165**	**7860**
Australia			
Bituminous coal	411	442	440
Brown coal	60	58	58[e]
Bosnia & Herzegovina			
Brown coal & lignite	12	12	12
Bulgaria			
Brown Coal & lignite	28	31	36
Canada			
Hard coal	60	59	52
Lignite	9	9	10
China			
Hard coal	3974	3874	3685
Colombia			
Bitumious coal	85	89	86
Czech. Rep.			
Bituminous coal	9	8	8
Brown Coal	41	38	38
Germany			
Anthracite & Bituminous	8	8	7
Brown coal	183	178	178
Greece			
Lignite	56	50	46
India *			
Bituminous coal	566	609	639
Lignite	44	48	44
Indonesia			
Anthracite & bituminous coal	475	458	462
Kazakhstan			
Bituminous coal	113	108	102
Lignite	7	7	6
Korea, Dem. People's Rep. of [e]			
Coal	42	41	41
Mongolia			
Brown coal & lignite	33	24	24
Mexico			
Bituminous coal	16	16	9
Poland			
Bituminous coal	68	66	65
Lignite	66	64	63
Romania			
Anthracite & Bituminous	2	2	1
Lignite	23	23	25
Russia			
Coal	347	356	372
Serbia			
Lignite	40	29	37
South Africa			
Hard coal	256	261	252
Thailand			
Lignite	18	18	15
Turkey			
Anthracite	3	2	2
Lignite	66	71	58
Ukraine			
Bituminous coal	64	46	30
UK			
Bituminous coal	13	12	9

Table 29 (Concld.)

Country	2013	2014	2015
USA			
Hard coal	823	835	749
Lignite	70	72	65
Vietnam			
Anthracite	41	41	42
Other Countries	94	100	92

***Source**: World Mineral Production, 2011-2015.*
***Hard coal** – Including anthracite, bituminous & sub-bituminous coal.*
** India's production of coal and lignite during 2015-16 were 639.2 million tonnes and 43.8 million tonnes, respectively.*

As estimated by the 'World Coal Association', coal provides around 30% of global primary energy needs and generates about 41% 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 CO_2 emission from coal use. The first is by carbon capture and storage (CCS) which can reduce 80-90% CO_2 emission into atmosphere and second is storing CO_2 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.

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 decrease in coal output and consumption was attributable to China's strategic decision to mitigate environmental effects by reducing high-emission and high-pollution energy. China's coal production capacity exceeded 4 Gt in 2014 and about 10 Mt of capacity was under construction.

Indonesia

Indonesia was the world's second ranked exporter and leading producer of coal.

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. Siberian Coal Energy Co. (SUEK) was the largest coal producer in Russia in terms of annual production. In February 2011, Russia adopted a new programme 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 Energy projected that Russia would construct more than 100 new coal enterprises within the next 20 years.

FOREIGN TRADE

Exports

Exports of coal (Excl. lignite) increased 27% to 1.58 million tonnes in 2015-16 from 1.24 million tonnes in the previous year. Exports of coke decreased 8% to 89.85 thousand tonnes in 2015-16 from 98 thousand tonnes in 2014-15. Coal was mainly exported to Bangladesh (52%), Nepal (35%) and Bhutan, UAE & Iran (4% each). Coke was exported predominantly to China (37%), Bhutan & Nepal (25% each), Pakistan (5%) and Bangladesh (3%). Exports of lignite slightly decreased to negligible quantity in 2015-16 from only one thousand tonnes in the previous year while exports of coal water gas were decreased to one tonne in 2015-16 from 32 tonnes in the previous year. Coal Water Gas was exported to Nepal and Bangladesh (Tables - 31 to 34).

Imports

Imports of coal (Excl. lignite) decreased by about 4% to 204 million tonnes in 2015-16 from 212 million tonnes in the previous year. Imports of coke decreased by 8% to about 3.02 million tonnes in 2015-16 from 3.29 million tonnes in the previous year. Coal was mainly imported from Indonesia (48%),

Australia (24%), South Africa (18%) and USA (3%), whereas coke was imported mainly from China (71%), Poland (12%), Australia & Japan (6% each) and Russia & Colombia (2% each). Imports of lignite and coal water gas were of negligible quantity during both the current and the preceding year (Tables - 35 to 38).

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

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**1237**	**7202914**	**1576**	**9006273**
Bangladesh	542	2654093	816	4424849
Nepal	481	3027128	559	3146590
Bhutan	38	547507	69	532097
UAE	141	588607	67	230282
Iran	35	372497	64	649555
UK	-	-	1	13265
Madagascar	-	-	++	2805
Malaysia	++	2188	++	2366
Saudi Arabia	++	2309	++	727
Unspecified	-	-	++	2561
Other countries	++	8585	++	1176

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

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**1**	**13882**	**++**	**2752**
Pakistan	++	306	++	2252
UAE	++	161	++	500
Saudi Arabia	++	4348	-	-
Nepal	1	3799	-	-
USA	++	3400	-	-
Thailand	++	1629	-	-
China	++	230	-	-
Australia	++	8	-	-
Other countries	-	1	-	-

Table – 33 : Exports of Coal, Water Gas, etc. (Except Gaseous Hydrocarbons) (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**32**	**7820**	**1**	**99**
Bangladesh	-	-	++	78
Nepal	2	15	1	21
Netherlands	30	7805	-	-
Other countries	-	-	-	-

Table – 34 : Exports of Coke (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**98003**	**1090634**	**89847**	**1073159**
Bhutan	13095	221880	22449	421388
China	-	-	33003	322290
Nepal	54157	386867	22363	148434
Pakistan	20713	328057	4491	71390
Bangladesh	2591	25795	2962	23468
UAE	1240	21329	1257	22086
Saudi Arabia	821	19583	891	19622
Oman	1530	18701	1119	15648
Sri Lanka	636	15771	494	11733
South Africa	216	5649	259	7814
Other countries	3004	47002	559	9286

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

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**++**	**11131**	**++**	**5518**
USA	++	10393	++	5095
China	++	738	++	423
Other countries	-	-	-	-

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

Country	2014-15		2015-16 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**212106**	**1045300819**	**204000**	**861073457**
Indonesia	118215	451920393	97513	320109184
Australia	47460	343890876	48893	294756289
South Africa	30730	152636453	36901	142115520
USA	4269	30000874	5815	32399335
Russia	1333	8485569	3822	20199668
Canada	1957	15201174	1551	9329920
Mozambique	1979	13358912	2780	14217599
New Zealand	1025	7896790	681	4375851
Chile	1728	5549350	773	2173788
Unspecified	2967	12537835	4238	15999036
Other countries	443	3822593	1033	5397267

Table – 37 : Imports of Coke (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**3290324**	**43751479**	**3019502**	**31956111**
China	2026974	25468625	2156034	21985869
Poland	98000	1336722	353486	4234041
Australia	214653	2767202	192646	2099787
Japan	340759	5089919	175829	1904014
Russia	132260	1943572	74874	904242
Colombia	103314	1909295	62426	796343
Saudi Arabia	-	-	2440	11471
Ukraine	305585	4374869	1249	11015
UK	136	4209	153	4804
Bangladesh	-	-	350	4408
Other countries	68643	857066	15	117

Table – 38 : Imports of Coal Water Gas (By Countries)

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**1290**	**++**	**75**
France	-	-	++	75
USA	++	672	-	-
China	++	618	-	-

FUTURE OUTLOOK

The XIIth 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 the country's growing demand for coal, foreign collaborations with advanced coal producing countries are also being considered by the Government with an aim to bring in new technologies both in underground and opencast sectors for efficient management of the Coal Industry along with building adequate support mechanism through comprehensive skill development and training activities.

As per the draft National Energy Policy (NEP), (version as on 27.06.2017) formulated by the Niti Aayog, India Vision 2040 envisages demand-driven provision of energy at affordable prices, high per capita consumption of electricity, access to clean cooking energy & electricity with universal coverage, low emission and security of supply as criteria that would characterise the energy parameters of India in 2040.

The installed coal-based electricity generation capacity is expected to grow to 330-441 GW by 2040. This is likely to translate into a coal demand of 1.1-1.4 billion tonnes. The known levels of proven coal reserves (138 billion tonnes as of 31.03.2016) may only be able to support an annual peak production of 1.2-1.3 billion tonnes till 2037, with a gradual decrease thereafter. This fact calls for intensifying exploration to enhance the proven coal reserves. Multiple institutions such as GSI and CMPDI are responsible for exploration of coal in India. There is a need to synergise the efforts of all these agencies to undertake 100% resource mapping of coal.