



ENERGY OPTIONS & COAL

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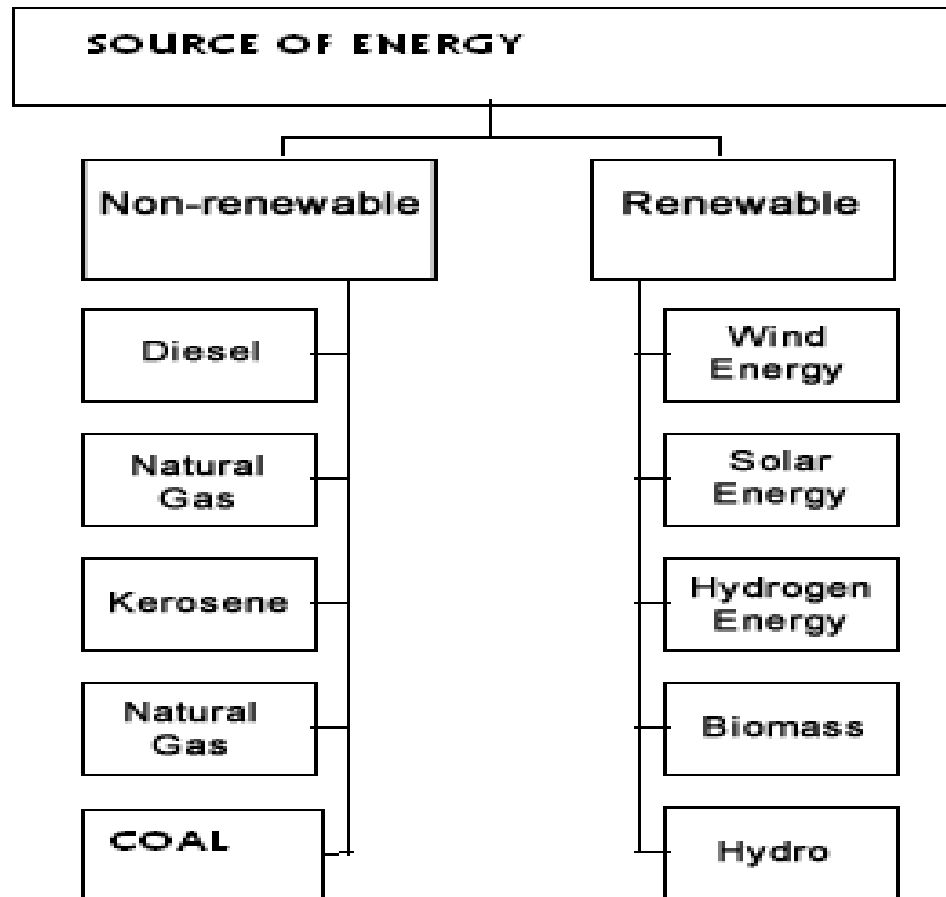
Key factors for consideration..

- Energy security depends on availability of secure and reliable energy
 - at affordable and
 - internationally competitive prices
- Energy system must be able to sustain shocks and uncertainties with
 - long term objective of energy security and
 - short term objective of providing low cost energy for the present .

Key factors for consideration..

- Increasing dependence on oil and gas imports would
 - undermine energy security
 - expose to unexpected and uncontrollable changes in energy prices and
 - increase the risk of physical supply disruption
- Energy security should essentially be integrated with social development and advancement and environmental sustainability

ENERGY – SOURCE ALTERNATIVES

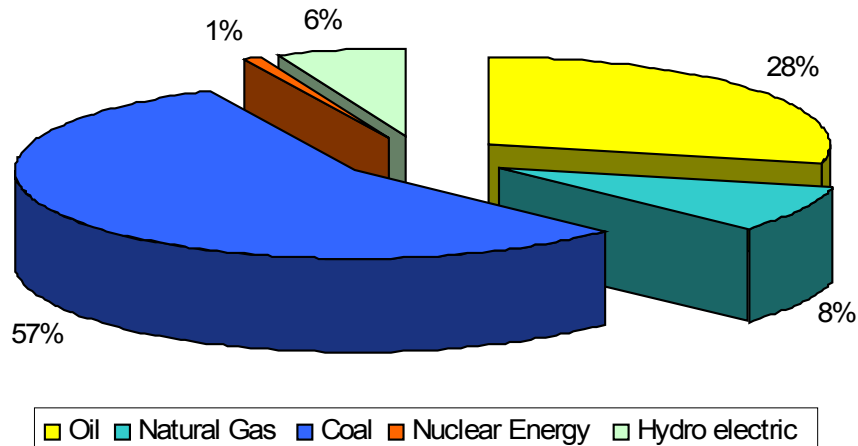


Key considerations

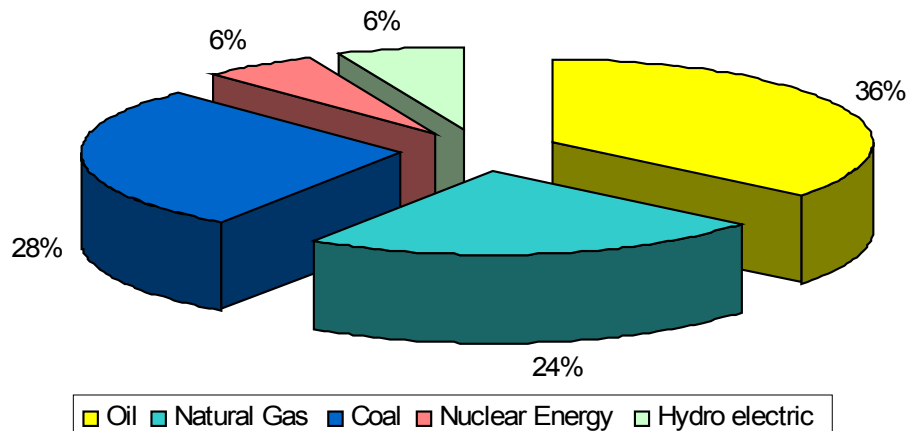
- ***India's growing dependence on energy imports would expose its energy needs to external price uncertainties/shocks. Thus domestic energy resources base must be expanded.***
- ***For India it is not a question of choosing among alternate domestic energy resources but exploiting all available domestic energy resources as an optimum mix as long as they are competitive ..***

Comparison of Primary Energy consumption

INDIA- FUEL WISE PRIMARY ENERGY CONSUMPTION 2006



WORLD - FUEL WISE PRIMARY ENERGY CONSUMPTION 2006

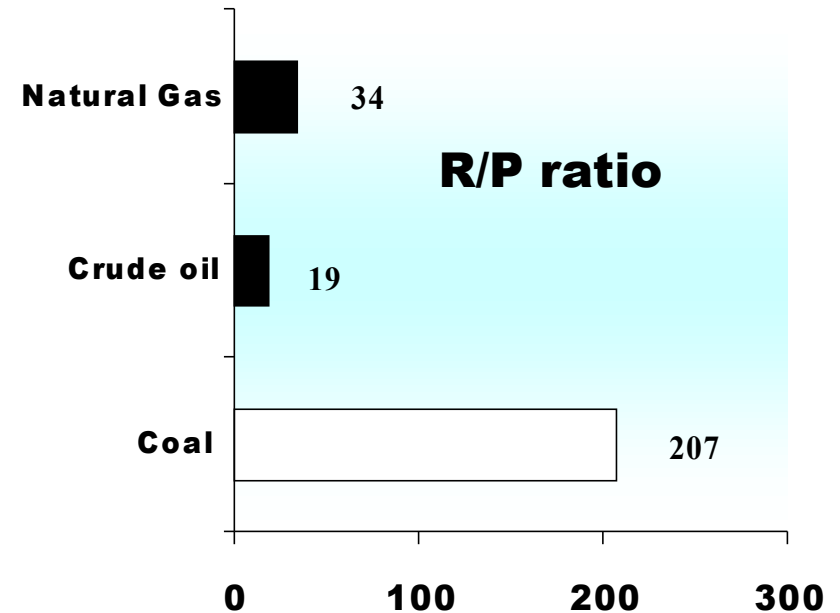


Fuel Wise Breakup of Power Generation

	INDIA		WORLD	
	CAPACITY %	ACTUAL %	ACTUAL	%
Total Thermal	66	80	67	
Coal	54	70	40	
Gas	11	9	20	
Oil	1	0	7	
Hydro	27	16	16	
Nuclear	3	3	16	
Renewable	5	2	2	

SOURCING FUEL IN INDIA : CONSIDERATIONS

	Reserves	Production/Yr.	R/P (yrs)
Coal (Proven) (MT)	98159 (as on 1.1.07)	475	207
Crude oil (MT)	786	41	19
Natural Gas (BCM)	1101	32	34



Choice of fuel would largely depend upon its sustained Availability, Quality, Affordability & Price Predictability

From resource potential point of view in the long term coal emerges as the natural choice.

Sectoral Composition of Primary Energy Consumption by Fuel in India

SECTOR	2005 (MTOE)	2006 (MTOE)
COAL & LIGNITE	222.0 (55%)	237.7 (56%)
OIL	119.6	120.3
NATURAL GAS	34.3	35.8
HYDRO ELECTRIC	21.7	25.4
NUCLEAR ENERGY	4.0	4.0
TOTAL PRIMARY COMMERCIAL ENERGY SUPPLY *	401.6 (100%)	423.2 (100%)



* Only commercially traded fuels, i.e. excluding wind, geothermal, solar & bio-fuels

Source: BP Energy Statistics June 2007

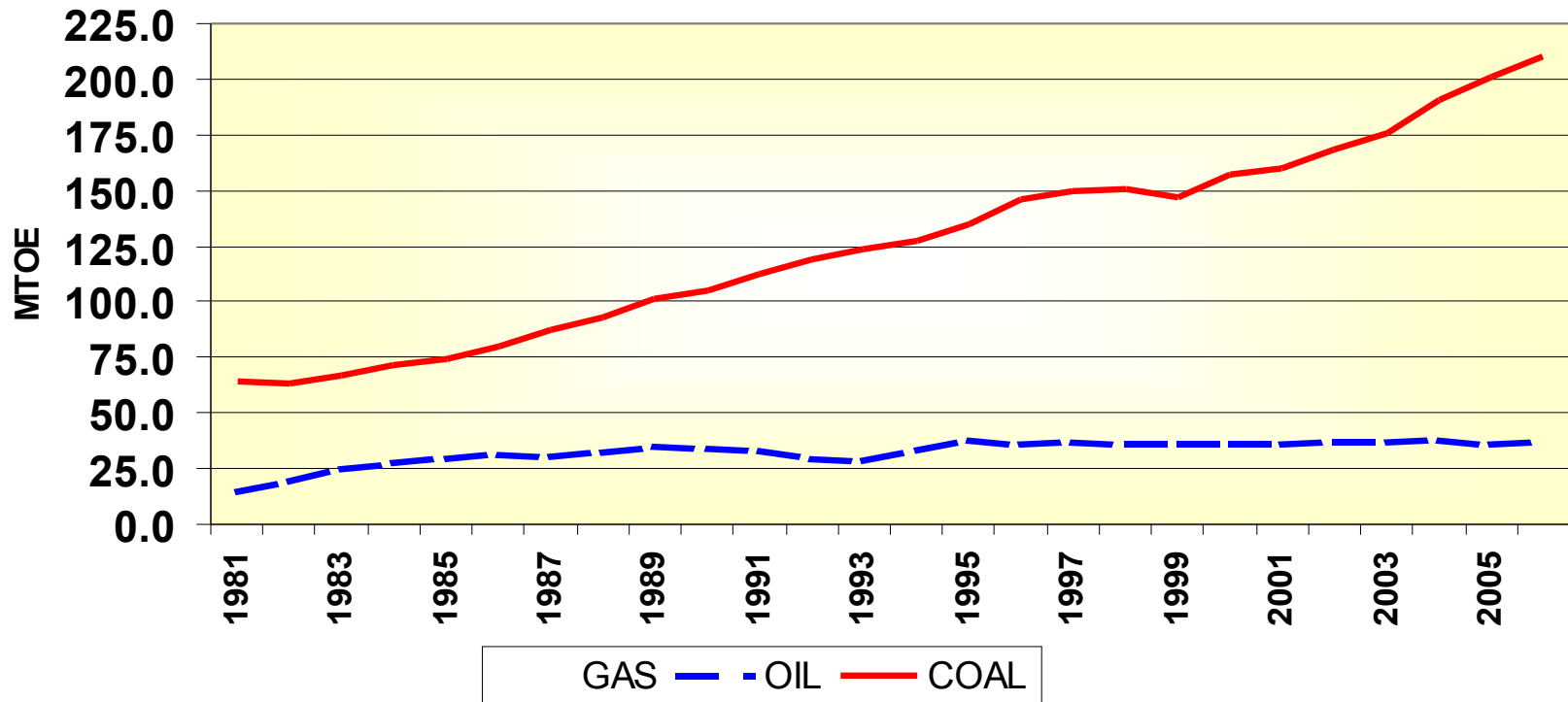
PROVED RESERVE OF OIL-GAS-COAL POSITION OF INDIA AS AGAINST WORLD

	OIL	GAS	COAL
	Thousand Mill Barrel	Trillion Cu M	Billion Tonne
WORLD PROVED RESERVE	1208.2	181.5	909.1
RESERVE IN INDIA	5.7	1.1	97.5
% OF WORLD RESERVE	0.5%	0.6%	10.7%
WORLD (R/P) / YEARS	41	63	147
INDIA (R/P) / YEARS	19	34	207



TREND OF GROWTH IN PRODUCTION OF COAL – OIL - GAS OVER LAST 15 YEARS

COAL-OIL-GAS PRODUCTION IN MTOE



Source BP Energy statistics 2007

- ***To meet the lifeline energy needs of all citizens, India needs to increase its primary energy supply by 3 to 4 times and, its electricity generation capacity/ supply by 5 to 6 times of their 2003-04 levels .***
- ***The role of coal as a supply and price ‘shock absorber’ in the competitive electricity market is of prime importance***

Key considerations

- *It is amply clear from the preceding slides that there is hardly any doubt on choice of coal as reliable source of energy for at least the near future.*
- *However, the environmental considerations, socio political problems will have to be addressed in the right earnest to ensure growth of the Indian coal sector at the desired pace.*
- *Private and Public coal mining sector has to be responsible for their respective role in making the country coal secured.*

Energy the fundamental driver of Growth

- ***With 2003-04 as the base, India's commercial energy supply would need to grow from 5.2% to 6.1% per annum in the timeframe till 2031-32***
- ***Power generation capacity must increase to nearly 8,00,000 MW from the current capacity of around 1,60,000 MW during the same period***

Energy the fundamental driver of Growth

- *Accordingly requirement of coal, the dominant fuel in India's energy mix will need to expand to over 2 billion tonnes/annum based on domestic quality of coal by 2031/32.*
- *Integrated Energy Policy Report of Planning Commission has identified Coal as the natural choice for primary energy source in India on consideration of available indigenous resources, cost of energy and emerging technologies of power generation –.*

Choice of Coal- factors for consideration

- *A relative abundance of reserves of Coal*
- *Near stagnation in the discovery of oil and gas from indigenous source*
- *Growing pressure to expand supply of electricity, given the fact that almost half the population does not use electricity at homes*
- *Environmental and Socio-economic problems associated with large hydro projects.. Holding back the growth of hydro power capacity to the extent of potential.*

Choice of Coal- factors for consideration

- ***Unpredictable & volatile international crude price and eco-political interference***
- ***Largely the demand of coal is directly related to growing demand of electricity where so far coal is the best available choice considering the factors projected in the following slides.....***

COAL RESERVE IN INDIA (HARD COAL) ** AS ON 01.01.2007 (IN BILLION TONNE)

	TOTAL RESERVE	PROVED RESERVE	INDICATED RESERVE	INFERRED RESERVE
COKING	32.27	16.87	13.30	2.10
NON COKING	221.95	80.58	105.58	35.79
TOTAL	254.22	97.45	118.88	37.89
WORLD COAL RESERVE	-	909.1	-	-
% RESERVE IN INDIA OVER WORLD RESERVE	-	10.2	-	-

GEOLOGICAL RESOURCES OF INDIAN COAL

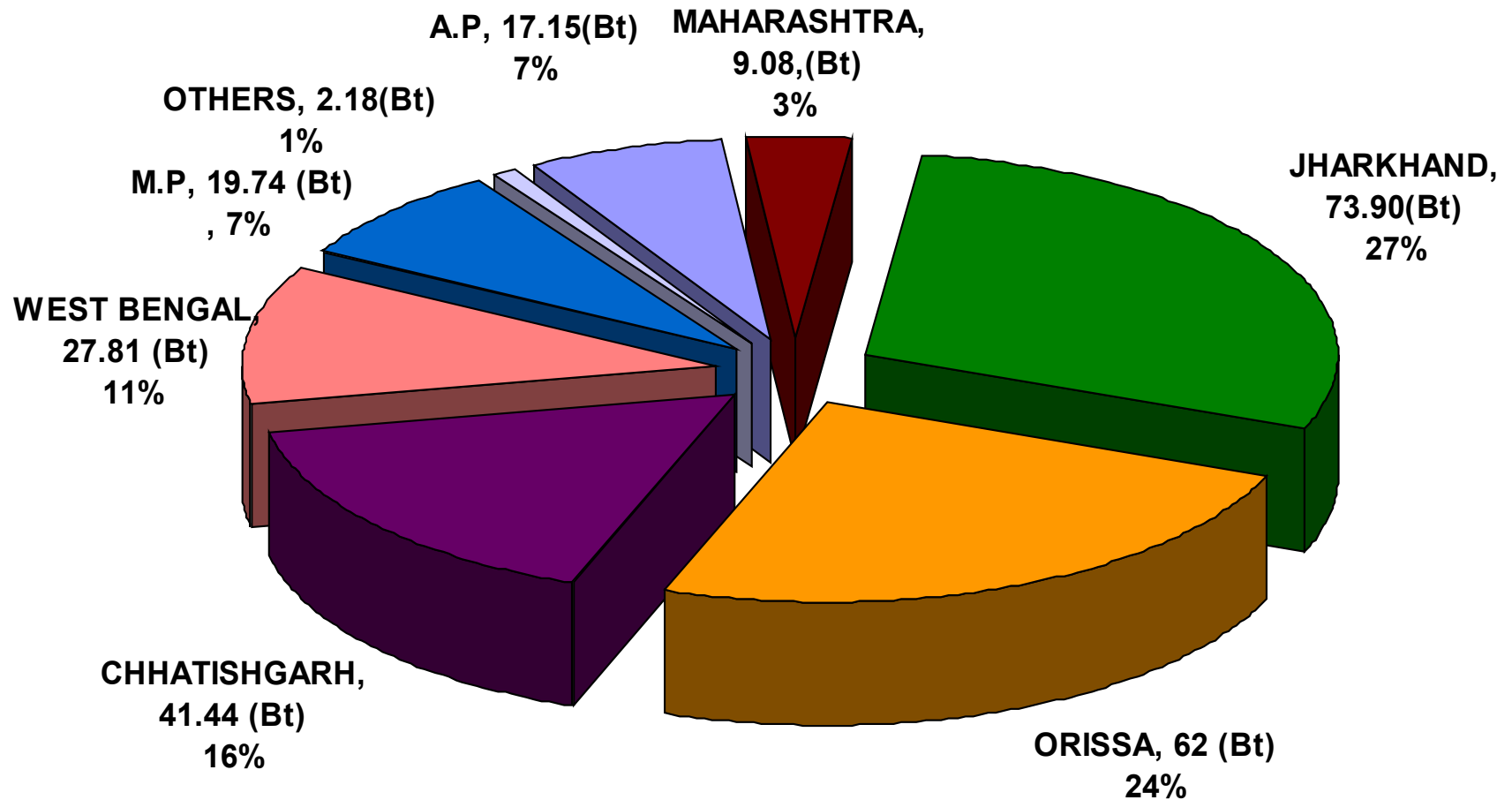
(CATEGORYWISE AND DEPTHWISE, AS ON 1.1.2007)

(In Billion Tonne)

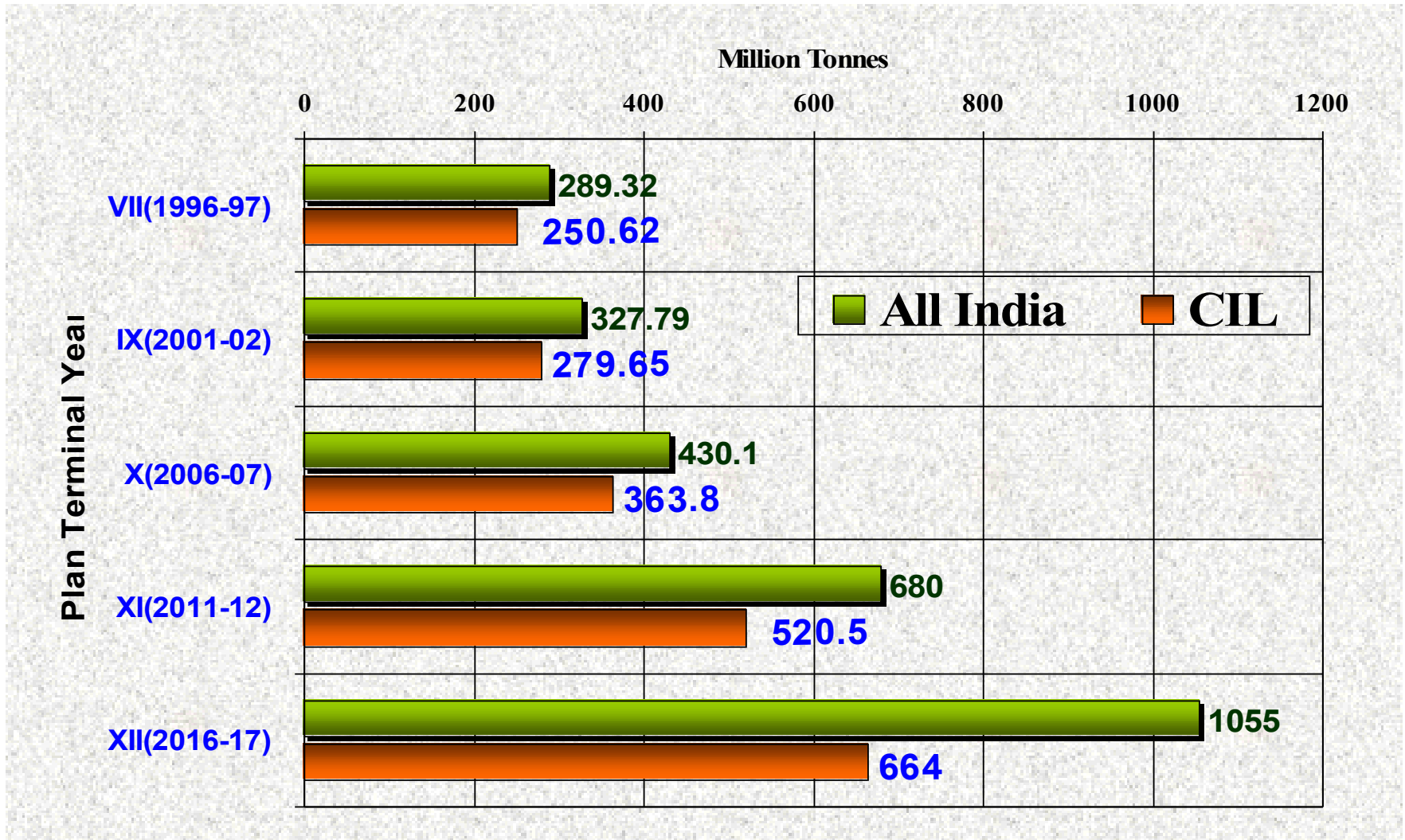
Depth (M)	Proved	Indicated	Inferred	Total	%
0 - 300	75.76	65.56	14.42	155.74	61.0%
300 - 600	6.78	41.65	18.04	66.47	26.0%
0 - 600 (For Jharia)	13.71	0.5	-	14.21	5.6%
600-1200	1.67	11.27	5.8	18.74	7.3%
Total	97.92	118.99	38.26	255.17	100.0%
%	38.4%	46.6%	15.0%	100.0%	-

Statewise Coal Reserve in India

(As on 01.01.2007) in Billion Tonnes



Trend of Coal Production – Past & Future



FUEL WISE BREAK UP OF POWER GENERATION CAPACITY (as on March 2007)

Fuel	MW	%age
Total Thermal	84,400	65.6
Coal	69,616	54.1
Gas	13,582	10.6
Oil	1,202	0.9
Hydro	33,942	26.5
Nuclear	3,900	3.0
Renewable	6,191	4.8
Total	1,28,432	

EXPECTATION FROM THE COAL SECTOR

- ▶ *Coal to continue as dominant source of commercial energy in the near to medium term.*
- ▶ *Planning commission envisages growth in demand of coal from the level of 432 MT in 2005-06 to 670 MT in 2011-12. Out of above, demand from Utilities will be 500 MT.*
- ▶ *According to Working Group on Coal & Lignite demand of coal would grow by 9.7% during XI plan – as would be evident from the next slide*

Sector wise demand as per Working group for XI & XII Plan

Fig in million tonne

Sector	X Plan (P)	XI Plan Assessed	CAGR(%)	XII Plan Projected
Power(Utilities)	310	483	9.27	750
Power Captive	31.50	57.06	9.50	85
Cement	25	31.90		50
Sponge Iron & Others	50.50	90.64	12.41	135
Total Non Coking	417	662.60	9.70	1020
Coking Steel	43	68.50	9.76	105
Total	460	731.10	9.71	1125

PREPAREDNESS OF COAL SECTOR

► *XI plan envisages growth of 9.47% in coal production.*

► *Captive mine is expected contribute phenomenally in mitigating coal demand with CAGR of 30%*

Fig in million tonne

	IX PLAN	X PLAN	GROWTH		XI PLAN	GROWTH	
	Actual	Actual	Absolute	CAGR(%)	Projected	Absolute	CAGR(%)
CIL	279.65	360.94	81.29	5.4	520.50	156.70	7.43
SCCL	30.81	37.70	6.89	4.01	40.80	3.30	1.70
Others	17.33	32.21	14.88	12.45	118.70	87.50	30.63
Total	327.79	430.85	103.06	5.70	680	247.50	9.47

PREPAREDNESS OF COAL SECTOR ...contd

- *The indigenous coal supply plan has been made in accordance with the priorities set by Planning Commission in its approach paper for XI plan.*
- *However, demand supply gap continues as may be evident from the next slide*

PREPAREDNESS OF COAL SECTORcontd

Fig in million tonne

2011-12 T.Year XI Pln	Coking Coal	Non-coking Coal						Total
	Steel	Power(U)	Power (CPP)	Cement	Sp.Iron	Others	Sub Total	
Demand	68.50	483.00	57.06	31.90	28.96	61.68	662.50	731.00
Source	INDIGENOUS AVAILABILITY							
CIL	18.25	382.35	35.49	21.245	15.55	47.41	502.25	520.50
SCCL	0.00	29.40	2.20	5.50	0.40	3.30	40.80	40.80
Others	9.40	65.95	19.37	0.00	13.01	10.97	109.30	118.70
Availability	27.65	477.70	57.06	26.95	28.96	61.68	652.25	680.00
Gap(-) / Surplus(+)	(-) 40.85	(-) 5.30	Nil	(-) 4.95	Nil	Nil	(-) 10.25	(-) 51.10

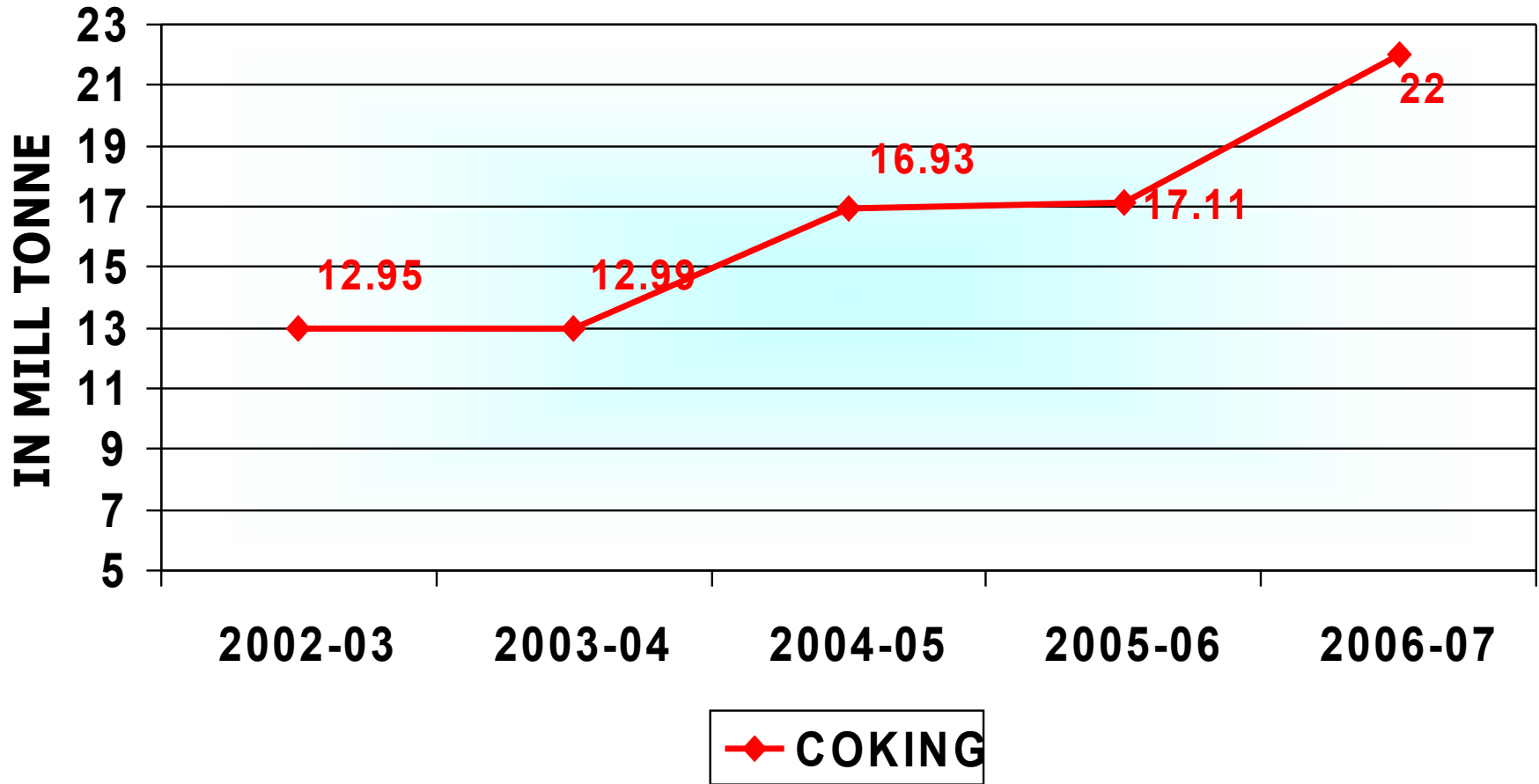
PREPAREDNESS OF COAL SECTOR ...contd

- ➡ *Demand Supply gap predominant in Coking coal segment.*
- ➡ *The gap in non coking coal segment is on the basis of existing trend of low ash coal consumption through import at coastal regions. Further augmentation in production of Non coking coal is inbuilt through captive mining blocks.*
- ➡ *Non availability of requisite quality of coal in country makes these import unavoidable.*

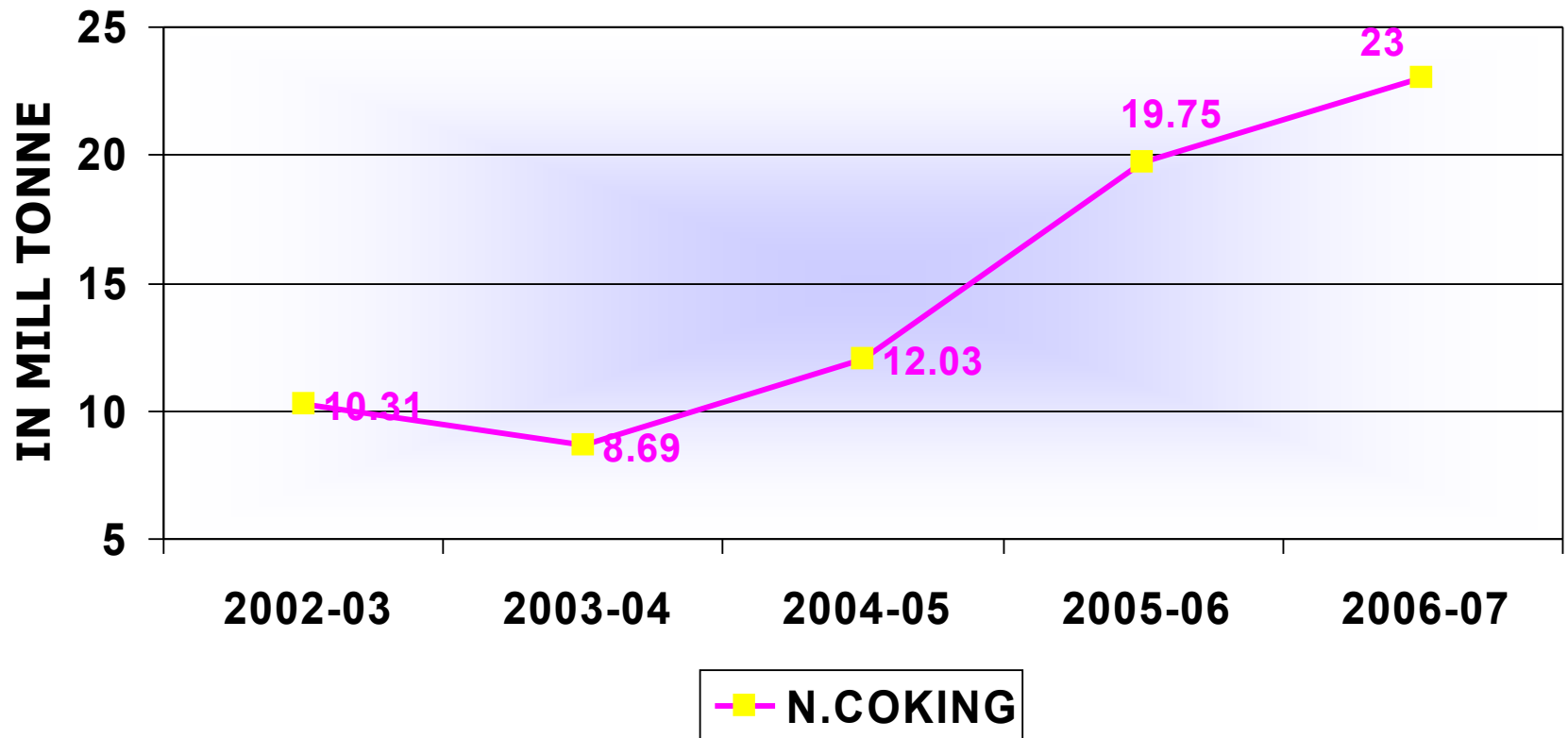
Likely importing segments for Non- coking coal

SECTOR	QUNATITY(MT)	REMARKS
Power Utilities	5.30	These are import-based utilities
Steel Plants(Corex)	3.80	Esser steel/ Hazira
Cement Plants	4.95	Coastal Plants

TREND IN COKING COAL IMPORT



TREND IN NON COKING COAL IMPORT



Dimensions of Coal Security

■ *Internal Dimensions*

- *Government direction to PSU Coal companies to take up more Greenfield coal projects on urgent basis*
- *Coal Blocks being allotted to private Entrepreneurs .*
- *Technological improvement to increase efficiency in production.*

Dimensions of Coal Security

■ *External Dimensions*

- *Import being projected as the short term remedy for meeting gap of demand and supply - Global Coal Trade becomes an important consideration for choosing coal as reliable source of energy.*
- *Coal is globally much more evenly and widely dispersed than oil and gas.*
- *The global coal reserve is far more than any other fossil fuel with Asia-Pacific region being the richest deposit*
- *Given the advantage in geopolitics, handling safety, existence of a well developed market and price stability in relation to other fuel - coal is the reliable source of energy even when the overseas market is compared*



THANK YOU

