

24 Coal & Lignite

Coal plays a pivotal role in sustainable development. It is the most widely used energy source for electricity generation and an essential input to most steel production. As estimated by the World Coal Institute, coal currently fuels 40% of the world electricity and this proportion is set to remain as static over the next 30 years. About 70% of the world's steel production is based on coal. As per Integrated Energy Policy Committee of Planning Commission, coal will remain India's most important energy source till 2031-32 and possibly beyond. In India, about 77% coal output is consumed in power sector. In addition, other industries like cement, fertilizer, chemical, paper and thousands of medium and small-scale industries are dependent on coal for their process and energy requirements. The production of coal at 430.8 million tonnes in 2006--07 increased by 6.1% to 457 million tonnes in 2007-08. Lignite production in 2007-08 at 34 million tonnes increased by 8.6% from that in the previous year. India ranks 3rd in world coal production. It is 11th largest energy producer (2.4% of world energy production) and 6th largest energy consumer (3.7% of world energy consumption).

RESOURCES

Coal

The Indian coal deposits are primarily concentrated in the Gondwana sediments

occurring mainly in the eastern and central parts of Peninsular India. The Tertiary coal-bearing sediments are found in Assam, Arunachal Pradesh, Nagaland and Meghalaya. As a result of exploration carried out by GSI, CMPDI and other agencies, 264.5 billion tonnes coal resources to 1,200m depth have been established in the country as on 1.4.2008. Out of these resources, 101.8 billion tonnes were proved reserves. Total prime-coking coal resources were 5.31 billion tonnes. Statewise/coalfieldwise and statewise/typewise reserves of coal as on 1.4.2008 are given in Tables-1 & 2, respectively.

Lignite

Indian lignite deposits occur in the Tertiary sediments in the southern and western parts of peninsular shield particularly in Tamil Nadu, Puducherry, Gujarat, Rajasthan and Jammu & Kashmir. The total known geological reserves of lignite as on 1.4.2008 were 38.93 billion tonnes. Most of the reserves were in Tamil Nadu. Other states where lignite deposits have been located are Rajasthan, Gujarat, Jammu & Kashmir, Kerala West Bengal and the Union Territory of Puducherry. Statewise/districtwise reserves are given in Table - 3.

**Table – 1: Reserves of Coal as on 1.4.2008
(By States/Coalfields)**

| State/Coalfield | Proved | Indicated | Inferred | Total |
|---|------------------|------------------|-----------------|------------------|
| All India : Total | 101829.49 | 124215.96 | 38489.61 | 264535.06 |
| Gondawana Coalfields* | 101391.25 | 124080.73 | 38120.84 | 263592.82 |
| Andhra Pradesh/ Godavari Valley | 9007.13 | 6710.65 | 2978.81 | 18696.59 |
| Assam/Singrimari | - | 2.79 | - | 2.79 |
| Bihar/Rajmahal | - | - | 160.0 | 160.00 |
| Chhattisgarh | 10419.32 | 29272.15 | 4442.57 | 44134.04 |
| Sohagpur | 94.30 | 10.08 | - | 104.38 |
| Sonhat | 199.49 | 2463.86 | 1.89 | 2665.24 |
| Jhilimili | 228.20 | 38.90 | - | 267.10 |
| Chirimiri | 320.33 | 10.83 | 31.00 | 362.16 |
| Bisrampur | 733.44 | 765.55 | - | 1498.99 |
| East Bisrampur | - | 41.75 | - | 41.75 |
| Lakhanpur | 365.56 | 85.84 | - | 451.40 |
| Panchbahini | - | 11.00 | - | 11.00 |
| Hasdeo-Arand | 1183.36 | 2946.68 | 842.98 | 4972.96 |

(Contd.)

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Table - 1 (Contd.)

| State/Coalfield | Proved | Indicated | Inferred | Total |
|----------------------------------|-----------------|-----------------|-----------------|-----------------|
| Sendurgarh | 152.89 | 126.32 | - | 279.21 |
| Korba | 4980.58 | 4499.90 | 830.18 | 10310.66 |
| Mand-Raigarh | 2161.17 | 16856.90 | 2534.33 | 21552.40 |
| Tatapani-Ramkola | - | 1414.60 | 202.19 | 1616.79 |
| Jharkhand | 37492.92 | 31628.90 | 6338.32 | 75460.14 |
| Raniganj | 1538.19 | 466.56 | 31.55 | 2036.30 |
| Jharia | 15077.57 | 4352.49 | - | 19430.06 |
| East Bokaro | 3351.87 | 3842.04 | 863.32 | 8057.23 |
| West Bokaro | 3488.10 | 1482.47 | 34.42 | 5004.99 |
| Ramgarh | 446.27 | 545.15 | 58.05 | 1049.47 |
| North Karanpura | 8077.77 | 5917.70 | 1864.96 | 15860.43 |
| South Karanpura | 2620.41 | 1985.73 | 1508.88 | 6115.02 |
| Aurangabad | 213.88 | 2279.82 | 503.41 | 2997.11 |
| Hutar | 190.79 | 26.55 | 32.48 | 249.82 |
| Daltongunj | 83.86 | 60.10 | - | 143.96 |
| Deogarh | 326.24 | 73.60 | - | 399.84 |
| Rajmahal | 2077.97 | 10596.69 | 1441.25 | 14115.91 |
| Madhya Pradesh | 7895.96 | 9882.37 | 2781.63 | 20559.96 |
| Johilla | 185.08 | 104.09 | 32.83 | 322.00 |
| Umaria | 177.70 | 3.59 | - | 181.29 |
| Pench-Kanhan | 1375.98 | 736.71 | 316.78 | 2429.47 |
| Pathakhera | 290.80 | 88.13 | 68.00 | 446.93 |
| Gurgunda | - | 47.39 | - | 47.39 |
| Mohpani | 7.83 | - | - | 7.83 |
| Sohagpur | 1622.03 | 2889.05 | 197.46 | 4708.54 |
| Singrauli | 4236.54 | 6013.41 | 2166.56 | 12416.51 |
| Maharashtra | 5004.26 | 2821.66 | 1992.17 | 9818.09 |
| Wardha Valley | 3092.98 | 1258.48 | 1466.73 | 5818.19 |
| Kamthi | 1276.14 | 1079.23 | 505.44 | 2860.81 |
| Umrer | 308.41 | - | - | 308.41 |
| Nand Bander | 316.73 | 483.95 | - | 800.68 |
| Bokhara | 10.00 | - | 20.00 | 30.00 |
| Orissa | 19221.59 | 31728.09 | 14313.66 | 65263.34 |
| Ib-River | 5459.51 | 9778.95 | 7183.33 | 22421.79 |
| Talcher | 13762.08 | 21949.14 | 7130.33 | 42841.55 |
| Uttar Pradesh/Singrauli | 765.98 | 295.82 | - | 1061.80 |
| Sikkim/Rangit Valley | - | 58.25 | 42.98 | 101.23 |
| West Bengal | 11584.09 | 11680.05 | 5070.70 | 28334.84 |
| Raniganj | 11469.82 | 7608.82 | 4443.91 | 23522.55 |
| Barjora | 114.27 | - | - | 114.27 |
| Birbhum | - | 4071.23 | 611.79 | 4683.02 |
| Darjeeling | - | - | 15.00 | 15.00 |
| Tertiary Coalfields | 438.24 | 135.23 | 368.77 | 942.24 |
| Assam | 314.59 | 24.04 | 34.01 | 372.64 |
| Makum | 304.87 | 9.85 | 1.19 | 315.91 |
| Dilli-Jeypore | 9.03 | 14.19 | 30.80 | 54.02 |
| Mikir Hills | 0.69 | - | 2.02 | 2.71 |
| Arunachal Pradesh/Namchik | 31.23 | 40.11 | 18.89 | 90.23 |
| Meghalaya | 88.99 | 69.73 | 300.71 | 459.43 |
| West Darangiri | 64.47 | 62.53 | - | 127.00 |
| Balphakram-Pendengu | - | - | 107.03 | 107.03 |
| Siju | - | - | 125.00 | 125.00 |
| Langrin | 11.34 | 7.20 | 31.46 | 50.00 |
| Mawlong Shelia | 2.17 | - | 3.83 | 6.00 |
| Khasi Hills | - | - | 7.09 | 7.09 |

(Contd.)

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Table - 1 (Concl.)

| State/Coalfield | Proved | Indicated | Inferred | Total |
|-----------------|-------------|-------------|--------------|--------------|
| Bapung | 11.01 | - | 22.65 | 33.66 |
| Jayanti Hills | - | - | 3.65 | 3.65 |
| Nagaland | 3.43 | 1.35 | 15.16 | 19.94 |
| Borjan | 3.43 | 1.35 | 5.22 | 10.00 |
| Jhanzi-Disai | - | - | 2.08 | 2.08 |
| Tiensang | - | - | 1.26 | 1.26 |
| Tiru Valley | - | - | 6.60 | 6.60 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

**Table – 2 : Reserves of Coal as on 1.4.2008
(By States/Types)**

(In million tonnes)

| State/Type of coal | Proved | Indicated | Inferred | Total |
|---------------------------------------|------------------|------------------|-----------------|------------------|
| All India : Total | 101829.49 | 124215.96 | 38489.61 | 264535.06 |
| Prime-coking | 4614.35 | 698.71 | - | 5313.06 |
| Medium-coking | 12307.51 | 12136.21 | 1880.23 | 26323.95 |
| Semi-coking | 482.16 | 1003.29 | 221.68 | 1707.13 |
| Non-coking | 83987.23 | 110242.52 | 36018.93 | 230248.68 |
| High sulphur | 438.24 | 135.23 | 368.77 | 942.24 |
| Andhra Pradesh/Non-coking | 9007.13 | 6710.65 | 2978.81 | 18696.59 |
| Arunachal Pradesh/High sulphur | 31.23 | 40.11 | 18.89 | 90.23 |
| Assam | 314.59 | 26.83 | 34.01 | 375.43 |
| Non-coking | - | 2.79 | - | 2.79 |
| High sulphur | 314.59 | 24.04 | 34.01 | 372.64 |
| Bihar/Non-coking | - | - | 160.00 | 160.00 |
| Chhattisgarh | 10419.32 | 29272.15 | 4442.57 | 44134.04 |
| Semi-coking | 70.77 | 99.25 | - | 170.02 |
| Non-coking | 10348.55 | 29172.90 | 4442.57 | 43964.02 |
| Jharkhand | 37492.92 | 31628.90 | 6338.32 | 75460.14 |
| Prime-coking | 4614.35 | 698.71 | - | 5313.06 |
| Medium-coking | 11743.02 | 10557.60 | 1607.40 | 23908.02 |
| Semi-coking | 223.34 | 471.55 | 53.45 | 748.34 |
| Non-coking | 20912.21 | 19901.04 | 4677.47 | 45490.72 |
| Madhya Pradesh | 7895.96 | 9882.37 | 2781.63 | 20559.96 |
| Medium-coking | 354.49 | 1560.11 | 272.83 | 2187.43 |
| Non-coking | 7541.47 | 8322.26 | 2508.80 | 18372.53 |
| Maharashtra/Non-coking | 5004.26 | 2821.66 | 1992.17 | 9818.09 |
| Meghalaya/High sulphur | 88.89 | 69.73 | 300.71 | 459.43 |
| Nagaland/High sulphur | 3.43 | 1.35 | 15.16 | 19.24 |
| Orissa/Non-coking | 19221.59 | 31728.09 | 14313.66 | 65263.34 |
| Sikkim/Non-coking | - | 58.25 | 42.58 | 101.23 |
| Uttar Pradesh/Non-coking | 765.98 | 295.82 | - | 1061.80 |
| West Bengal | 11584.09 | 11680.05 | 5070.70 | 28334.84 |
| Medium-coking | 210.00 | 18.50 | - | 228.50 |
| Semi-coking | 188.05 | 432.49 | 168.23 | 788.77 |
| Non-coking | 11186.04 | 11229.06 | 4902.47 | 27317.57 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

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**Table – 3 : Reserves of Lignite as on 1.4.2008
(By States/Districts)**

(In million tonnes)

| State/District | Area/Lignite field | Proved | Indicated | Inferred | Total |
|----------------------------|---|----------------|-----------------|----------------|-----------------|
| All India : Total | | 4824.35 | 26072.88 | 8032.33 | 38929.56 |
| Gujarat | | 785.27 | 259.40 | 1618.08 | 2662.75 |
| Kachchh | Panandhro & Extn., Akrimota, Umarsar, Matanomadh-Lakhpat-Dhedadi, Jhularai-Waghpadar, Hamla-Ratadia, Kaiyari, Barkham-Dam, Pranpur. | 300.61 | 32.10 | 33.09 | 365.80 |
| Bhavnagar | Kharsalia, Surka, Hoidad, Bhuteshwar, Rampur. | - | - | 299.17 | 299.17 |
| Surat | Vastan, Mongrol, Mandvi, Tadkeswar, Dungra, Kamrej-Vesma, Nani Naroli, Ghala. | 218.28 | 108.71 | 336.21 | 663.20 |
| Bharuch | Rajparadi, Bhagma, Luna, Pansoli, Nani, Pardi, Bhimpur, Bhuri, Valia. | 266.38 | 118.59 | 949.61 | 1334.58 |
| Jammu & Kashmir | | - | 20.25 | 7.30 | 27.55 |
| Kupwara | Nichahom, Budhasung | - | 20.25 | 7.30 | 27.55 |
| Kerala | | - | - | 9.65 | 9.65 |
| Kannur | Madayi, Kadamkottumala and Kayyur & Nileswarm | - | - | 9.65 | 9.65 |
| Rajasthan | | 639.69 | 2568.30 | 1276.84 | 4484.83 |
| Barmer | Kapurdi, Jalipa, Bothia (Jalipa N Ext.), Giral, Jogeswartala, Sonari, Sachcha-Saudha, Bharka, Bothia-Bakra-Dunga, Sindheri East & West, Kurla, Chokla North, Mahabar- Shivkar, Mithra, Hodu, Nimbalkot, Nimbalkot North, Nagurda, Nagurda East, Munabao, Kawas Gravity Block. | 170.40 | 2177.84 | 964.12 | 3312.36 |
| Jaisalmer & Barmer | Kuuri | - | - | 13.80 | 13.80 |
| Bikaner | Palana, Barsinghsar, Gurha East & West, Bholasar, Bithnok Main & Extn., Gadiyala, Girirajsar & Extn., Raneri, Mandal Chaman, Hadla, Badhnu, Hira-ki-Dhani, Chak-Vjaysinghpura, Kuchore (Napasar), Riri, Latamdesar Bada, East or Riri, Bania, Kuchur-Athuni, Sarupdesar. Palana East, Gigasar-Kesardesar, Bapeau, Bigga-Abhayasingpura. | 356.29 | 330.39 | 162.49 | 849.17 |
| Nagaur | Kasnau-Igiar, Matasukh, Mokala, Nimbri-Chadwatan, Kaprion-ka-Dhani, Merta Road & Meerangar, Indawar, Kuchera, Lunsara. | 113.00 | 60.07 | 60.35 | 233.42 |
| Jalore | Sewara | - | - | 76.08 | 76.08 |
| Tamil Nadu | | 3399.39 | 22819.03 | 5108.60 | 31327.02 |
| Cuddalore | NLC Leasehold areas, South of Vellar (Srimushnam), Veeranam (Lalpettai) Eastern part of NLC leasehold area, Kullanchavadi, Kudikadu, Bhavanagiri-Kullanchavadi, Bahur*, West of Bahur*. | 2831.00 | 2530.74 | 1163.73 | 6525.47 |
| Ariyalur | Meensuruti Jayamkondamcholapuram, Michaelpatti | 568.39 | 599.61 | 481.07 | 1649.07 |
| Tanjavur & Thiruvarur | Mannargudi-Central, Mannargudi-NE, Mannargudi-NE Extn., Mannargudi SE, Melnattam-Araharam. | - | 17248.06 | 3123.46 | 20371.52 |
| Tanjavur | Mannargudi-NW & SW, Maharajapuram Orattanadu-Puttukottai, Vadaseri (Orattanadu-Pattukottai) Madukkur-Anaikkadu Veppanagulam-Kasangadu | - | 2290.71 | 72.66 | 2363.37 |
| Tanjavur & Nagappatinam | Alangudu, Pandanallur, Tiruumangaichcheri | - | 125.99 | 238.89 | 364.88 |
| Ramanathapuram | Ramanathapuram Lignite field, Misal | - | 23.92 | 28.79 | 52.71 |
| Puducherry | | - | 405.61 | 11.00 | 416.61 |
| | Neyveli Lignite Field, Bahur & West of Bahur | - | 405.61 | 11.00 | 416.61 |
| West Bengal | | - | 0.29 | 0.86 | 1.15 |
| | Rakshitpur | - | 0.29 | 0.86 | 1.15 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

* Blocks cover parts of Tamil Nadu and Puducherry.

EXPLORATION & DEVELOPMENT

The agencies engaged in exploration during 2006-07 and 2007-08 for coal were mainly GSI, CMPDI, MECL and State Directorates of Geology & Mining. For lignite, exploration was carried out by GSI, MECL, DMG, Rajasthan and GMDC Ltd.

GSI carried out exploration for coal in Gondwana basins of Andhra Pradesh, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa and West Bengal to identify additional resources of power grade coal and superior grade coking coal. As a result of exploration carried out, additional resources of 2,290.14 million tonnes and 2,760.0 million tonnes coal were assessed in 2006-07 (up to June 2007) and 2007-08 (up to June 2008), respectively. GSI continued extensive exploration for lignite in Rajasthan and Tamil Nadu, keeping in view the high demand for accelerated growth of power and industrial sectors. Details of exploration activities and additional reserves estimation for coal & lignite by GSI are given in Tables 4(A), 4(B) and 4(C).

MECL carried out 51,747.90 m and 55,716.95 m exploratory drilling for coal on behalf of Ministry of Coal in 2006-07 and 2007-08, respectively in Andhra Pradesh, Madhya Pradesh, Maharashtra, Chhattisgarh and Assam. About 3,148.45 m contractual drilling for coal on behalf of NTPC, JAL, WCL and IISCO in 2006-07 and 36,163.20 m drilling on behalf of NTPC, CMPDIL, WCL, WBMDTC, APMDC and OMC in 2007-08 were carried out. MECL established 1,425.629 million tonnes and 3,609.44 million tonnes coal resources in 2006-07 and 2007-08, respectively.

MECL carried out exploration for lignite in Neyveli Lignite Field in Tamil Nadu and Barmer and Bikaner Lignite Fields in Rajasthan on

promotional basis on behalf of Ministry of Coal and completed 25,191.60 m and 37,865.20 m drilling in 2006-07 and 2007-08, respectively. Similarly 44,590.40 m contractual drilling for lignite on behalf of NLC and RSMML in 2006-07 and 43,243.60 m drilling on behalf of NLC and RSMML in 2007-08 were carried out. About 652.608 million tonnes and 394.603 million tonnes lignite resources were established during 2006-07 and 2007-08, respectively. Particulars of exploratory drilling carried out for coal and additional resources estimated by MECL are summarised in Tables 5(A) and 5(B), respectively.

DGM, Maharashtra estimated 115.56 million tonnes and 49.00 million tonnes coal resources in 2006-07 and 2007-08, respectively, in Chandrapur, Nagpur, Yavatmal and Wardha districts. DGM, Chhattisgarh established 237.15 million tonnes and 93.39 million tonnes coal resources of indicated category during 2006-07 and 2007-08, respectively. DMG, Rajasthan carried out exploration for lignite in Bikaner and Nagaur districts. GMDC also conducted exploration and estimated 22.00 million tonnes and 121 million tonnes lignite reserve in 2006-07 and 2007-08, respectively. Details of exploration carried out by the various state DGMs and state undertakings are given in Tables-6A and 6B.

CMPDI in its exploration programme for 2006-07 and 2007-08 laid emphasis on proving power grade and superior grade of non-coking coal in CIL and non-CIL blocks. A total of 201,850 m of exploratory drilling was completed by CMPDI during 2007-08 as against 198,496 m in 2006-07 which includes 153,707 m in CIL blocks, 45,151 m in non-CIL/captive mining blocks and 2,992 m in promotional blocks. During 2007-08, CMPDI and its contractual agencies conducted exploration in 73 blocks/mines spread over 17 coalfields namely,

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Raniganj (5 blocks/mine), N.Karnapura (3), S. Karnapura (1), E.Bokaro (2), W.Bokaro (4), Ramgarh (1), Tawa valley/Patharkheda (3), Pench Kanhan (7), Kamptee (2), Wardha (11), Sohagpur (14), Mand Raigarh (1), Korba (4), Bistrampur (2), Singrauli (4), Talcher (6) and Ib valley (3). Out of 73 blocks/mines, 9 were non-CIL/captive blocks, 4 promotional blocks and 60 CIL blocks/mines.

SCCL carried out detailed exploration covering eight exploratory blocks each during 2006-07 and 2007-08 in Godavari Valley coalfield, Andhra Pradesh. A total of 87,469 m and 79,380 m drilling was achieved and coal reserves of the order of 393.94 million tonnes and 187.20 million tonnes were proved during 2006-07 and 2007-08, respectively.

Table – 4(C) : Additional Resources Estimated by GSI for Coal, 2006-07 (up to June 2007) and 2007-08 (up to June 2008)

(In million tonnes)

| State/Coalfield/Block | Additional resources | |
|-------------------------|----------------------|----------------|
| | 2006-07 | 2007-08 |
| Andhra Pradesh | | |
| Allapalli | - | 26.00 |
| Chhattisgarh | | |
| Hasdo-Arand Coalfield | | |
| Pendrakhi | 387.46 | |
| Madhya Pradesh | | |
| Sohagpur Coalfield | | |
| Chainpa | 99.29 | |
| Malachua | 169.24 | |
| Shahpur | - | 180.00 |
| Singrauli Coalfield | | |
| Budher | 326.60 | - |
| Majhauri(S) | - | 78.00 |
| Maharashtra | | |
| Wardha Valley Coalfield | | |
| Ashtona-Kothurla-Mangli | 73.23 | - |
| Orissa | | |
| Talcher Coalfield | | |
| Tentuloi | 1234.32 | - |
| Saradhapur | - | 1922.00 |
| Ib-River coalfield | | |
| Kuraloi (A) | - | 386.00 |
| ENE of Khariaparha | - | 168.00 |
| Total | 2290.14 | 2760.00 |

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Table – 4 (A) : Details of Exploration Activities conducted by GSI for Coal & Lignite, 2006-07

| State/Coalfield/ Lignite Field | Area/Block | Exploration details |
|--|---|--|
| COAL | | |
| Andhra Pradesh | | |
| Godavari Valley Coalfield | Penaballi block | Seam zones 1(6.90 m to 20.05 m thick) of lower Kamthi formation were intersected between 355.20 m and 495.10 m depth. Queen seam of Barakar Formation (with 1.85 m thick clean coal) recorded between 528.70 m and 538.80 m depth. |
| | Gattugudem block | Coal zones (B&C) of Lower Kamphthi formation and seam zone A of Barakar formation intersected within 600 m depth. |
| Chhattisgarh | | |
| Mand Raigarh Coalfield | Nayadih block | Ten regional Barakar coal seams (0.29 m to 8.30 m thickness) were intersected between depth of 70.13 m and 411.66m. |
| | Sithra-Kurekela | Nine regional Barakar coal seams intersected between 102.39m and 665.28 m depth. The cumulative thickness of seam IV ranges from 8.41 m to 10.20 m. |
| Hasdo-Arand Coalfield | Saidu block | Regional Barakar coal seams VI (Ketma 1.86 m thick), V (Mogra 7.19 m thick) and IV (Dhajag 9.07 m thick and II (1.51 m thick) were intersected at shallow depth between 15.58 m and 187.94 m. |
| Tatapani-Ramkola | Reonti block | Regional coal seams (1.49 to to 11.28 m cumulative thickness) intersected at the depth range of 289.69 m and 493.94 m. |
| East of the confines of Bisrampur Coalfield | Ulia-Gamhardih Area | Coal seams (0.54 m to 11.27 m thick, having cumulative thickness 25 m) were intersectedbetween 10.35 m and 171.40 m. |
| Jharkhand | | |
| Brahmani Coalfield | Salbadra- Gomarpahadi Sector | Four regional coal seams/zones of thickness ranging from 4 to 58 m intersected within Barakar formation between 113 and 464m depth.were recorded. |
| | Gosaipahari- Siulibana block | Presence of thick Barakar formation (533 m) with development of coal seams (0.5 m-14 m thick) between 102 m and 604 m depth |
| | Pokharia-Paharpur Block | Individual coal seams (0.5 m to 26.35 m thick, 86 m cumulative thickness) occured between 205 m and 572 m depth within Barakar formation. |
| East Bokaro Coalfield | Muditoli block | Regional coal seams like Jarangdih Top, Jarangdih, Jarangdih new, Jarangdih 6, Jarangdih A, Sawang A & C, Kathara group, Uchitdih group, Kargali Top & bottom were intersected between 352 m and 813 m depth. |
| South Karanpura Coalfields | Binja block | Occurrences of two coal seams of 1.5 m to 0.84 m thicknesses within barren measures between depth of 252 m and 302 m. Three coal seams of 0.6 m to 1.0 m thickness intersected between 409 m and 440 m depth within Barakar Formation. |
| Madhya Pradesh | | |
| Singrauli Coalfield | Tendudol Block | Four Raniganj coal seams varying in thickness from 0.78 m to 5.65 m intersected between 38.80 m and 167.15 m depth. Seven regional coal seams (0.70 m to 16.45 m thickness) of Barakar formation intersected within the depth range of 508.24 m to 742.00 m. |
| Pench Valley Coalfield | Pathakhuri- Pipariya area | Boreholes intersected seven coal horizon (0.65m-3 m thick) of Barakar Formation between 437.05 and 480 m depth. |
| Sohagpur Coalfield | Shahpur and Bicharpur (South) Block | Four regional Barakar coal seams (II to IV) varying in thickness from 0.44 m to 0.06 m developed within the depth range of 38.61 m and 289.05 m. |

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

| State/Coalfield/ Lignite Field | Area/Block | Exploration details |
|---|---|--|
| | Merdhi block | Coal seam IV (0.70 m to 1.20 m thickness) and seam III (1.63 m) intersected between 184.45 m and 247.50 m depth. |
| | Gohparu blocks | Borehole intersected Raniganj formation and Barren measures and Barakar formation. |
| | Maikhi block | Two regional Barakar coal seams (No. III & IV) varying in thickness from 1.40 m to 6.72 m were intersected between 406.65 m and 516.30 m depth. |
| | | Raniganj coal seams varying in thickness from 0.70 m to 2.31 m intersected between 81.45 m and 220.0 m depth. |
| Maharashtra Kamthi Coalfield | Pipla-Kewalram area | Barakar formation intersected at 249.35 m depth and one coal horizon of 2.65 m thickness intersected at 252.60 m depth. |
| Orissa Talcher Coalfield | Jalatap, Saradhapur (North) and Phulajhari blocks | Established the persistent development of ten regional Barakar coal seams (seam II to XI) varying in thickness from 1.00 m to 27.85 m at depth range from 13.17 m to 605.46 m. Preliminary appraisal of CBM in potentiality in Jalagap block indicates desorbed volume of gas varying from 0.012 cc/gm to 0.034 cc/gm at ambient temperature and pressure. |
| | Jamujhari-Brahmanbil block | Four coal seams (1.08 to 5.96 m thick) were intersected between 292.13 m and 365.60 m depth. |
| | Kundanali, North East block | Four coal seams (0.60 m to 2.30 m thick) were intersected between 40.50 m and 80.92 m depth. |
| Ib River Coalfield block | Kuraloi (A) North block | Five regional Barakar coal seams namely Belpahar Parkhani, Lajkura, Rampur and Ib with cumulative thickness varying from 3.05 to 53.13 m have been intersected between 57.30 m and 577.61 m depth. Two Raniganj coal seams (3.25 m and 2.08 m) were also intersected within a depth range from 8.20 m to 36.60m. |
| West Bengal Raniganj Coalfield | Nabasan block | Seven coal seams within Barakar formation ranging in thickness 0.50 m to 4.74 m recorded between 290.80 m and 343.19 m depth. |
| Birbhum Coalfield | Kapasdanga-Bharkata block | Four regional coal seam zones (I to IV) ranging in thickness from 32 m to 86 m have been recorded within 300 m and 700 m depth. |
| LIGNITE Tamil Nadu Ramnad-sub-basin | Tiyanur sector | Three regionally persistent seams I, II & III of thickness varying from 0.60 to 13.40 m were intersected between 339.80 m and 407.00 m depth. |
| Mannargudi-sub-basin | Tirumangalam sector | Four to five lignite seams A to E with varying thickness from 0.50 to 24.50 m were intersected between 310.00 m and 458.30 m with cumulative thickness varying from 17.00 m to 29.00 m. |
| Rajasthan Jaisalmer District | Borana East Area | One lignite seam of 0.80 m thickness intersected at 105.60 m depth. |

COAL & LIGNITE

Table – 4 (B) : Details of Exploration Activities conducted by GSI for Coal & Lignite, 2007-08

| State/Coalfield/ Lignite Field | Area/Block | Exploration details |
|-----------------------------------|----------------------------------|--|
| COAL | | |
| Andhra Pradesh | | |
| Godavari Valley Coalfield | Allapalli block | Seam zone of lower Kamthi formation containing coal carbonaceous shale section (individual thickness varying from 0.50 m to 0.85 m) intersected between 71.75 m and 304.90 m depth. |
| Chhattisgarh | | |
| Mand Raigarh Coalfield | Nayadih block | Ten Barakar coal seams (regional coal seams III to XII) varying in thickness from 0.36 m to 8.58 were intersected between depth of 124.78 m and 364.36 m. |
| | Chainpur block | Eleven regional Barakar coal seams (I to IX, XI & XII) varying in cumulative thickness from 0.89 m to 12.23 m occurs at shallow depth of 40.36 m and 726.20 m. |
| Hasdo-Arand Coalfield | Parogia (West) block | During the year 95.3 m drilling was conducted. |
| | Saidu block | Four regional Barakar coal seams (II,IV to VI) of cumulative thickness varying between 0.80 m and 9.63 m intersected between shallow depth of 65.99m and 212.62 m. |
| Tatapani-Ramkola Coalfield | Reonti block | Occurrences of five regional Barakar coal seams (II to VI) with cumulative thickness varying between 1.48 m and 27.33 m recorded within a depth range of 246.59 m to 729.80 m. |
| Jharkhand | | |
| Brahmani Coalfield | Pokharia-Paharpur block | Three Barakar coal seams/zones viz. 'D' (7.30 m thick), 'C' (cumulative thickness 17.35 m), and 'A' (cumulative thickness 21.25 m) intersected between 199.95 m and 321.40 m depths. |
| | Gosai pahari- Siulibana block | Three coal seams viz 'D' (cumulative thickness 16m) 'C' (cumulative thickness 18.60 m) and 'B' (cumulative thickness 27.35 m) recorded between 193.55 m and 470.3 m depth. |
| East Bokaro Coalfield | Muditoli block | One regional Barakar coal seams namely Karo VIII of 8.20 m thickness intersected at 1075 m depth. |
| South Karanpura Coalfield | Binja block | Five coal seams (>40 cm thick) intersected of which first one belong to Barren measures and other belong to Barakar formation. |
| Madhya Pradesh | | |
| Singrauli Coalfield | Tendudol Block | Four regional Raniganj coal seams (R I to R IV) varying in cumulative thickness from 1.22 m to 5.64 m intersected within the depth range from 49.21 m to 157.10 m. Seven regional Barakar coal seams (I to VII) of 1.61 m to 4.45 m cumulative thickness intersected within the depth range from 476.34 m to 719 m. |
| Pench Valley Coalfield | Bagbardiya Block | Five coal horizons varying in thickness from 0.25 m to 2.50 m were intersected between 371.25 m and 381.60 m depth |
| Sohagpur Coalfield | Merkhi Block | Four regional coal seams varying in thickness ranging from 1.25 m to 2.80 m established within Barakar formation at a depth ranging from 225.55 m to 363.70 m. |

(Contd.)

COAL & LIGNITE

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

| State/Coalfield/ Lignite Field | Area/Block | Exploration details |
|-----------------------------------|-----------------------------|---|
| | Maiki block | Three regional Barakar coal seams (No. III A., III B & IV) with cumulative thickness varying from 1.25 m to 3.60 m developed within the depth range of 399.81 m and 476.85 m. |
| Orissa | | |
| Talcher Coalfield | Jalatap block | Three tentatively corelated regional coal seam zones viz, seam zone IV (7.84 m thick), III top (15.85 m thick) and III- Middle cumulative thickness 35.46 m, intersected within Barakar formation between 432 m and 520.95 m depth. |
| | Jamujhari-Brahmanbil block | Ten Barakar coal seam zones (II to XI) varying in cumulative thickness from 1 m to 25.91 m, intersected between 65.30 m and 591.15 m depth. |
| | Kundanali, North-East block | Five Barakar coal seam zones viz, seam zone II, III, VI, VII and VIII varying in thickness from 2.77 m to 31.70 m intersected within depth range from 40.50 m to 452.22 m and Karharbari seam zone I varying in thickness from <1 m to 8.54 m between 281 m and 452.72 m depth. |
| Ib River Coalfield | Kuraloi (A) North block | Five regional Barakar coal seam zones namely Belpahar, Parkhani, Lajkura, Rampur and Ib varying in cumulative thickness from 1.38 to 39.88 m have been recorded at shallow depth between 43.69 m and 533.09 m depth. |
| | Piplimal-Khairkuni block | Five regional Barakar coal seam zones varying in thickness from 1.71 m to 29.57 m intersected between 17.14 m and 265.98 m. |
| West Bengal | | |
| Raniganj Coalfield | Nabasan block | Tentatively corelated Barakar coal seam zones, namely, Salanpur A and Salanpur B (max. cum. thickness 27 m) respresented by eleven coal seams recorded at depth between 558.35 m and 657.50 m. |
| Birbhum Coalfield | Kapasdanga-Bharkata block | Barakar coal seam zones I (cumulative thicknes 17.35 m) intersected between 600.10 m and 646.60 m depth |
| LIGNITE | | |
| Tamil Nadu | | |
| Ramnad-sub-basin | Bogalur block | Two regionally persistant tentatively corelated seams of thickness varying from 0.50 to 10.90 m were intersected between 316.00 m and 344.00 m depth. |
| Rajasthan | | |
| Bikaner dist. | Hadda block | 0.30 m thick lignite seam recorded at 137.10 m depth within Tertiary sediments. |
| Nagaur & Pali dist. | Phalki area | Two lignite seams of 0.55 m and 0.30 m thickness intersected between 80.05 m and 86.85 m depth. |
| West Bengal | | |
| Birbhum Coalfield | Mahallah Area | Occurrence of two lignite coal seams, varying in thickness from 2.05 m to 3.45 m within Tertiary sediments between 174.30 m and 184.60 m depth. |

COAL & LIGNITE

Table – 5 (A) : Exploration of Coal & Lignite by MECL, 2006-07 and 2007-08

| State/Coalfield | Block | Drilling (m) | |
|--|---------------------------|--------------|----------|
| | | 2006-07 | 2007-08 |
| COAL | | | |
| (A) Promotional on behalf of Ministry of Coal | | | |
| Andhra Pradesh | | | |
| Godavari Valley Coalfield | Chirtalpudi | 4896.00 | 2352.50 |
| | Gaveridevipatta | 5193.00 | 361.60 |
| | Paloncha | 2314.20 | 68.40 |
| | Raghavapuram | 4151.20 | - |
| | Ramanagaram | 1658.00 | - |
| | Jangareddygudem | - | 6713.10 |
| Assam | | | |
| Makum Coalfield | West of Tirap | - | 564.00 |
| Chhattisgarh | | | |
| Mand Raigarh Coalfield | Banai | - | 2500.60 |
| Madhya Pradesh | | | |
| Sohagpur Coalfield | Marwatola | 11605.00 | 181.50 |
| | Naukariya | 6619.70 | 2968.00 |
| | Naukariya-E | 9184.10 | 33.00 |
| | Chaka (East of Naukariya) | - | 9432.00 |
| | Patnar (North Marwa II) | - | 8147.50 |
| | Arjuni (North Marwa I) | - | 9121.30 |
| Maharashtra | | | |
| Katol-Kamthi Coalfield | Hardoli | 6126.70 | 976.50 |
| | Khapri | - | 2576.20 |
| | Sukuli | - | 2062.75 |
| (B) Contractual | | | |
| (i) On behalf of NTPC | | | |
| Chhattisgarh | | | |
| Mand Raigarh Coalfield | Tillaipalli | 22433.70 | 16615.95 |
| Jharkhand | | | |
| North Karnpura Coalfield | Pakri Bawradih | 2026.10 | 1083.20 |
| Orissa | | | |
| Ib Valley Coalfield | Dulunga | 2202.35 | 1135.30 |
| (ii) On behalf of JAL | | | |
| Madhya Pradesh | | | |
| Singrauli Coalfield | Ameliya North | 859.10 | - |
| (iii) On behalf of WCL | | | |
| Madhya Pradesh | | | |
| PK Valley Coalfield | Jharna | 715.00 | - |
| | Pench | - | 1071.05 |
| (iv) On behalf of IISCO | | | |
| Jharkhand | | | |
| Raniganj Coalfield | Ramnagore | 3607 | - |
| (v) On behalf of WBMTDC | | | |
| West Bengal | | | |
| Raniganj Coalfield | Kulti | - | 9070.10 |

(Contd.)

COAL & LIGNITE

Table - 5 (A) (Concl'd.)

| State/Coalfield | Block | Drilling (m) | |
|--|-------------------------|--------------|----------|
| | | 2006-07 | 2007-08 |
| (vi) On behalf of APMDC-OMC | | | |
| Orissa | | | |
| Talcher Coalfield | Nuagaon-Telishahi | - | 1204.70 |
| vii) On behalf of CMDCL | | | |
| Chhattisgarh | | | |
| Mand Raigarh coalfield | Gare Pelma | - | 5983.70 |
| LIGNITE | | | |
| (A) Promotional on behalf of Ministry of Coal | | | |
| Rajasthan | | | |
| Barmer Lignite field | South of Nimba | 6610.80 | - |
| | Kurla East | 6027.80 | 7764.70 |
| | Kagau East | - | 1518.60 |
| Bikaner Lignite field | Dosarana | 2473.00 | - |
| | Bigga-Abhaysingapura | 2725.00 | - |
| | Lalamdesar Chhota | 1730.00 | - |
| | Jayal | 258.00 | - |
| | Bikaner -Palana (Pyau) | - | 12065.00 |
| | Ramsar- Sinthal | - | 7363.90 |
| | Nagaur basin (Scouting) | - | 2023.00 |
| Tamil Nadu | | | |
| Neyveli Lignite field | Nachiyarkudi | 2249.00 | 7130.00 |
| | Thiruvapur | 2658.00 | - |
| | Eastern part of Neyveli | 460.00 | - |
| (B) Contractual | | | |
| (i) On behalf of NLC | | | |
| Tamil Nadu | | | |
| Neyveli Lignite field | Jayamkondam | 12032.00 | 16757.00 |
| Rajasthan | | | |
| Bikaner Lignite field | Riri | 13844.00 | 1791.60 |
| | Bithnook | 10635.00 | 4819.00 |
| | Hadla | 1349.00 | 2571.00 |
| Gujarat | | | |
| Surat Lignite field | Valia | 858.40 | 8645.30 |
| (ii) On behalf of RSMML | | | |
| Rajasthan | | | |
| Barmer Lignite field | Giral | 3241.60 | - |
| | Jalipa | 2630.00 | 8650.70 |
| (iii) On behalf of WBMDTC | | | |
| Raniganj Coalfield | Barjora | 3696.75 | - |

COAL & LIGNITE

Table – 5 (B) : Additional Resources Estimated by MECL for Coal & Lignite 2006-07 and 2007-08

| State/Coalfields District/Block | Additional Resources | |
|------------------------------------|----------------------|----------------|
| | 2006-07 | 2007-08 |
| COAL | | |
| Andhra Pradesh | | |
| Godavari Coalfield | | |
| Siddavaram | 243.033 | - |
| Ramnagar | 206.112 | - |
| Singreni Coalfields | | |
| Raghavapuram | - | 696.83 |
| Chhattisgarh | | |
| Mand Raigarh Coalfield | | |
| West of Basin Phatehpur | - | 1546.46 |
| East of Basin Phatehpur | - | 899.89 |
| Madhya Pradesh | | |
| Singrauli Coalfield | | |
| Dogrital Phase I & II Main Basin | 569.038 | - |
| Amelia (N) | - | 123.25 |
| P.K. Valley Coalfield | | |
| Jharna (Extn) | - | 7.35 |
| Orissa | | |
| Jharia Coalfield | | |
| Bijahan | 327.05 | - |
| Ib Valley Coalfield | | |
| Dulanga | - | 245.14 |
| Meghalaya | | |
| Darangiri Coalfield | | |
| Darang | - | 62.74 |
| Sikkim | | |
| Rangit Valley Coalfield | | |
| Namchi | 73.448 | - |
| Namchi (Extn) | - | 27.78 |
| West Bengal | | |
| Raniganj Coalfield | | |
| Mahatadih Raidih (Ph.II) | 6.948 | - |
| Total | 1425.629 | 3609.44 |
| LIGNITE | | |
| Rajasthan | | |
| Barmer | | |
| Giral Mine block | 14.210 | - |
| Jalipa | - | 202.051 |
| Kawas | - | 53.031 |
| Jalore | | |
| Sanchore basin | 76.078 | - |
| Bikaner | | |
| Bapeu- | - | 35.584 |
| Hadla | - | 59.299 |
| Bigga Abhysinghpura | - | 44.638 |
| Tamil Nadu | | |
| Cuddalore | | |
| Eastern part of Neyveli | 562.32 | - |
| Total | 652.608 | 394.603 |

COAL & LIGNITE

Table – 6 (A) : Details of Exploration for Coal and Lignite by State Directorates of Geology & Mining and State Undertakings, 2006-07

| Agency/State/ District | Location | Geological mapping | | Drilling | | Remarks Reserves estimated (in million tonnes) |
|---------------------------|---------------------------------------|--------------------|----------------------|-----------|----------|---|
| | | Area (sq km) | Scale | Boreholes | Meterage | |
| COAL | | | | | | |
| DGM | | | | | | |
| Chhattisgarh | | | | | | |
| Raigarh | Dhaurabhata Gare sector | - | - | 2 | 671.45 | About 0.60 to 6.53 m thick coal seams intersected between 104.95 to 325.0 m depth. |
| Korba | Saila | 190 | 1:50,000 | 8 | 1348.65 | Eleven coal seams were intersected and 195.40 million tonnes of reserves estimated. |
| Surguja | Shankargarh | 40 | 1:50,000 | 3 | 282 | Seven carbonaceous w bands encountered up to a depth of 195.6 m and 41.75 million tonnes of reserves estimated. |
| Maharashtra | | | | | | |
| Chandrapur | Bhandak- Kesurli | 5.5 | 1:5,000 | - | 1140.10 | About 56.38 million tonnes of reserves have been proved so far. |
| -do- | Kondha (E) block | 5.0 | 1:25,000 | - | 1170.90 | About 44.95 million tonnes of reserves have been proved so far. |
| -do- | Nandori and Nandori South block | 25.00 | 1:25,000 | - | 4796.50 | About 29.52 million tonnes of reserves proved. |
| -do- | Nandra-Pauna | 4.5 | 1:25,000 | - | 472.35 | No coal horizon intersected. |
| -do- | East of Ekaijuna area | 45.00 | 1:25,000 | - | 2038.55 | About 56.00 million tonnes of reserves have been proved so far. |
| -do- | Takli | - | 1:25,000 1:50,000 | - | 1480.70 | No coal horizon intersected. |
| Nagpur | Shirpur pipardol | 0.32 | 1:5,000 | - | 181.10 | Five coal seams have been proved at a depth of 160.90 to 330.63 m. |
| -do- | Nand- Panjrepar | - | - | - | 2493.20 | About 5.77 million tonnes of reserves estimated. |

(Contd.)

COAL & LIGNITE

Table - 6 (A) (Concl'd.)

| Agency/State/ District | Location | Geological mapping | | Drilling | | Remarks Reserves estimated (in million tonnes) |
|-----------------------------------|--|--------------------|---------------------|-----------|----------|---|
| | | Area (sq km) | Scale | Boreholes | Meterage | |
| Nagpur | Makardhokda | 0.64 | 1:5,000 | - | 1083.55 | About 10.80 million tonnes of reserves estimated. |
| -do- | Dahegaon- Phukeshwar | 0.16 | 1:5,000 | - | 326.25 | About 0.65 to 2.53 m thick coal seams were located. |
| -do- | Bela-Ashta | - | 1:25,000 1:5,000 | - | 156.50 | - |
| Yavatmal | Jhari-Jamni Adkoli | 2.50 | 1:5,000 | - | 1531.15 | About 4.84 million tonnes of reserves were estimated. |
| | Dara-Parsoda | - | - | - | 378.50 | About 2.50 million tonnes of reserves were estimated. |
| Wardha | Wadner- Shehapur | 11.00 1.44 | 1:25,000 1:5,000 | - | 1887.40 | About 1.56 million tonnes of reserves were estimated. |
| Madhya Pradesh | | | | | | |
| Anuppur | Hasdeo | - | - | 17 | 2046.2 | Production support drilling. |
| -do- | Jamuna Kotma area | - | - | 39 | 3224.35 | Production support drilling. |
| Orissa | | | | | | |
| Angul | Talcher West and Nindira block of Talcher coalfield | - | - | 14 | 1264.05 | Exploration conducted on behalf of M/s CMPDIL. |
| WBMDTC West Bengal | | | | | | |
| Bankura | Trans Damodar Sector | 4 | 1:4,000 | 34 | 3696.75 | A total of about 61.73 million tonnes of reserves estimated. |
| LIGNITE DMG, Rajasthan | | | | | | |
| Bikaner | Lakhasar Lumbasar | 100 | 1:50,000 | 7 | 1239 | Carbonaceous clay encountered. Exploration continued. |
| -do- | Ambasar, Gigasar | 135 | 1:50,000 | 19 | 2769 | Total 4.12 million tonnes of lignite reserves under indicated category established. |
| Nagaur | Ninbri-Chanda- Watan | 100 | 1:50,000 | - | - | No indication of lignite observed. |
| | Indavar, Luniyas, Bargaon | 100 | 1:50,000 | - | - | Lignite occurrences noticed n/v Bargaon. |
| GMDC, Gujarat | | | | | | |
| Kachchh | Near Panandhro | - | - | - | - | Balance geological reserves of lignite estimated at 22 million tonnes. |

COAL & LIGNITE

Table – 6 (B) : Details of Exploration for Coal and Lignite by State Directorates of Geology & Mining and State Undertakings, 2007-08

| Agency/State/ District | Location | Geological mapping | | Drilling | | Remarks Reserves estimated (in million tonnes) |
|-------------------------------------|---------------------------------------|--------------------|---------------------|-----------|----------|--|
| | | Area (sq km) | Scale | Boreholes | Meterage | |
| COAL | | | | | | |
| DGM | | | | | | |
| Chhattisgarh | | | | | | |
| Raigarh | Dhaurabhata Gare sector 1A | - | - | 2 | 1562.25 | Thirteen coal horizons intersected and 42.24 million tonnes of resources under indicated category estimated. |
| Korba | Saila | 25 | 1:50,000 | 8 | 703.60 | Fourteen coal seams intersected and 51.15 million tonnes of resources under indicated category estimated. |
| Jharkhand | | | | | | |
| Latehar | Jatta-Parsahi | 20.00 1.00 | 1:50,000 1:5,000 | 2 | 151.30 | - |
| Maharashtra | | | | | | |
| Chandrapur | Takli/ Wislon block | - | - | - | 1600.80 | Total 2.36 million tonnes of resources have been proved. |
| -do- | Nandori and Nandori South block | - | - | - | 3982.00 | Total 29.11 million tonnes of resources have been proved. |
| -do- | East of Ekajuna area | 20.00 | 1:25,000 | - | 2079.20 | Total 1.40 million tonnes of resources estimated. |
| Nagpur | Makardhokda block | 0.64 | 1:5,000 | - | 2748.15 | Total 7.96 million tonnes of resources estimated. |
| -do- | Nand- Panjrepar | 1.00 | 1:5,000 | - | 2753.00 | Total 3.70 million tonnes of resources estimated. |
| Yavatmal | Jhari-Jamni Adkoli | 15.00 2.00 | 1:25,000 1:5,000 | - | 3225.15 | A total of 4.47 million tonnes of reserves were estimated. |
| Nagaland | | | | | | |
| Northern Mangichen coalfields | Mangchen | - | - | 1 | 17.95 | Seven coal seams of thickness ranging from 0.4 to 5.4 m were encountered. |

(Contd.)

COAL & LIGNITE

Table - 6 (B) (Concl'd.)

| Agency/State/ District | Location | Geological mapping | | Drilling | | Remarks Reserves estimated (in million tonnes) |
|-----------------------------------|---|--------------------|---------------------------------|-----------|----------|---|
| | | Area (sq km) | Scale | Boreholes | Meterage | |
| Orissa | | | | | | |
| Angul | Talcher West & Jagannath block of Talcher coalfield | - | - | 10 | 1441 | In Talcher West block coal seam encountered at a depth of 80.06 to 170.9 m and in Jaggannath block at 119.51 to 171.85 m depth. |
| Jharsuguda | Madhupur block | 2.5 | 1:4000 | 12 | 1954 | Coal seams of Barkar and Karharbari formation established. |
| WBMDTC West Bengal | | | | | | |
| Burdwan | Kulri coal block | 3 | 1:5,000 | 11 | 9070 | - |
| LIGNITE DMG, Rajasthan | | | | | | |
| Bikaner | Diyatra Area (Ranasar-Pabusar project) | - | - | 6 | 921 | Lignite beds not encountered. |
| -do- | Ambasar, Gigasar | - | - | 12 | 1689 | About 1.912 million tonnes of lignite resources estimated under indicated category. |
| -do- | Kuchor, Bania, Gajroopdesar | 530 | 1:50,000 | - | - | Carbonaceous cuttings observed in some tubewells. |
| -do- | Jaisinghdesar, Kolasar, Bholasar | 520 | 1:50,000 | - | - | - do - |
| -do- | Jegla-Bhamatsar | 510 | 1:50,000 | - | - | Tubewells n/v Mahayon-ki-Dhoni encountered lignite. |
| Barmer | Uttralai Bhurtia Jogasaria | 120 18 1.5 | 1:50,000 1:10,000 1:2,000 | - | - | Occurrences of carbonaceous shale observed. |
| Nagaur | Indawaar, Luniyas, Bargaon | 300 | 1:50,000 | - | - | - |
| GMDC, Gujarat | | | | | | |
| Kachchh | Panandhro | - | 1:50,000 | - | 87.45 | 14 million tonnes of lignite reserves estimated. |
| Bhavnagar | Surla | - | - | 23 | 328 | 107 million tonnes of lignite reserves estimated. |

Production, Stocks and Prices

COAL

Production

The provisional total production of coal in 2007-08 was 457.0 million tonnes which was higher by 6.1% as compared to the previous year. Jharkhand continued to be the largest coal producing state with a share of about 19.9%, followed closely by Chhattisgarh and Orissa having contribution of 19.7% and 19.6%, respectively, in the national output. Next in order of share in the total production were, Madhya Pradesh (14.8%), Andhra Pradesh (8.9%), Maharashtra (8.0%), West Bengal (4.9%) and Uttar Pradesh (2.5%). The remaining 1.7% of coal production accrued from the states of Meghalaya, Assam and Jammu & Kashmir.

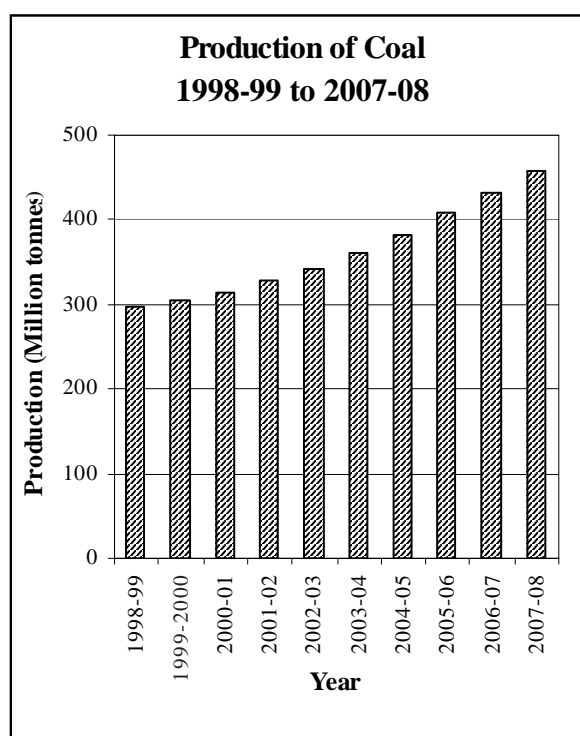
During 2006-07, the production of coal was 430.8 million tonnes which was higher by 5.7% as compared to the previous year. Jharkhand continued to be the largest coal producing state with a share of about 20.6%, followed by Chhattisgarh having contribution of 19.3% in the national output. Next in order of share in the total production were Orissa accounting for 18.8%, Madhya Pradesh (13.9%), Andhra Pradesh (8.8%), Maharashtra (8.4%), West Bengal (5.8%), and Uttar Pradesh (2.8%). The remaining 1.6% coal production accrued from the states of Meghalaya, Assam and Jammu & Kashmir.

Coal mining was confined mainly to the public sector contributing 92.9% and 92.4% in 2006-07 and 2007-08, respectively. In 2006-07, out of the total production of coal, 7.5% was coking coal and the rest 92.5% was non-coking coal. As in the earlier years, bulk of the coking coal production i.e. about 78.1% was reported from the public sector. Gradewise analysis of coking coal revealed that washery grade IV had the maximum share at 65.4% followed by washery grade III (21.0%), washery grade II (9.9%), and washery grade I (0.9%). The remaining 2.8% production of coking coal was of steel grade I, steel grade II and semi-coking grade I. Out of the total production of coking coal in India, bulk quantity (96.9%) was produced in Jharkhand followed by Madhya Pradesh (2.4%). The remaining 0.7% was contributed by Chhattisgarh and West Bengal.

During 2006-07 excepting a nominal quantity (7.1%), the entire production of non-coking coal came from the public sector. Out of the total non-coking coal production, 41.5% was of F grade, 24.6% of E grade,

13.3% of C grade, 10.6% of D grade and 5.2% of 'B' grade. The remaining 4.8% production was contributed by A grade, G grade, SLV grade and ungraded varieties of non-coking coal. Chhattisgarh was the largest producing state of non-coking coal in 2006-07 which alone accounted for 20.8% of the national output. Next in order were Orissa with a contribution of 20.4%, Jharkhand (14.5%), Madhya Pradesh (14.8%), Andhra Pradesh (9.5%), Maharashtra (9.1%), West Bengal (6.2%) and Uttar Pradesh (3.1%). The remaining 1.6% production came from the states of Meghalaya, Assam and Jammu & Kashmir.

There were 561 coal mines (as on 31.03.2007) in India which reported production in 2006-07. Out of these, 173 mines were located in Jharkhand, West Bengal had 102 mines, Madhya Pradesh (74), Andhra Pradesh (62), Chhattisgarh (58), Maharashtra (52) and Orissa (24). The remaining 16 mines were located in the states of Assam, Jammu & Kashmir, Uttar Pradesh and Meghalaya. There were 76 large mines each producing more than 10 lakh tonnes of coal during the year and these mines accounted for 74% of the total production. The bulk of production i.e. 84.6% was contributed by 139 mines, with annual output ranging between 5 to 10 lakh tonnes each. About 15.0% of the total coal production was shared by 319 mines whose individual production varied between 50,000 and



The Graphical Representations have been deleted

COAL & LIGNITE

5 lakh tonnes. Only 0.4 % of the production was contributed by 103 small mines each producing upto 50,000 tonnes (Tables - 7 to 12).

Despatches

Despatches of coal at 419.8 million tonnes in 2006-07 were higher by 6.1% as compared to that in the previous year. Jharkhand, the leading state in the despatches in 2006-07, accounted for 20.1% of the total despatches. The states next in order were Chhattisgarh 19.2%, Orissa (18.5%), Madhya Pradesh (14.3%), Andhra Pradesh (8.9%), Maharashtra (8.5%), West Bengal (6.0%) and Uttar Pradesh (3.0%). The remaining 1.5% was shared by the other coal producing states.

In total despatches of raw coal, a sizable share of 73.6% was made to the electricity sector. As much as 4.9% despatches were made to the steel industry, followed by cement industry (3.5%), sponge iron industry (2.7%), fertilizer and paper & pulp industry (0.6% each) and brick manufacturing (0.1%). Nominal quantity of 0.1% of total despatches was for colliery consumption. The remaining 15.5% despatches were made to other priority sectors including chemical, textile & rayons and basic metals in 2006-07 (Tables 13 & 14).

Stocks

The mine-head stocks of coal at the end of the year 2006-07 was 44.3 million tonnes which was 29.2% more as against in the beginning of the year. Bulk of the coal stocks (about 98.5%) at the end of the year was accounted for the mines

located in the states of Jharkhand, Chhattisgarh, Orissa, West Bengal, Madhya Pradesh, Maharashtra and Andhra Pradesh (Table - 15).

Prices

Domestic prices of coal during 2005-06 to 2007-08 are furnished in Table-16.

LIGNITE

Production and Despatches

During the year 2007-08 the production of lignite at 34.0 million tonnes increased by 8.6% in comparison to that of the previous year. The production from Tamil Nadu accounted for 63.5%. The share of Gujarat in lignite production was 34.7% and that of Rajasthan was 1.8%.

The production of lignite was 31.3 million tonnes in 2006-07. It increased by 4.1% as compared to that in the previous year. Out of total 11 mines of lignite operating during 2007-08, six are located in Gujarat, three in Tamil Nadu and remaining two mines are located in Rajasthan (Tables - 17 and 18).

The quantum of despatches of lignite was 30.8 million tonnes for the year 2006-07 which was higher by 1.5% as compared to that in the previous year (Table - 19).

Stocks

Stocks of lignite at the end of 2006-07 were 997 thousand tonnes against 504 thousand tonnes at the beginning of the year (Table 20).

**Table – 7 : Number of Coal Mines, 2006-07 & 2007-08
(By States)**

| State | No. of Mines | |
|-------------------|--------------|------------|
| | 2006-07 # | 2007-08 \$ |
| India | 561 | 559 |
| Andhra Pradesh | 62 | 52 |
| Arunachal Pradesh | - | 1 |
| Assam | - | 7 |
| Chhattisgarh | 58 | 57 |
| Jammu & Kashmir | 7 | 7 |
| Jharkhand | 173 | 174 |
| Madhya Pradesh | 74 | 74 |
| Maharashtra | 52 | 53 |
| Orissa | 24 | 27 |
| Uttar Pradesh | 4 | 5 |
| West Bengal | 102 | 102 |

Relates to number of mines as on 31.3.2007.

\$ Relates to number of mines as on 31.3.2008.

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**Table – 8 : Production of Coal, 2005-06 to 2007-08
(By States/Sectors)**

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

| State | 2005-06 | | 2006-07 | | 2007-08(p) | |
|-----------------|---------------|------------------|---------------|------------------|---------------|------------------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| India | 407039 | 336752625 | 430832 | 348367906 | 457003 | 384493450 |
| Public sector | 381334 | 312528700 | 400393 | 323755132 | 422087 | 355117334 |
| Private sector | 25705 | 24223925 | 30439 | 24612774 | 34916 | 29376116 |
| Andhra Pradesh | 36138 | 36801494 | 37707 | 37727362 | 40604 | 44405347 |
| Assam | 1101 | 2038000 | 1050 | 1386000 | 1101 | 2001398 |
| Chhattisgarh | 76358 | 48937830 | 83241 | 53200988 | 90172 | 58120363 |
| Jammu & Kashmir | 19 | 14250 | 16 | 12000 | 17 | 13804 |
| Jharkhand | 85423 | 76105226 | 88764 | 75765400 | 90895 | 84356924 |
| Madhya Pradesh | 55579 | 54832969 | 59726 | 59098280 | 67841 | 68703260 |
| Maharashtra | 36119 | 36071043 | 36215 | 36281998 | 36403 | 40013813 |
| Meghalaya | 5566 | 7347120 | 5787 | 7638840 | 6541 | 5292390 |
| Orissa | 70540 | 29748746 | 81160 | 33437920 | 89482 | 42115599 |
| Uttar Pradesh | 15721 | 12637025 | 12228 | 9202181 | 11426 | 8864062 |
| West Bengal | 24475 | 32218922 | 24938 | 34616937 | 22521 | 30606490 |

**Table – 9 : Production of Coal, 2005-06 & 2006-07
(By Frequency Groups)**

| Production group (Tonnes) | No. of Mines | | Production for the group ('000 tonnes)# | | Percentage in total production # | | Cumulative percentage | |
|------------------------------|--------------|------------|--|---------------|-------------------------------------|---------------|--------------------------|---------------|
| | 2005-06 | 2006-07 | 2005-06 | 2006-07 | 2005-06 | 2006-07 | 2005-06 | 2006-07 |
| All Groups | 547 | 561 | 401473 | 425045 | 100.00 | 100.00 | 100.00 | 100.00 |
| 0-10000 | 20 | 45 | 43 | 73 | 0.01 | 0.02 | 0.01 | 0.02 |
| 10001-25000 | 12 | 16 | 190 | 318 | 0.05 | 0.07 | 0.06 | 0.09 |
| 25001-50000 | 48 | 42 | 1866 | 1586 | 0.46 | 0.37 | 0.52 | 0.46 |
| 50001-100000 | 69 | 78 | 5211 | 5910 | 1.30 | 1.39 | 1.82 | 1.85 |
| 100001-300000 | 189 | 172 | 34362 | 31606 | 8.56 | 7.44 | 10.38 | 9.29 |
| 300001-500000 | 80 | 69 | 30113 | 25997 | 7.50 | 6.12 | 17.88 | 15.41 |
| 500001-1000000 | 123 | 63 | 241464 | 43661 | 60.14 | 10.27 | 78.02 | 25.68 |
| 1000001 & above | 6 | 76 | 88224 | 315893 | 21.98 | 74.32 | 100.00 | 100.00 |

Excluding Meghalaya.

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**Table – 10 : Production of Coal, 2005-06 & 2006-07
(By Grades and by Sectors)**

(In '000 tonnes)

| Grade | 2005-06 | | | 2006-07 (p) | | |
|-------------------|---------------|---------------|--------------|---------------|---------------|--------------|
| | Total | Pub. Sec. | Pvt. Sec. | Total | Pub. Sec. | Pvt. Sec. |
| All Grades | 407039 | 381334 | 25705 | 430832 | 400393 | 30439 |
| Coking | 31511 | 24984 | 6527 | 32097 | 25061 | 7036 |
| ST-I | 139 | 139 | - | 127 | 127 | - |
| ST-II | 999 | 999 | - | 559 | 559 | - |
| W-I | 249 | 249 | - | 291 | 291 | - |
| W-II | 4641 | 2464 | 2177 | 3171 | 2052 | 1119 |
| W-III | 6038 | 5361 | 677 | 6737 | 6110 | 627 |
| W-IV | 19203 | 15530 | 3673 | 20999 | 15709 | 5290 |
| SC-I | 192 | 192 | - | 182 | 182 | - |
| SLV1 | 50 | 50 | - | 31 | 31 | - |
| Non Coking | 375528 | 356350 | 19178 | 398735 | 375332 | 23403 |
| A | 4599 | 3929 | - | 4958 | 4958 | - |
| B | 21723 | 22152 | - | 20815 | 20815 | - |
| C | 50720 | 46023 | 3994 | 53059 | 47332 | 5727 |
| D | 41881 | 41312 | 232 | 42439 | 40223 | 2216 |
| E | 96175 | 85645 | - | 98079 | 98079 | - |
| F | 148170 | 132248 | 3786 | 165673 | 160683 | 4990 |
| G | 6560 | 2401 | - | 7733 | 3050 | 4683 |
| Ungraded | 5700 | 9745 | 399 | 5979 | 192 | 5787 |

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

**Table – 11(A) : Production of Coking Coal, 2005-06
(By States and by Grades)**

(In '000 tonnes)

| State | All-Grades | ST-I | ST-II | W-I | W-II | W-III | W-IV | SLV1 | SC-I |
|----------------|--------------|------------|------------|------------|-------------|-------------|--------------|-----------|------------|
| India | 31511 | 139 | 999 | 249 | 4641 | 6038 | 19203 | 50 | 192 |
| Chhattisgarh | 150 | - | - | - | - | - | - | - | 150 |
| Jharkhand | 30295 | 72 | 999 | 244 | 3695 | 6032 | 19203 | 50 | - |
| Madhya Pradesh | 932 | - | - | - | 932 | - | - | - | - |
| West Bengal | 134 | 67 | - | 5 | 14 | 6 | - | - | 42 |

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**Table – 11(B) : Production of Coking Coal, 2006-07
(By States and by Grades)**

(In '000 tonnes)

| State | All-Grades | ST-I | ST-II | W-I | W-II | W-III | W-IV | SLV1 | SC-I |
|----------------|--------------|------------|------------|------------|-------------|-------------|--------------|-----------|------------|
| India | 32097 | 127 | 559 | 291 | 3171 | 6737 | 20999 | 31 | 182 |
| Chhattisgarh | 157 | - | - | - | - | - | - | - | 157 |
| Jharkhand | 31098 | 85 | 559 | 291 | 2396 | 6737 | 20999 | 31 | - |
| Madhya Pradesh | 775 | - | - | - | 775 | - | - | - | - |
| West Bengal | 67 | 42 | - | - | - | - | - | - | 25 |

**Table – 12 (A) : Production of Non-Coking Coal, 2005-06
(By states and by grades)**

(In '000 tonnes)

| State | All-Grades | A | B | C | D | E | F | G | Ungraded |
|-----------------|---------------|-------------|--------------|--------------|--------------|--------------|---------------|-------------|-------------|
| India | 375528 | 4599 | 21723 | 50720 | 41881 | 96175 | 148170 | 6560 | 5700 |
| Andhra Pradesh | 36138 | - | 388 | 6700 | 7013 | 15709 | 3872 | 2439 | 17 |
| Assam | 1101 | 1101 | - | - | - | - | - | - | - |
| Chhattisgarh | 76208 | 1063 | 7669 | 4125 | 1213 | - | 58017 | 4121 | - |
| Jammu & Kashmir | 19 | - | - | - | - | - | - | - | 19 |
| Jharkhand | 55128 | - | 1053 | 6528 | 7851 | 21842 | 17853 | - | 1 |
| Madhya Pradesh | 54647 | 1413 | 1890 | 19424 | 6302 | 25618 | - | - | - |
| Maharashtra | 36119 | - | 391 | 1446 | 13003 | 21279 | - | - | - |
| Meghalaya | 5566 | - | - | - | - | - | - | - | 5566 |
| Orissa | 70540 | - | 242 | 205 | 1842 | 2445 | 65806 | - | - |
| Uttar Pradesh | 15721 | - | - | 3497 | 3794 | 8430 | - | - | - |
| West Bengal | 24341 | 1022 | 10090 | 8795 | 863 | 852 | 2622 | - | 97 |

**Table –12 (B) : Production of Non-Coking Coal, 2006-07
(By States and by Grades)**

(In '000 tonnes)

| State | All-Grades | A | B | C | D | E | F | G | Ungraded |
|-----------------|---------------|-------------|--------------|--------------|--------------|--------------|---------------|-------------|-------------|
| India | 398735 | 4958 | 20815 | 53059 | 42439 | 98079 | 165673 | 7733 | 5979 |
| Andhra Pradesh | 37707 | - | 382 | 6047 | 7256 | 13928 | 7012 | 3050 | 32 |
| Assam | 1050 | 1050 | - | - | - | - | - | - | - |
| Chhattisgarh | 83084 | 1145 | 6991 | 4294 | 2260 | - | 63711 | 4683 | - |
| Jammu & Kashmir | 16 | - | - | - | - | - | - | - | 16 |
| Jharkhand | 57666 | - | 862 | 9116 | 7382 | 22573 | 17733 | - | - |
| Madhya Pradesh | 58951 | 1754 | 2442 | 20724 | 6494 | 27537 | - | - | - |
| Maharashtra | 36215 | - | 401 | 1298 | 13910 | 20606 | - | - | - |
| Meghalaya | 5787 | - | - | - | - | - | - | - | 5787 |
| Orissa | 81160 | - | 208 | 212 | 1613 | 4456 | 74671 | - | - |
| Uttar Pradesh | 12228 | - | - | 1591 | 2146 | 8491 | - | - | - |
| West Bengal | 24871 | 1009 | 9529 | 9777 | 1378 | 488 | 2546 | - | 144 |

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**Table – 13 : Despatches of Raw Coal, 2006-07 & 2007-08
(By States)**

(In '000 tonnes)

| State | 2006-07 | 2007-08 (p) |
|-----------------|---------------|---------------|
| India | 419800 | 452760 |
| Andhra Pradesh | 37487 | 41792 |
| Assam | 1182 | 1200 |
| Chhattisgarh | 80526 | 90834 |
| Jammu & Kashmir | 14 | 17 |
| Jharkhand | 84292 | 88853 |
| Madhya Pradesh | 59996 | 68158 |
| Maharashtra | 35508 | 37387 |
| Meghalaya | 5787 | 5900 |
| Orissa | 77585 | 85151 |
| Uttar Pradesh | 12393 | 11352 |
| West Bengal | 25030 | 22116 |

**Table –14 : Despatches of Raw Coal, 2006-07 & 2007-08
(By Priorities)**

(In '000 tonnes)

| Priority | 2006-07 | 2007-08(p) |
|----------------------------|---------------|---------------|
| Total | 420791 | 453797 |
| Steel | 4736 | 16511 |
| Colliery Consumption/Staff | 991 | 1037 |
| Sponge Iron | 11569 | 21063 |
| Chemical | 513 | - |
| Electricity | 309865 | 350154 |
| Cement | 14562 | 15305 |
| Cokeries | 974 | 573 |
| Paper & pulp | 2496 | - |
| Fertilizer | 2452 | 2487 |
| Textile & Rayons | 303 | - |
| Bricks | 578 | - |
| Other Basic metal | 500 | - |
| Others | 71252 | 46667 |

**Table – 15 : Mine-head Stocks of Coal, 2006-07
(By States)**

(In '000 tonnes)

| State | At the beginning of the year | At the end of the year |
|-----------------|------------------------------|------------------------|
| India | 34334 | 44434 |
| Andhra Pradesh | 1419 | 1491 |
| Assam | 316 | 181 |
| Chhattisgarh | 4589 | 7060 |
| Jammu & Kashmir | - | 1 |
| Jharkhand | 14910 | 19083 |
| Maharashtra | 3213 | 3910 |
| Meghalaya | - | - |
| Orissa | 4454 | 8029 |
| Uttar Pradesh | 656 | 486 |
| West Bengal | 2583 | 2057 |

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**Table – 16 : Prices of Coal, 2005-06 to 2007-08
(Domestic Markets)**

(In Rs. per tonne)

| Grade | Market | 2005-06 | 2006-07 | 2007-08(p) |
|--|-----------------|---------|---------|------------|
| COKING COAL (run-of-mine) | | | | |
| <i>Bharat Coking Coal Ltd</i> | | | | |
| Washery grade I | f.o.r. Colliery | 1600 | 1600 | 1760 |
| | Rly. Siding | | | |
| Washery grade II | " | 1330 | 1330 | 1460 |
| Washery grade III | " | 980 | 980 | 1080 |
| Washery grade IV | " | 910 | 910 | 1000 |
| <i>Western Coalfields Ltd</i> | | | | |
| Washery grade I | f.o.r. Colliery | 1160 | 1160 | 1550 |
| | Rly. Siding | | | |
| Washery grade II | " | 1060 | 1060 | 1280 |
| Washery grade III | " | 1060 | 1060 | 1170 |
| <i>Central Coalfields Ltd</i> | | | | |
| Washery grade I | f.o.r. Colliery | 1620 | 1620 | 1780 |
| | Rly. Siding | | | |
| Washery grade II | " | 1340 | 1340 | 1470 |
| Washery grade III | " | 990 | 990 | 1090 |
| Washery grade IV | " | 930 | 930 | 1020 |
| NON-COKING COAL-LONG FLAME COAL (run-of-mine) | | | | |
| <i>South Eastern Coalfields Ltd</i> | | | | |
| Grade A | f.o.r. Colliery | 1200 | 1200 | 1320 |
| | Rly. Siding | | | |
| Grade B | " | 1130 | 1130 | 1240 |
| Grade C | " | 970 | 970 | 1070 |
| Grade D | " | 840 | 840 | 920 |
| <i>Northern Coalfields Ltd</i> | | | | |
| Grade A | f.o.r. Colliery | 1380 | 1380 | 1520 |
| | Rly. Siding | | | |
| Grade B | " | 1250 | 1250 | 1380 |
| Grade C | " | 1050 | 1050 | 1160 |
| Grade D | " | 890 | 890 | 980 |
| <i>Mahanadi Coalfields Ltd</i> | | | | |
| Grade A | f.o.r. Colliery | 1180 | 1180 | 1300 |
| | Rly. Siding | | | |
| Grade B | " | 1060 | 1060 | 1170 |
| Grade C | " | 890 | 890 | 980 |
| Grade D | " | 760 | 760 | 840 |

(Contd.)

Table - 16 (Concl.)

| Grade | Market | 2005-06 | 2006-07 | 2007-08(p) |
|--|-----------------|---------|---------|------------|
| NON-COKING COAL- NON- LONG FLAME COAL (run-of-mine) | | | | |
| <i>South Eastern Coalfields Ltd</i> | | | | |
| Grade A | f.o.r. Colliery | 1080 | 1080 | 1460 |
| | Rly. Siding | | | |
| Grade B | " | 1010 | 1010 | 1380 |
| Grade C | " | 860 | 860 | 1180 |
| Grade D | " | 730 | 730 | 1010 |
| Grade E | " | 600 | 600 | 790 |
| Grade F | " | 470 | 470 | 570 |
| Grade G | " | 350 | 350 | 400 |
| <i>Western Coalfields Ltd</i> | | | | |
| Grade A | f.o.r. Colliery | 1320 | 1320 | 1450 |
| | Rly. Siding | | | |
| Grade B | " | 1250 | 1250 | 1380 |
| Grade C | " | 1160 | 1160 | 1280 |
| Grade D | " | 1100 | 1100 | 1210 |
| Grade E | " | 900 | 900 | 990 |
| Grade F | " | 710 | 710 | 780 |
| Grade G | " | 540 | 540 | 590 |
| SEMI-COKING & WEAKLY COKING COAL (run-of-mine) | | | | |
| <i>South Eastern Coalfields Ltd</i> | | | | |
| Semi-Coking grade I | f.o.r. Colliery | 1440 | 1440 | 1580 |
| | Rly. Siding | | | |
| Semi-Coking grade II | " | 1200 | 1200 | 1320 |
| <i>Eastern Coalfields Ltd (Raniganj)</i> | | | | |
| Semi-Coking grade I | f.o.r. Colliery | 1700 | 1700 | 1780 |
| | Rly. Siding | | | |
| Semi-Coking grade II | " | 1420 | 1420 | 1560 |

Sources: Coal India Ltd, Kolkata (for coal) vide their Notification No. CIL/GM(F)/Pricing/1124 dated 12.12.2007.

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**Table – 17 : Production of Lignite, 2005-06 to 2007-08
(By States)**

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

| | 2005-2006 | | 2006-2007 | | 2007-2008 (p) | |
|----------------|--------------|-----------------|--------------|-----------------|---------------|-----------------|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| India | 30066 | 21531368 | 31285 | 26260258 | 33980 | 29608836 |
| Public sector | 30066 | 21531368 | 31201 | 26189749 | 33889 | 29529542 |
| Private sector | - | - | 84 | 70509 | 91 | 79294 |
| Gujarat | 8944 | 4980556 | 9808 | 6635308 | 11788 | 8277771 |
| Rajasthan | 687 | 505659 | 463 | 427400 | 606 | 511799 |
| Tamil Nadu | 20435 | 16045153 | 21014 | 19197550 | 21586 | 20819266 |

**Table – 18 : Number of Lignite Mines
2006-07 & 2007-08
(By States)**

| State | No. of Mines | |
|--------------|--------------|-----------|
| | 2006-07 | 2007-08 |
| India | 9 | 11 |
| Gujarat | 4 | 6 |
| Rajasthan | 2 | 2 |
| Tamil Nadu | 3 | 3 |

**Table – 19 : Despatches of Lignite
2006-07 & 2007-08
(By States)**

(In '000 tonnes)

| State | 2006-07 | 2007-08 |
|--------------|--------------|--------------|
| India | 30797 | 34657 |
| Gujarat | 9819 | 11792 |
| Rajasthan | 467 | 606 |
| Tamil Nadu | 20511 | 22259 |

**Table – 20 : Mine-head Stocks of
Lignite, 2006-07
(By States)**

(In '000 tonnes)

| State | At the beginning of the year | At the end of the year |
|--------------|---------------------------------|---------------------------|
| India | 504 | 997 |
| Gujarat | 28 | 24 |
| Rajasthan | 10 | - |
| Tamil Nadu | 466 | 973 |

MINING & MARKETING

Coal

Coal mining in the country is being carried out by both opencast and underground methods. Opencast mining contributed over 86% of total production whereas rest of the production (about 14%) comes from underground mining. These mines are mostly semi-mechanised or mechanised. The machinery deployed commonly are drill machines, load-haul-dumper (LHD), ventilation fans, pumps for dewatering, haulage for transport, etc. In order to arrest the decline in production from few underground mines, "mass production technology" by introducing 'continuous miner' is being practised. Modern roof-bolting technology with "flexibolts" up to 5 m length; 'smart bolting' for cost reduction of roof support; introduction of mechanised roof bolting using hydraulic bolts for difficult roof are new technology absorptions in Indian Underground Coal Mining. Mechanised Long wall mining (long wall powered support) has also been introduced in a limited scale which yield higher percentage of recovery (70-80%) with higher output. In opencast mines, 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 Continuous Miners at SECL and WCL.

COAL & LIGNITE

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

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

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

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

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

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

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

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

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

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

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

As on 31.3.2008, there were 559 operating mines for coal in the country, out of which 186 were opencast while 337 were underground mines. The remaining 36 were mixed collieries. There were 539 public sector mines and 20 mines in private sector (Table-21). Thrust is now given to further increase production from opencast mines where the gestation period is comparatively shorter. In 2007-08, share of production of raw coal from opencast mines was 87.1% against 12.9% from underground mines. Production of coal employing different mining technologies is furnished in Table-23. The overall output per man shift (OMS) in 2007-08 was 3.87 tonnes as against 3.49 tonnes in 2006-07.

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**Table – 21 : Number* of Coal Mines
(By Sectors/States)**

| State | No. of collieries | | | Total |
|-------------------|-------------------|------------|-----------|------------|
| | OC | UG | Mixed | |
| All India | 186 | 337 | 36 | 559 |
| Public sector | 173 | 330 | 36 | 539 |
| Private sector | 13 | 7 | - | 20 |
| Andhra Pradesh | 14 | 38 | - | 52 |
| Arunachal Pradesh | 1 | - | - | 1 |
| Assam | 2 | 5 | - | 7 |
| Chhattisgarh | 16 | 40 | 1 | 57 |
| Jammu & Kashmir | - | 7 | - | 7 |
| Jharkhand | 63 | 88 | 23 | 174 |
| Madhya Pradesh | 19 | 50 | 5 | 74 |
| Maharashtra | 31 | 22 | - | 53 |
| Orissa | 18 | 9 | 0 | 27 |
| Uttar Pradesh | 5 | - | - | 5 |
| West Bengal | 17 | 78 | 7 | 102 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

* As on 31.3.2008

Note: OC - Opencast UG - Underground.

Table – 22 : Production of Raw Coal

(In million tonnes)

| Year | Production from opencast mines (% share) | Production from underground mines (% share) | Total production |
|---------|--|---|------------------|
| 2005-06 | 346.07 (85.02%) | 60.97 (14.98%) | 407.04 |
| 2006-07 | 373.13 (86.6%) | 57.70 (13.4%) | 430.83 |
| 2007-08 | 398.18 (87.1%) | 58.90 (12.9%) | 457.08 |

Source: Coal Directory of India, 2007-08 Coal Controller's Organisation, Kolkata.

**Table – 23 : Production of Coal, 2007-08
(By Technologies)**

(In million tonnes)

| Technology adopted | Production | Percentage of total |
|-----------------------------------|----------------------|---------------------|
| All India : Total | 457.082 | 100 |
| <i>Opencast (Total)</i> | <i>398.18</i> | <i>87.11</i> |
| Mechanised | 391.32 | 85.61 |
| Manual | 6.86 | 1.50 |
| <i>Underground (Total)</i> | <i>58.90</i> | <i>12.89</i> |
| Conventional B&P | 16.15 | 3.53 |
| Mechanised B&P | 38.59 | 8.44 |
| Conventional LW | 0.45 | 0.10 |
| Mechanised LW | 1.54 | 0.34 |
| Other methods | 2.17 | 0.48 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

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

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

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

Lignite

Of the eleven working mines, all of them opencast, three were owned by Neyveli Lignite Corporation (NLC), four by Gujarat Mineral Development Corporation (GMDC) and two by Rajasthan State Mines and Minerals Limited (RSMML). One mine each was with Gujarat Industries Power Co. Ltd (GIPCL) and Gujarat Heavy Chemicals Ltd (GHCL). NLC shared maximum production during the period under review. The NLC mines are a part of an integrated complex consisting of three opencast lignite mines (10.5 million tpy + 10.5 million tpy + 3 million tpy), 3 thermal power plants (600 MW+ 420 MW+1470 MW) and a carbonisation and

briquetting plant (262,000 tpy) producing carbonised briquetts, commercially called "Leco". The third mine having 3 million tpy capacity feeds an independent power project of 250 MW commissioned on 30.3.2003. Capacity increase of Mine-II from 10.5 million tpy to 15 million tpy with the installation of 2x250 MW units is approved by the Ministry of Coal. The new Barsingar Thermal-cum-Mine Project will have 2.1 million tpy lignite capacity to feed the 2x125 MW thermal project. The mine is expected to produce 0.5 million tonnes lignite in 2009-10 and 1.79 million tonnes per annum up to 2012-13. The NLC's mines are highly mechanised. Electric-powered equipment like bucket-wheel excavators, fabric & steel cord belt conveyors, trippers and spreaders are used in their opencast mines for excavation, transportation and refilling of the overburden. The Neyveli Lignite Mines is the largest opencast mine in the whole country with eco-friendly technology. Hydraulic shovels & dumpers are used only for auxiliary works. Mobile transfer Conveyor (MTC) of capacity 4420 cu m/Hr, stacker of 4000 t/hr capacity and reclaimer of 2000 t/Hr capacity are also deployed.

Policy-Captive Coal and Lignite Block Allocation

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

At present, captive coal blocks are only allotted to companies in power, cement and steel sectors. Till 31.12.2008, a total of 198 coal blocks with 44,003 million tonnes geological reserves have been allotted in various states (Table-24). The Ministry of Coal has allocated coal blocks for the two Ultra Mega Power Projects (UMPPs) (400 MW capacity each) proposed by Ministry of Power, to be set up at Sasan in Madhya Pradesh and in Orissa (Singrauli Coalfield).

In terms of Govt. of India CBM Policy, consortium of CIL and ONGC has been allotted 2 blocks- one each in Raniganj and Jharia coalfield for development of Coal Bed Methane.

Similarly, 30 captive lignite blocks with 2,223.53 million tonnes geological reserves have been allocated in Gujarat (12 blocks), Rajasthan (17 blocks) and Tamil Nadu (one block).

FOREIGN COLLABORATION

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

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

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

Table – 24 : Allotment of Captive Coal Blocks, (As on 31.12.2008) (Statewise)

| (In million tonnes) | | |
|---------------------|--------------------|---------------------|
| State | No. of Coal Blocks | Geological Reserves |
| Total | 198 | 44003.1 |
| Arunachal Pradesh | 1 | 27 |
| Andhra Pradesh | 4 | 237.2 |
| Chhattisgarh | 38 | 7803.36 |
| Jharkhand | 57 | 16995.89 |
| Maharashtra | 27 | 1072.6 |
| Madhya Pradesh | 24 | 3272.59 |
| Orissa | 30 | 12189.88 |
| West Bengal | 17 | 2404.6 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

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

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

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

COAL WASHERIES

Presently 19 coal washeries (15 in public sector and 4 in private sector) with 32.80 million tonnes capacity produced 7.17 million tonnes coking coal in 2007-08. Similarly 9 coal washeries with 26.53 million tonnes capacity produced 12.69 million tonnes non-coking coal during the year. In public sector BCCL operates 9 coal washeries (Dugda II, Bhojudih, Patherdih, Sudamdih, Barora, Moonidih, Mahuda, Madhuband and Dugda-I), CCL 4 washeries (Kathara, Swang, Rajrappa and Kalla), WCL one (Nandan) and SAIL one (Chasnala), whereas 4 washeries (W. Bokaro-II, W. Bokaro-III, Jamadoba and Bhelatand) were operated by Tata Steel Ltd, in private sector.

By and large, ash content in raw coal used by washeries varied between 24 and 33%. The ash content in the washed coal and middlings produced by washeries ranged from 19 to 22% and 35 to 40%, respectively. The rejects in most washeries contained over 50% ash. The capacity and production of washed coking/non-coking coal is shown in Tables - 25, 26, 27 and 28, respectively.

Table – 25 : Production of Washed Coking Coal: 2006-07 & 2007-08 (Sectorwise/Companywise)

| | 2006-07 | 2007-08 |
|--------------------------|---------------|---------------|
| All India : Total | 7025.1 | 7170.9 |
| Public Sector | 4038.5 | 4345.2 |
| BCCL | 1660.4 | 1662.0 |
| CCL | 1825.0 | 1838.0 |
| WCL | 327.0 | 331.0 |
| SAIL | 226.1 | 514.2 |
| Private Sector | 2986.6 | 2825.7 |
| Tata Steel Ltd | 2986.6 | 2825.7 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

Table – 26 : Capacity of Washed Coking Coal

| Coalfield/state/washery | Raw coal capacity (In '000 tpy) |
|---|------------------------------------|
| Grand Total | 32800 |
| BCCL | |
| Jharia Coalfield, Jharkhand | |
| Dugda-I | 2500 |
| Dugda-II | 2000 |
| Bhojudih | 1700 |
| Patherdih | 1600 |
| Sudamdih | 1600 |
| Barora | 420 |
| Moonidih | 1600 |
| Mohuda | 630 |
| Madhuban | 2500 |
| CCL | |
| East Bokaro Coalfield, Jharkhand | |
| Kathara | 3000 |
| Swang | 750 |
| Rajrappa | 3000 |
| Kedia | 2600 |
| WCL | |
| Pench-Kanhan Coalfield, Madhya Pradesh | |
| Nandan | 1200 |
| SAIL | |
| West Bengal | |
| DSP | - |
| Jharkhand | |
| Chasnala | 2040 |
| Tata Steel Ltd | |
| Bokaro Coalfield, Jharkhand | |
| West Bokaro-II & III | 3900 |
| Jharia Coalfield, Jharkhand | |
| Jamadoba | 900 |
| Bhelatand | 860 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

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**Table – 27 : Production of Washed Non-Coking Coal :
2006-07 & 2007-08
(Sectorwise/Companywise)**

(In '000 tonnes)

| | 2006-07 | 2007-08 |
|--------------------------|----------------|-----------------|
| All India : Total | 12688.3 | 12686.00 |
| Public Sector | 10313.9 | 10454.00 |
| BCCL | 1056.9 | 788.00 |
| CCL | 6676.0 | 6595.00 |
| NCL | 2581.0 | 3071.00 |
| Private Sector | 2374.4 | 2232.00 |
| JSPL | 2163.0 | 1916.00 |
| BLA Ind. Ltd | 211.4 | 316.00 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

Table – 28 : Capacity of Washed Non-Coking Coal

| Coalfield/state/washery | Raw coal Capacity (In '000 tpy) |
|--|------------------------------------|
| Grand Total | 26,530 |
| BCCL | |
| Jharia Coalfield, Jharkhand | |
| Dugda-I | 1000 |
| Lodna | 480 |
| Madhuban | 2500 |
| CCL | |
| East Bokaro Coalfield, Jharkhand | |
| Gidi | 2500 |
| North Kanarpura Coalfield, Jharkhand | |
| Piparwar | 6500 |
| South Kanarpura Coalfield, Jharkhand | |
| Kargali | 2720 |
| NCL | |
| Bina Coalfield, Uttar Pradesh | |
| Bina | 4500 |
| JSPL | |
| Raigarh Coalfield, Chhattisgarh | |
| JSPL | 6000 |
| BLA Industries Pvt. Ltd, Madhya Pradesh | |
| Dhamasthal | 330 |

Source: Coal Directory of India, 2007-08, Coal Controller's Organisation, Kolkata.

CLASSIFICATION AND GRADES

Indian coal is classified into two main classes; 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 while for semi-weakly-coking coal, ash percentage and moisture percentage are the two main criteria. For non-coking coal, an empirical formula is used to determine Useful Heat Value (UHV) of coal in Kcal/kg.

The classification of coal as per the Ministry of Coal is given in Table - 29. Changing grading and

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

CONSUMPTION

Thermal power plants, iron & steel and cement continued to be the major consuming industries. Sizable quantities are also consumed by the railways, collieries and as a domestic fuel. Data regarding consumption in these sectors are not available. However, industrywise despatches of coal are given in Table - 30.

Table – 29 : Classification of Coal

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

**Table – 30 : Despatches* of Coal
2005-06 to 2007-08
(By Industries)**

| (In million tonnes) | | | |
|--|--------------|--------------|--------------|
| Industry | 2005-06 | 2006-07 | 2007-08(p) |
| Total | 395.6 | 420.8 | 453.8 |
| Iron & steel ¹ | 34.2 | 16.3 | 37.6 |
| Fertilizer | 2.3 | 2.5 | 2.5 |
| Cement | 15.0 | 14.6 | 15.3 |
| Electricity | 311.3 | 309.9 | 350.2 |
| Others (Chemical, cokeries, paper & pulp, textile, bricks, etc. | 32.8 | 77.5 | 48.2 |

Source : Coal Directory, 2006-07 and 2007-08

* Data on consumption is not available.

¹ Including sponge iron.

DEMAND & SUPPLY

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

XI Plan Demand Projections

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

XI Plan Supply Projections

| (Million tonnes) | | |
|--------------------------------|---------|---------------|
| Source | 2011-12 | |
| CIL | 520.50 | |
| SCCL | 40.80 | |
| Others | 118.70 | |
| Total Indigenous Supply | | 680.00 |
| Import - Coking | 40.85 | |
| Non-Coking | 10.25 | |
| Total Imports | | 51.10 |

WORLD REVIEW

World proven coal reserves were estimated at 847.5 billion tonnes (Table-31). World production of coal and lignite increased from 6.19 billion tonnes in 2006 to 6.36 billion tonnes in 2007. China continued to be the largest producer of coal and lignite in 2007 with about 40% share in world production (Table-32). According to the BP Statistical Review of World Energy, June 2008, global consumption rose by 4.5%, above the ten year average of 3.2%. The price of coal has soared to record highs. Global demand and problems with supply have led to prediction that it could go up further, during 2008.

**Table – 31 : World Proven Coal Reserves
at the end of 2007
(By Principal Countries)**

| (In million tonnes) | | | |
|----------------------|--------------------------------|---------------------------------|---------------|
| Country | Anthracite and bituminous coal | Sub-bituminous coal and lignite | Total |
| World : Total | 430896 | 416592 | 847488 |
| Australia | 37100 | 39500 | 76600 |
| Brazil | - | 7068 | 7068 |
| Canada | 3471 | 3107 | 6578 |
| China | 62200 | 52300 | 114500 |
| Colombia | 6578 | 381 | 6959 |
| Germany | 152 | 6556 | 6708 |
| India* | 52240 | 4258 | 56498 |
| Kazakhstan | 28170 | 3130 | 31300 |
| Poland | 6012 | 1490 | 7502 |
| Russian Federation | 49088 | 107922 | 157010 |
| South Africa | 48000 | - | 48000 |
| Ukraine | 15351 | 18522 | 33873 |
| USA | 112262 | 130460 | 242721 |
| Other countries | 10272 | 41898 | 52171 |

Source: Coal Directory, 2007-08, Coal Controller's Organisation, Kolkata.

* However, India's reserves of coal as on 1.1.2008 are estimated at 264.54 billion tonnes to a depth of 1,200 m and those of lignite at 38.93 billion tonnes.

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**Table - 32 : World Production of Coal and Lignite
(By Principal Countries)**

| (In Million tonnes) | | | |
|--------------------------------|-------------------|-------------------|-------------------|
| Country | 2005 | 2006 | 2007 |
| World : Total | 5898 | 6189 | 6357 |
| Australia | | | |
| Hard coal | 308 | 315 | 324 |
| Brown coal | 67 | 68 | 66 |
| Bulgaria | | | |
| Brown Coal & lignite | 25 | 25 | 28 |
| Canada | | | |
| Hard coal | 57 | 55 | 55 |
| Lignite | 11 | 10 | 11 |
| China | | | |
| Hard coal | 2148 ^e | 2312 ^e | 2470 ^e |
| Lignite | 97 | 61 ^e | 66 ^e |
| Colombia | | | |
| Hard coal | 60 | 66 | 70 |
| Czech. Rep. | | | |
| Bituminous coal | 13 | 13 | 12 |
| Brown Coal | 49 | 49 | 49 |
| Germany | | | |
| Hard coal | 25 | 21 | 22 |
| Brown coal | 178 | 176 | 180 |
| Greece | | | |
| Lignite | 71 | 65 | 63 |
| India | | | |
| Hard coal | 407 | 431 | 456 |
| Lignite | 30 | 31 | 34 |
| Indonesia | | | |
| Hard coal | 153 | 194 | 175 |
| Kazakhstan | | | |
| Hard coal | 82 | 92 ^e | 90 ^e |
| Poland | | | |
| Hard coal | 98 | 95 | 88 |
| Lignite | 62 | 61 | 58 |
| Romania | | | |
| B. Coal & lignite | 31 | 33 | 33 ^e |
| Russia | 299 | 310 | 315 |
| Serbia & Montenegro | | | |
| Lignite | 36 | - | - |
| South Africa | | | |
| Hard coal | 244 | 245 | 247 |
| Thailand | | | |
| Lignite | 21 | 19 | 18 |
| Turkey | | | |
| Hard coal | 3 | 3 | 3 |
| Lignite | 61 | 61 | 58 |
| Ukraine | | | |
| Hard coal | 78 | 80 | 76 |
| U.S.A. | | | |
| Hard coal | 951 | 978 | 967 |
| Lignite | 76 | 76 | 71 |
| Other Countries | 197 | 244 | 252 |

Source: World Mineral Production, 2003-2007.

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

As estimated by the 'World Coal Institute', coal currently fuels 40% of the World electricity and this proportion is set to remain static over the next 30 years. About 70% of the World's steel production is based on coal. The World Coal Institute in its new report "Coal Meeting the Climate Challenge: Technology to reduce Greenhouse Gas Emission" released in 2007, outlined two primary ways of reducing CO₂ emission from coal use. The first is by carbon capture and storage (CCS) which can reduce 80-90% CO₂ emission into atmosphere and second is storing CO₂ in geological formations. CCS is now acknowledged as the only technology that can significantly reduce emissions from fossil fuel power stations and other industrial plants. International Energy Agency has emphasised need to install CCS on coal-fired plants by 2030. With the widespread deployment of CCS, fossil fuels will become an important part of solution rather than part of the problem.

Australia

Australia ranked fourth in world production of coal and lignite in 2007. At present, Jellinbah East Coal mine produces 4 million tpy for export purpose while Lake Vermont coal mine is expected to produce 3 to 4 million tpy low sulphur and low ash coal by first quarter of 2009. It is one of the largest exporters of coal. Coal reserves in Australia include both coking and thermal grade proven reserves which are estimated to last for 100 years and 450 years, respectively.

China

China continued to be the world's largest coal producer and represents the biggest surge in demand. Coal provides about 78% of China's energy need. Coal demand jumped 9% and represents one quarter of world's annual coal consumption. It ranks third in the world in terms of coal reserves. Henan Shenhua Group Co. Ltd is the major coal producer.

Indonesia

Indonesia, a major coal producing country in Asia Pacific Region, accounted for 2.7% of world production. JK, which is Indonesia's largest coal miner produced one-fifth of Indonesia's total production in 2007. Indonesia is the world's largest

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thermal coal exporter and its industry has benefited from strong demand from China and India and record high coal prices.

Russia and Former Soviet Union

Russian coal industry is the fifth largest coal and lignite producer in the world. Russia also has the second largest coal reserves in the world. The country is self sufficient in coking and thermal coal which is mined in the Kemerono region of central Siberia. Siberian Coal Energy Company (SUEK) is Russia's largest steam coal producer.

South Africa

South Africa is the largest coal producer in Africa. BHP Billiton, a major world producer accounted for 28% production followed by Anglo Coal (24%), Sasol Coal (19%), Kumba (9%) and Xstrata plc (8%). In South Africa, coal is the main source of power generation for at least the next 50 years. Waterberg basin near Botswana border holds about 50% of reserves but due to poor infrastructure, the region is not developed.

USA

USA was the second largest producer of coal and lignite with 16% production. It has the largest coal reserves in the world with about 243 billion tonnes. Demand for coal produced in USA from overseas market continues to grow. Arch Coal estimates that exports in 2008 will increase by 20 million tonnes over 2007 as a result of world wide demand for electricity generation and steel making. "Peabody Energy" is a major coal producer. Its exports have tripled since 2006 as global stock piles fell short by 100 million tonnes. The US Energy Department entered into agreement with FIA to develop and construct a coal-fuelled cleanest power plant in US with a target of zero emissions. The FIA comprises major coal producers (American Electric Power, BHP Billiton, China Huaneng Group, Peabody Energy, etc.).

FOREIGN TRADE

Exports

In 2007-08, exports of coal increased 5% to 1.63 million tonnes from 1.55 million tonnes in the previous year. Similarly, exports of coke also increased 27% to 101,799 tonnes in 2007-08 from 80,186 tonnes

in 2006-07. Coal was mainly exported to Bangladesh (81%) and Nepal (16%) and coke to Brazil (42%), Pakistan (28%) and Bhutan (20%). Exports of coal gas increased 72% to 7,354 tonnes in 2007-08 from 4,267 tonnes in the previous year. Almost entire export of coal gas in 2007-08 was to Singapore (Tables - 33 to 36).

Imports

Imports of coal increased to 49.8 million tonnes in 2007-08 from 43.1 million tonnes in 2006-07. Imports of coke decreased to 4.25 million tonnes in 2007-08 from 4.69 million tonnes in the previous year. Coal was mainly imported from Australia (42%), Indonesia (39%) and South Africa (14%) whereas coke was imported mainly from China (88%), Japan (5%) and Australia (4%)(Tables - 37 to 39).

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

| Country | 2006-07 | | 2007-08 | |
|----------------------|--------------|-----------------|--------------|-----------------|
| | Qty ('000 t) | Value (Rs.'000) | Qty ('000 t) | Value (Rs.'000) |
| All Countries | 1548 | 3126709 | 1627 | 2770280 |
| Bangladesh | 1325 | 2616935 | 1318 | 2148878 |
| Nepal | 212 | 474443 | 266 | 509908 |
| Bhutan | 11 | 35023 | 35 | 95778 |
| Sri Lanka | - | - | 4 | 6409 |
| USA | - | - | 1 | 2215 |
| Mauritius | - | - | 1 | 2203 |
| Qatar | - | - | 1 | 1701 |
| UK | - | - | 1 | 965 |
| Oman | - | - | ++ | 751 |
| Afghanistan | - | - | ++ | 572 |
| Other countries | ++ | 308 | ++ | 900 |

Table – 34 : Exports of Coal : Lignite (By Countries)

| Country | 2006-07 | | 2007-08 | |
|----------------------|--------------|-----------------|--------------|-----------------|
| | Qty ('000 t) | Value (Rs.'000) | Qty ('000 t) | Value (Rs.'000) |
| All Countries | 1 | 3852 | ++ | 1260 |
| Singapore | - | - | ++ | 603 |
| Saudi Arabia | - | - | ++ | 343 |
| Bangladesh | - | - | ++ | 264 |
| Korea, Rep. of | - | - | ++ | 36 |
| Germany | - | - | ++ | 12 |
| Egypt | ++ | 463 | - | - |
| Indonesia | ++ | 75 | - | - |
| Sri Lanka | ++ | 79 | - | - |
| UAE | ++ | 1152 | - | - |
| USA | 1 | 2083 | - | - |
| Other countries | - | - | ++ | 2 |

COAL & LIGNITE

**Table – 35 : Exports of Coke
(By Countries)**

| Country | 2006-07 | | 2007-08 | |
|----------------------|--------------|---------------------|---------------|---------------------|
| | Qty (t) | Value (Rs. '000) | Qty (t) | Value (Rs. '000) |
| All Countries | 80186 | 339823 | 101799 | 1010898 |
| Brazil | 37000 | 250317 | 45000 | 734016 |
| Pakistan | 31 | 78 | 28805 | 153547 |
| Bhutan | 12745 | 58823 | 20522 | 97029 |
| Bangladesh | 347 | 1144 | 1228 | 5317 |
| Nepal | 27721 | 18805 | 2740 | 4764 |
| Saudi Arabia | 304 | 2676 | 620 | 3584 |
| Kenya | 49 | 579 | 1003 | 3465 |
| Tanzania | 1484 | 5897 | 1290 | 3127 |
| Indonesia | - | - | 158 | 3078 |
| Sri Lanka | 226 | 705 | 154 | 1788 |
| Other countries | 279 | 799 | 279 | 1183 |

**Table – 36 Exports of Coal Gas, etc.
(Except Gaseous Hydrocarbons)
(By Countries)**

| Country | 2006-07 | | 2007-08 | |
|----------------------|-------------|---------------------|-------------|---------------------|
| | Qty (t) | Value (Rs. '000) | Qty (t) | Value (Rs. '000) |
| All Countries | 4267 | 115992 | 7354 | 187616 |
| Ireland | - | - | 4 | 100 |
| Malaysia | 4262 | 115887 | - | - |
| Nepal | 5 | 105 | ++ | 19 |
| Singapore | - | - | 7350 | 187497 |

**Table – 37 : Imports of Coal (Excl. Lignite)
(By Countries)**

| Country | 2006-07 | | 2007-08 | |
|----------------------|-----------------|---------------------|-----------------|---------------------|
| | Qty ('000 t) | Value (Rs. '000) | Qty ('000 t) | Value (Rs. '000) |
| All Countries | 43079 | 166886113 | 49792 | 207389726 |
| Australia | 15887 | 90176486 | 20700 | 111750717 |
| Indonesia | 18741 | 42913199 | 19516 | 52844569 |
| South Africa | 2388 | 8175975 | 6972 | 28690261 |
| New Zealand | 692 | 4395593 | 763 | 4455797 |
| USA | 877 | 5418728 | 537 | 3396670 |
| China | 4092 | 13569134 | 553 | 3149779 |
| Vietnam | 304 | 1766463 | 202 | 1230855 |
| Philippines | - | - | 322 | 900287 |
| Russia | 50 | 199182 | 102 | 484268 |
| Canada | 43 | 242446 | ++ | 124 |
| Other countries | 5 | 28907 | 125 | 486399 |

**Table – 39 : Imports of Coal Gas, etc.
(Except Gaseous Hydrocarbons)
(By Countries)**

| Country | 2006-07 | | 2007-08 | |
|----------------------|------------|---------------------|------------|---------------------|
| | Qty (t) | Value (Rs. '000) | Qty (t) | Value (Rs. '000) |
| All Countries | 1 | 1497 | ++ | 323 |
| UK | ++ | 243 | ++ | 224 |
| Germany | - | - | ++ | 66 |
| France | 1 | 1254 | ++ | 33 |

**Table – 38 : Imports of Coke
(By Countries)**

| Country | 2006-07 | | 2007-08 | |
|----------------------|----------------|---------------------|----------------|---------------------|
| | Qty (t) | Value (Rs. '000) | Qty (t) | Value (Rs. '000) |
| All Countries | 4686047 | 40210970 | 4247936 | 51231153 |
| China | 4203386 | 36264826 | 3746657 | 45462724 |
| Japan | 320146 | 2568825 | 214899 | 2324820 |
| Australia | 95905 | 824606 | 163760 | 1911677 |
| Singapore | - | - | 16000 | 436281 |
| Egypt | 26844 | 275874 | 32998 | 329942 |
| USA | 1075 | 20328 | 21575 | 272299 |
| Iran | - | - | 23376 | 254889 |
| Morocco | - | - | 12011 | 154050 |
| Colombia | 22272 | 100144 | - | - |
| Switzerland | 15290 | 141269 | - | - |
| Other countries | 1129 | 15098 | 16660 | 84471 |

FUTURE OUTLOOK

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

Per capita energy consumption in India is 285 kg oil per annum against 1,454 kg in the world. The Indian demand for energy will remain high and coal alone can meet this. The dominant role of coal in energy consumption and electricity generation is likely to continue for decades because of huge proven reserves of coal vis-a-vis the reserves of oil and natural gas. Thus, if coal could be produced at reasonable cost on a sustainable basis, the Indian coal industry can hope to flourish for decades if not centuries. The estimated demand for coal is 731.1million tonnes in 2011-12. As per National Steel Policy, the requirement of coking coal for Iron & Steel industry will be 70 million tonnes and non-coking coal will be 26 million tonnes by 2019-20. A massive increase in production is needed to meet the growing demand of coal & lignite. The future of Indian coal industry is reasonably secured and it has the capability of facing the emerging issues and challenges before it.