

South Asia Regional Initiative/ Energy (SARI/ E)

Regional Clean Coal Partnership Programme

COAL AT THE HEART OF SOUTH ASIA'S ENERGY SECURITY

Sept. 16, 2008, Kolkata,

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Per Capita Commercial Energy Consumption (2007)

Country	TPES* per Capita (Kgoe)	Electricity Consumption per Capita (KWh)	GDP per capita (US \$)
China	1400	2500	2460
India	400	700	1000
Japan	4100	9100	34300
Germany	3800	7750	40300
USA	7750	14350	45800
World	1688	3000	8240
Note: *TPES-Total Primary Energy Supply			

Energy Scenario

- ✓ Share of coal in world's energy consumption is 28%.
- ✓ Coal and lignite in India account for about 56% of the commercial energy

Fuel-wise Break-up of Primary Energy Consumption (in %)		
Consumption by Fuel	INDIA	WORLD
Oil	28	36
Natural Gas	9	24
Coal & lignite	56	28
Nuclear Energy	1	6
Hydro-Electric	6	6
Total	100	100

Source: BP Statistical Review of World Energy 2007

India's Energy Situation (Present)

- o Coal fulfills + 55% of commercial energy Requirement.
- o More than 90% of coal requirement is produced indigenously
- o Available coal reserves to last more than 100 years at the current rate of production
- o Nuclear and hydro energy, though has vast potential, meets - 5% of present energy requirement

India's Energy Situation (Contd.)

- o Oil (36%) and gas (9%) fulfill around 45% of commercial energy Requirement
- o More than 75% of crude oil requirement is to be imported
- o Known oil reserves in India to last 6 years at the present rate of consumption (- 25 years at present rate of production)
- o Known natural gas reserves in India to last - 35 years at the present rate of consumption

India's Energy Situation (Projected)

- o Projected primary energy requirement in 2031-32 as per Integrated Energy Policy for sustaining 9% of economic growth is 2043 Mtoe including 185 Mtoe of non commercial energy.
- o The Share of coal is projected to be 937 Mtoe (46 %) or in absolute terms 2343 million tonnes (1659 million tonnes for power generation & 684 million tonnes for non power requirements).

Top Ten Hard Coal Producers (2006)

PR China	2482Mt	Russia	233Mt
USA	990Mt	Indonesia	169Mt
India	427Mt	Poland	95Mt
Australia	309Mt	Kazakhst an	92Mt
South Africa	244Mt	Colombia	64Mt

Global Hard Coal Consumption

	1986	1996	2006
World	3232Mt	3773Mt	5339Mt

Selected Regional Aggregate Estimates

Europe	17%	11%	7%
FSU	17%	8%	6%
North America	21%	23%	18%
Asia- Pacific	39%	53%	65%

International Hard Coal Trade

	Steam	Coking	Total Trade
1996	318Mt	196Mt	513Mt
2000	421Mt	188Mt	609Mt
2006	593Mt	222Mt	815Mt

Top Coal Exporters (2006)

	<i>Total of which</i>	<i>Steam</i>	<i>Coking</i>
Australia	231Mt	111Mt	121Mt
Indonesia	129Mt	104Mt	25Mt
Russia	92Mt	82Mt	10Mt
South Africa	69Mt	68Mt	1Mt
PR China	63Mt	59Mt	4Mt
Colombia	60Mt	60Mt	-
USA	45 Mt	20Mt	25Mt

Electricity Generation Capacity-India (Utilities: 2006-07)

Mode	Capacity (MW)	% Share
Thermal	85576	65
Coal	70682	54
Gas	13692	10
Oil	1202	1
Hydro	34654	26
Nuclear	4120	3
Renewables	7760	6
Total capacity	1,32,110	100

Mode wise power generation-India (Utilities: 2006-07)

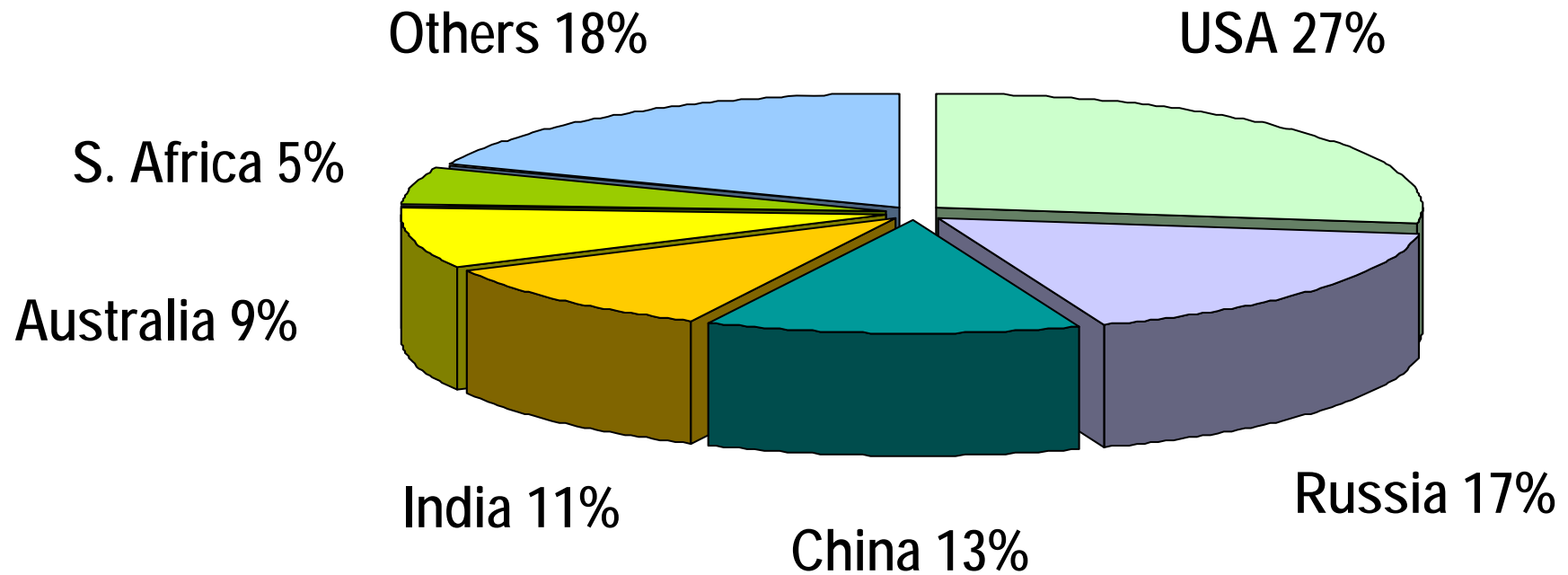
Mode	Energy generation in Bkwh	% Share
Thermal	527.457	80
Coal	431.126	65
Oil	2.489	0.40
Gas	63.719	10
Multifuel	9.172	1
Lignite	21.042	3
Hydro	113.359	17
Nuclear	18.607	3
Imports	3.097	0.5
Total	662.523	100

Total Primary Energy supply-India

(MTOE)

Resource	1960-61	1970-71	1980-81	1990-91	2003-04
Commercial energy supply	42.82	60.33	99.82	183.12	327.00
Primary non-commercial energy supply	74.38	86.72	108.48	122.07	143.00
Total primary energy supply	117.20	147.05	208.30	305.19	470.00

World Proved Coal Reserves



Total Proved Reserves (Coal & Lignite) - 909 Billion Tonnes

India's Coal Sector : An overview

- Coal reserves : 264 BT
- Lignite reserves : 39 BT
- Annual coal production (2007-08) : 456 MT
- Annual Lignite production : 34 MT
- 3rd largest producer of coal
- Coal mined from OC mines : 87%
- Coal mined from UG mines : 13%

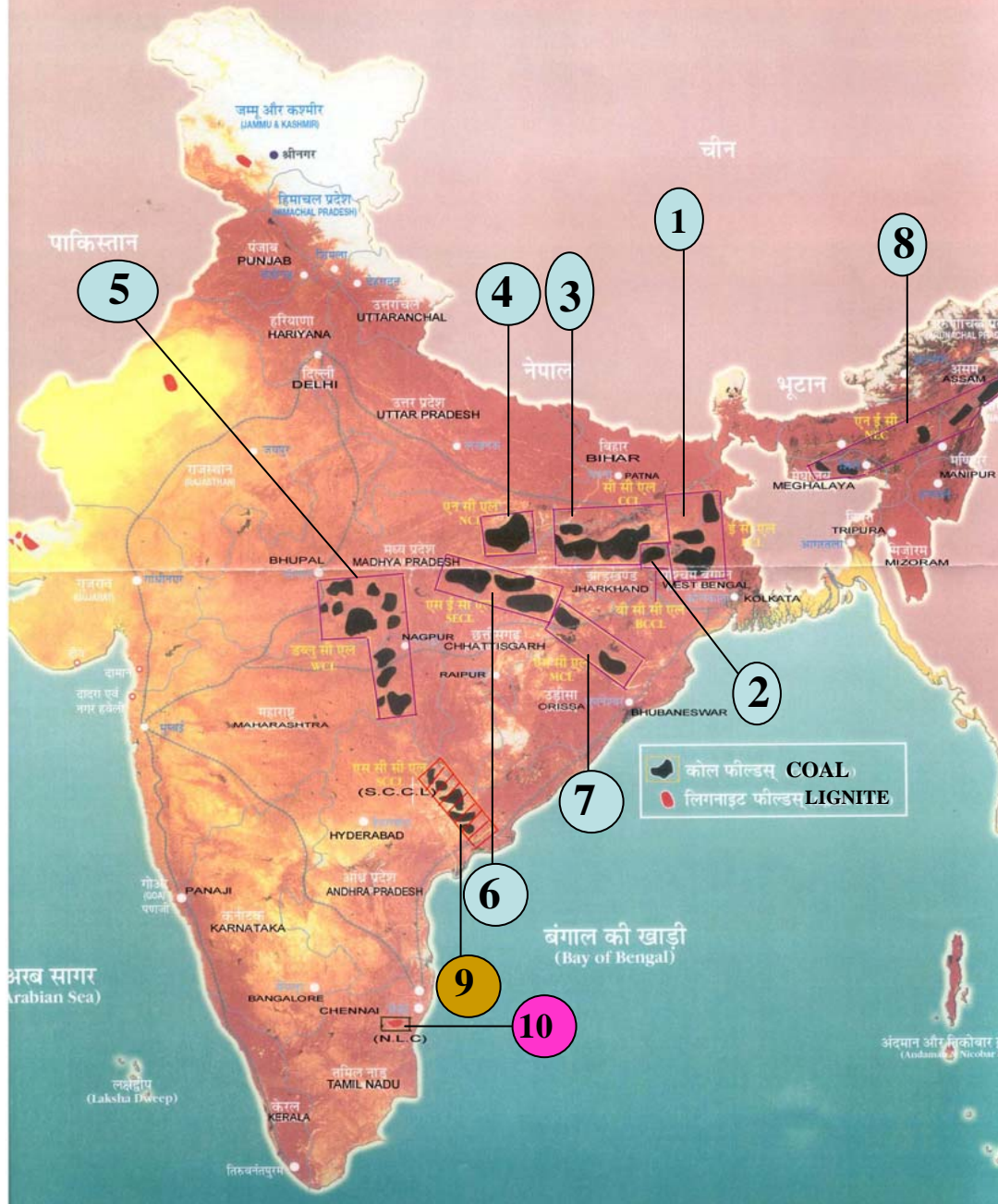
India's Coal Resources

(Billion Tones)

Type of Coal	Proved	Indicated	Inferred	Total
Prime Coking	4.6	0.7	0.0	5.3
Medium Coking Coal	12.3	12.1	1.9	26.3
Semi Coking	0.5	1.0	0.2	1.7
Sub-Total Coking	17.4	13.8	2.1	33.3
Non coking	84.4	110.4	36.4	231.2
Total	101.8	124.2	38.5	264.5
% Share	38.5%	47.0%	14.5%	100%

Note: Extractable reserves are about 52 Bt with an R/P ratio of >100 yrs

COAL AND LIGNITE RESOURCES IN INDIA



COAL PRODUCING SUBSIDIARIES OF COAL INDIA LTD. (CIL)

- EASTERN COALFIELDS LTD. (1)
- BHARAT COKING COAL LTD. (2)
- CENTRAL COALFIELDS LTD. (3)
- NORTHERN COALFIELDS LTD. (4)
- WESTERN COALFIELDS LTD. (5)
- SOUTH EASTERN COALFIELDS LTD. (6)
- MAHANADI COALFIELDS LTD. (7)
- NORTH EASTERN COALFIELDS. (8)
(A UNIT UNDER CIL (HQ))

SINGARENI COLLIERIES CO. LTD. (9) (SCCL)

NEYVELI LIGNITE CORPORATION (10) (NLC)

Coal Demand

(Million Tonnes)

Sector	X Plan	XI Plan Projected			XII (Proj.)
	06-07	07-08	08-09	11-12	2016-17
Coking Coal	39.26	39.31	44.00	68.50	105
Non Coking Coal:					
Power (U)	307.87	342.95	378.00	483.00	750
Power (C)	28.43		38.00	57.06	85
Cement	19.70	23.50	25.00	31.90	50
Others	70.53	97.17	70.00	90.64	135
Sub-total	426.53	463.62	511.00	662.60	1020
Total	465.79	502.93	555.00	731.10	1125
CAGR during 5 Yr. Plan Period	5.6%			9.4%	9%

Coal Production

(Million Tonnes)

COMPANY	X Plan	XI Plan Projected			
	2006-07 Actual	2007-08 Actual	2008-09 Target	2011-12 PROJ.	2016-17 PROJ.
CIL	360.91	379.49	405.00	520.50	664.00
SCCL	37.71	40.60	41.50	40.80	45.00
Other PSUs	1.80	2.02	2.02	2.52	2.52
Pvt. Sector	7.03	7.21	6.50	6.50	6.50
Captive Mining	17.61	21.15	36.22	104.08	331.38
Meghalaya	5.79	5.90	5.60	5.60	5.60
All India	430.85	456.37	496.84	680.00	1055
CAGR during 5 Yr. Plan Period	5.8%			9.6%	9.2%

Coal Demand Supply Gap

(Million Tonnes)

DEMAND/ SUPPLY/ GAP	SECTOR	06-07 actual	11-12	16-17
			Projected	
DEMAND	COKING COAL	39.26	68.50	105
	NON COKING COAL	426.53	662.60	1020
	TOTAL	465.79	731.10	1125
SUPPLY	COKING COAL	32.10	27.65	35
	NON COKING COAL	398.75	652.35	1020
	TOTAL	430.85	680.00	1055
GAP	COKING COAL	7.16	40.85	70
	NON COKING COAL	27.78	10.25	-
	TOTAL	34.94	51.10	70

Key Players in Indian Coal Sector

Coal Producing Companies	Production 2007-08
• Coal India Ltd (CIL) (A Govt. of India Enterprise)	379 Mt (83%)
• Singareni Collieries Company Ltd. (SCCL)	41 Mt (9%)
• Captive Producers (Steel & Power)	36 Mt (8%)
Total	456 Mt

Opencast /Underground Coal Production

(Million Tonnes)

COMPANY	X Plan (2006-07)			XI Plan (2011-12)		
	Actual			PROJ.		
	Opencast	Underground	Total	Opencast	Underground	Total
CIL	317.59	43.32	360.91	465.94	54.56	520.50
SCCL	25.83	11.88	37.71	27.35	13.45	40.80
Others	29.67	2.56	32.21	112.78	5.92	118.70
Total	373.09	57.76	430.85	606.07	73.93	680.00
Percentage	87%	13%	100%	89%	11%	100%

Plan wise coal production

Terminal Year	Plan Period	Coal production (million tonne)		
		Opencast	Underground	Total
1973-74	IV	18.40	59.77	78.17
1978-79	V	33.84	68.13	101.97
1984-85	VI	74.01	73.40	147.41
1989-90	VII	127.92	72.97	200.89
1996-97	VIII	218.37	70.95	289.32
2001-02	IX	262.97	64.82	327.79
2006-07	X	373.09	57.76	430.85
2011-12	XI	606.07	73.93	680.00

Coal imports

(In Million Tonnes)

Type of Coal	2001-02	2006-07	2011-12
Coking coal	11.11	17.88	40.85
Non coking	9.44	25.20	10.15
Total	20.55	43.08	51.00

Coal Exports

(In Million Tonnes)

Type of Coal	2006-07
Coking coal	0.11
Non coking	1.45
Total	1.55

Lignite production

(In Million Tonnes)

Company	IX Plan 2001-02 Actual	X Plan 2006-07 Actual	XI Plan 2011-12 Proj.
NLC	18.34	21.01	27.04
GMDC	4.85	7.99	27.16
Others	1.62	2.13	
Total	24.81	31.13	54.20

Per Capita Carbon Dioxide (CO2) Emissions- 2004

Country	CO2 Emissions Per Capita (tonnes)
China	3.8
India	1.2
Japan	9.8
Germany	9.8
USA	20.4
World Average	4.2

Policy changes since nationalisation

- New subsidiary companies under CIL were created for administrative convenience
- Coal Mines Nationalisation Act amended permitting private sector in coal mining limited to captive purposes
- Stringent environmental laws put in place
- State PSUs permitted to take up mining on par with CIL, a CPSU

Policy changes since nationalisation

- Coal was put on open general license & Import duty on coal tapered off
- Coal price and distribution de controlled
- Fuel supply agreements encouraged
- Project Approval procedures streamlined
- Policy for CBM put in place

Policy changes since nationalisation

- Action initiated for enhancement of exploration activities
- Private block holders have been permitted to take up exploration as per the guidelines
- Washing of thermal coal assumed significance
- Private sector has been permitted to set up washeries on coal company's land

Policy changes since nationalisation

- Profit making Coal Companies have been extended the status of Miniratna for more autonomy
- Emphasis laid on promotion of clean coal technologies
- Action initiated to promote new areas UCG, CTL etc.
- National R&R policy put in place
- New Coal distribution policy announced

Policy changes since nationalisation

- Acquisition of coal properties abroad permitted from energy security point of view
- Regulatory mechanism for coal is contemplated
- Allocation of blocks through competitive bidding is on cards
- Large scale imports encouraged

Policy changes since nationalisation

- Infrastructure for coal imports and movement being strengthened
- Outsourcing of operations being encouraged
- State of the art technologies being promoted
- Cadre management reviewed and new cadres created by CIL matching their business interests

Policy changes since nationalisation

- Organisational changes in terms of delegation of powers and bifurcation of areas took place for administrative convenience
- Training of manpower focused
- Managements of coal companies to review and reorient themselves in meeting consumers expectations and rapidly rising demand

Environmental Concern

- **India ratified UNFCCC in 1993**
- **India ratified the Kyoto Protocol in 2002 and set up National CDM Authority in 2005**
- **India is member of Carbon Sequestration Leadership Forum launched in 2003 by US**
- **India is Partner to Asia Pacific Partnership on Clean Development and Climate in 2005**

Climate Change

- India is pursuing various activities like energy efficiency improvement; conservation; reforms in power sector; promoting hydro and renewable energy; promotion of clean coal technologies; coal washing and efficient utilisation of coal; afforestation and conservation of forest; reduction of gas flaring; use of clean and less carbon intensive fuel for transport; adoption of mass rapid transport systems; environmental quality management etc. to mitigate Climate Change.
- India's National Environmental Policy which came into force in May, 2006 states elements of India's response to Climate Change.

Thrust on Clean Coal Technologies

- Augmenting Washed Coal Production
- CBM/CMM extraction
- Underground Coal Gasification
- Surface Gasification
- Coal liquefaction
- Power Sector is taking initiatives for efficiency improvements and adoption of new technologies including Super Critical Boilers etc.

COAL QUALITY MANAGEMENT

- Almost all Coking Coal (Prime/ Medium) being washed (Total Cap ~ 33 Mty)
- A portion of Low Grade Non-coking coal being washed (Cap ~ 103 Mty)
- Remaining Non-coking coal to be washed
- Washeries identified or under construction (Cap ~ 105 Mty)

Foreign Direct Investment

- **100% FDI allowed through an Indian company or Indian subsidiary of a power company in captive mining of coal and lignite and setting up of washeries for permitted end-uses.**

CAPTIVE Block Allocation

- Captive coal & lignite blocks are being allocated by the Govt. to private and other companies for specific end uses: Iron/ Steel production, Cement manufacture, Power generation, Syn gas production through surface or Underground gasification, CTL.
- 229 coal blocks, with 50 BT of geological reserves, identified for allocation to Govt. companies/approved captive end users.
- 182 coal blocks with 41.74 BT reserves allocated so far.
- 29 Lignite blocks with Geological Reserve of about 2.06 BT allotted
- **Besides, 26 blocks have been allotted for CBM exploration and exploitation.**



THANK YOU