



GOVT. OF INDIA



# OVERVIEW OF COAL MINING INDUSTRY IN INDIA

## FUTURE PROSPECTS AND POSSIBILITIES

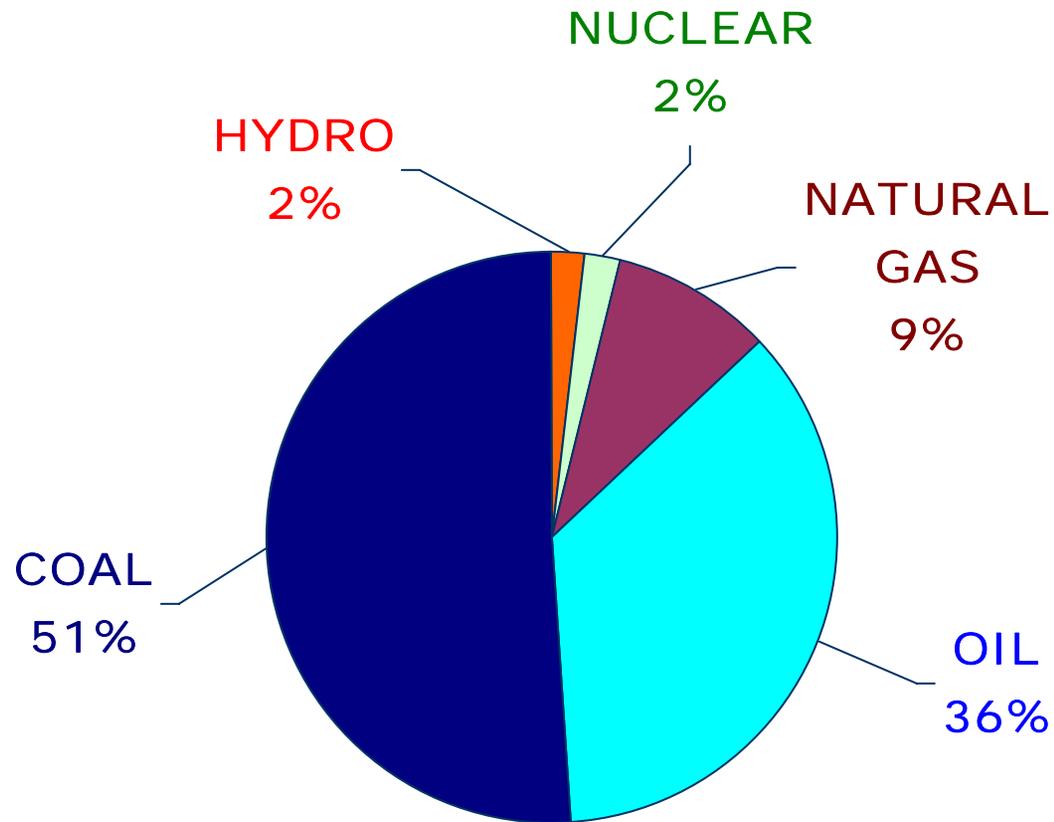
PARTHA S. BHATTACHARYYA  
CHAIRMAN, COAL INDIA LIMITED

05-07<sup>Th</sup>. JUNE 2007

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# % SHARE OF COMMERCIAL PRIMARY ENERGY RESOURCES - INDIA



# COAL AND LIGNITE RESOURCES IN INDIA



## A.CIL : COAL PRODUCING SUBSIDIARIES

- 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) )

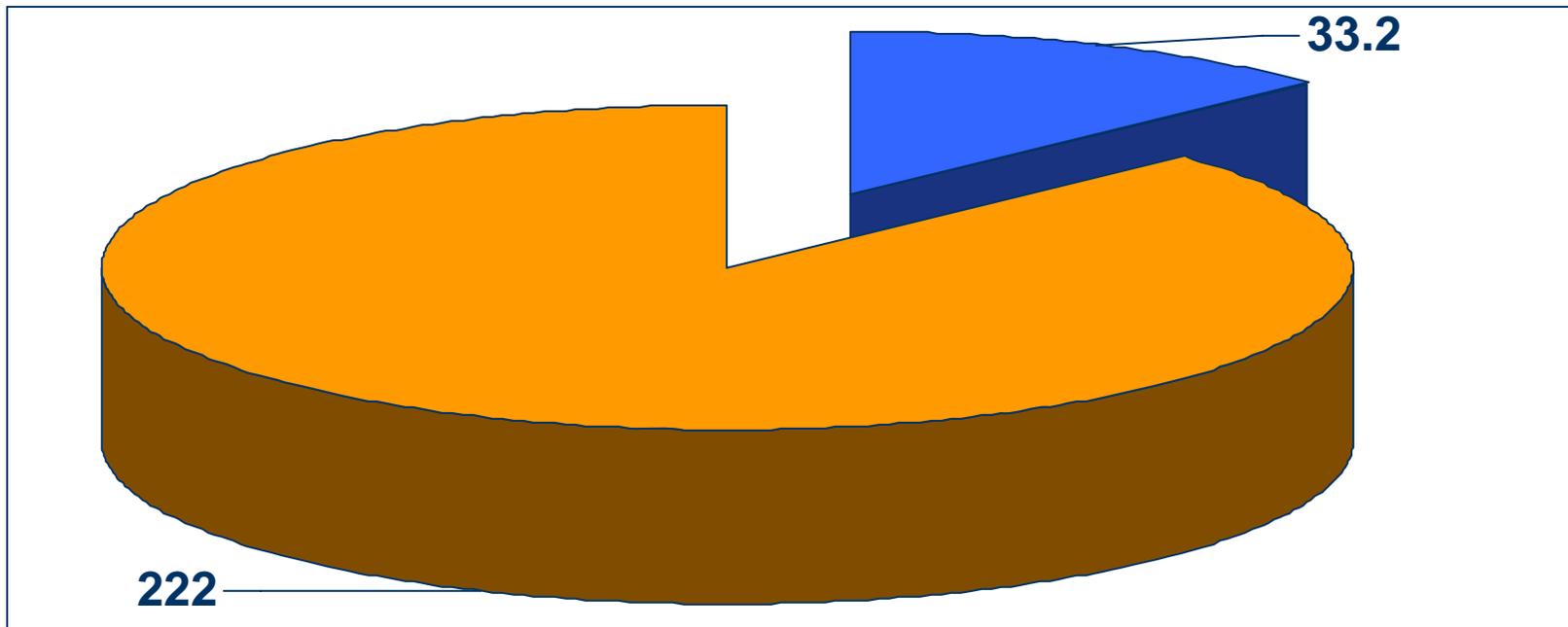
## PLANNING & DESIGN INSTITUTE

**CENTRAL MINE PLANNING & DESIGN INSTITUTE (CMPDIL)**

## B.SINGARENI COLLIERIES CO. LTD. (9)

## C.NEYVELI LIGNITE CORPORATION (10)

# INDIAN COAL RESOURCES - 2007 (Bill T)



■ Coking ■ Non-Coking

TOTAL RESOURCE - 255.2

# COAL RESERVES IN INDIA

(As on 1.1.2007)

(Billion T)

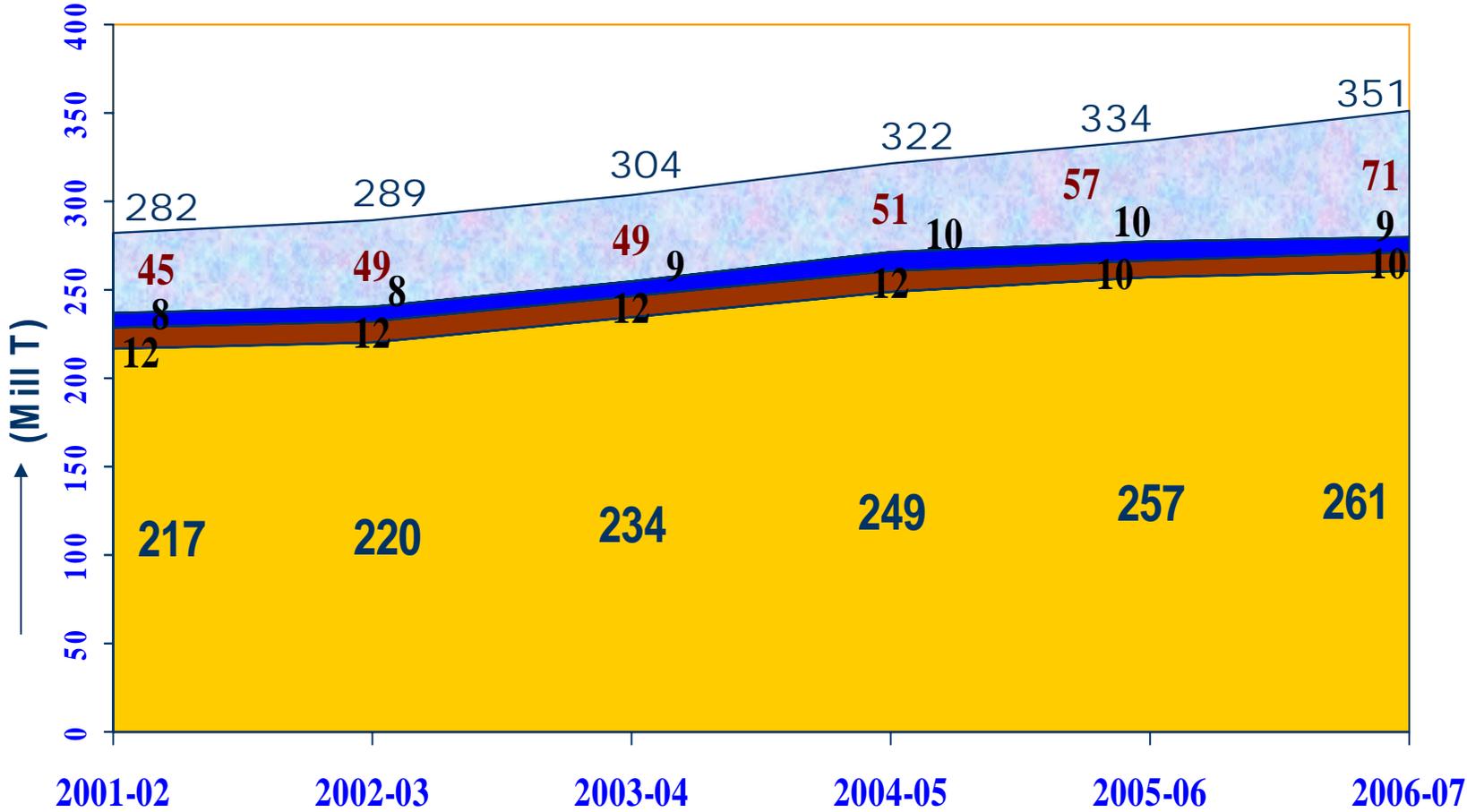
TYPE OF COAL	PROVED	INDICATED	INFERRED	TOTAL
Prime Coking	4.6	0.7	0.0	5.3
Medium Coking	11.8	11.6	1.9	25.3
Semi Coking	0.5	1.0	0.2	1.7
Non coking	80.6	105.6	35.8	222.0
<b>TOTAL</b>	<b>97.9</b>	<b>119.0</b>	<b>38.3</b>	<b>255.2</b>
Lignite	4.3	12.7	20.1	37.1

# CHARACTERISTICS OF INDIAN COAL DEPOSITS

1. LIMITED RESERVES OF COKING COAL(32.28 BT).
2. HIGH ASH AND LOW CALORIFIC VALUES ( 40% & ABOVE & AVERAGE 4000 K.CAL./KG-UHV)
3. MISMATCH IN LOCATION OF DEPOSITS AND MAJOR CONSUMPTION CENTRES
4. HIGH COST OF TRANSPORT



# CONSUMER PROFLIE



# NATIONALISATION OF COAL INDUSTRY

- Pursuant to a Oil price shock a high power committee was formed in early 1970s.

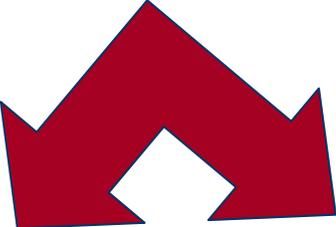


- The Committee identified - Coal as the mainstay for future energy requirements.

- Growth of coal Industry was sluggish prior to 1970s – less than 2% per annum.
- Private investment was not forthcoming due to non-remunerative coal price.
- Hiking Coal price was not feasible.
- Substantial investment was required to reach a level of 5.5% growth to sustain GDP growth of 5%.

- The situation necessitated channelising public funds into coal mining.
- Mainly for these reason, Coal mining was nationalised between 1971 & 1973.
- **Coal India was formed as PSU in Nov 1975.**
- During 1975-91 massive investment by Govt. helped to achieve a growth rate of 5.3%
- 'Coal at any cost' continued to dominate the investment strategy during this period.

- As a consequence company developed two major weaknesses in the Balance Sheet



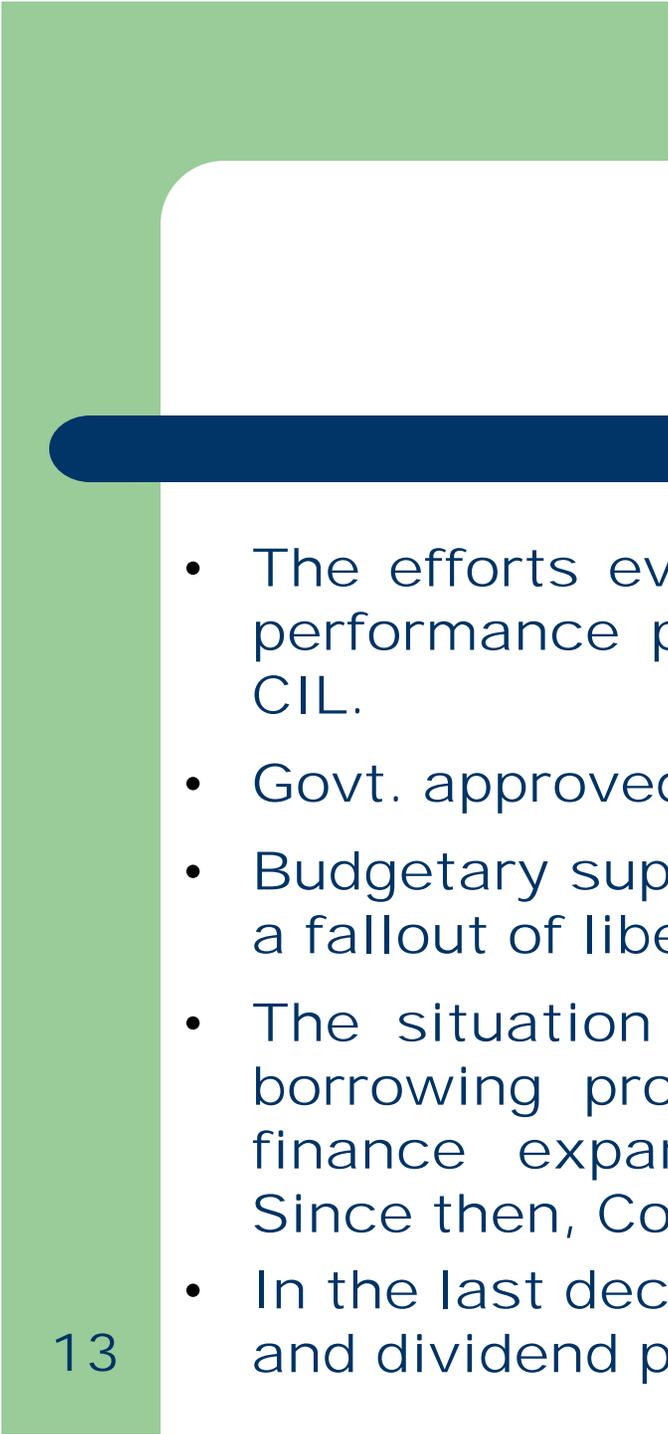
Accumulated losses of  
staggering Rs. 25 Bill  
(40% of the equity)

Overdue liability of debt  
service payments to GOI  
Rs. 22.3 Bill

- 
- In 1991 Govt. adopted a policy to keep PSUs at arms length
  - Progressive phasing out of budgetary support commenced.
  - However, a pragmatic coal pricing policy was put in place to enable CIL mobilize internal resources.
  - CIL earned a modest profit in 1991-92

## THE TURN AROUND OF CIL.

- Beginning VIII Plan (1992-93) investment were made only in financially viable projects (IRR 16% at 85% capacity Util.)
- Thrust on improvement of Availability and Utilisation of equipment
- Reduction of manpower through natural attrition and also by VRS in loss making subsidiaries
- Creating track record of consistent and timely debt servicing to Govt. without any default.

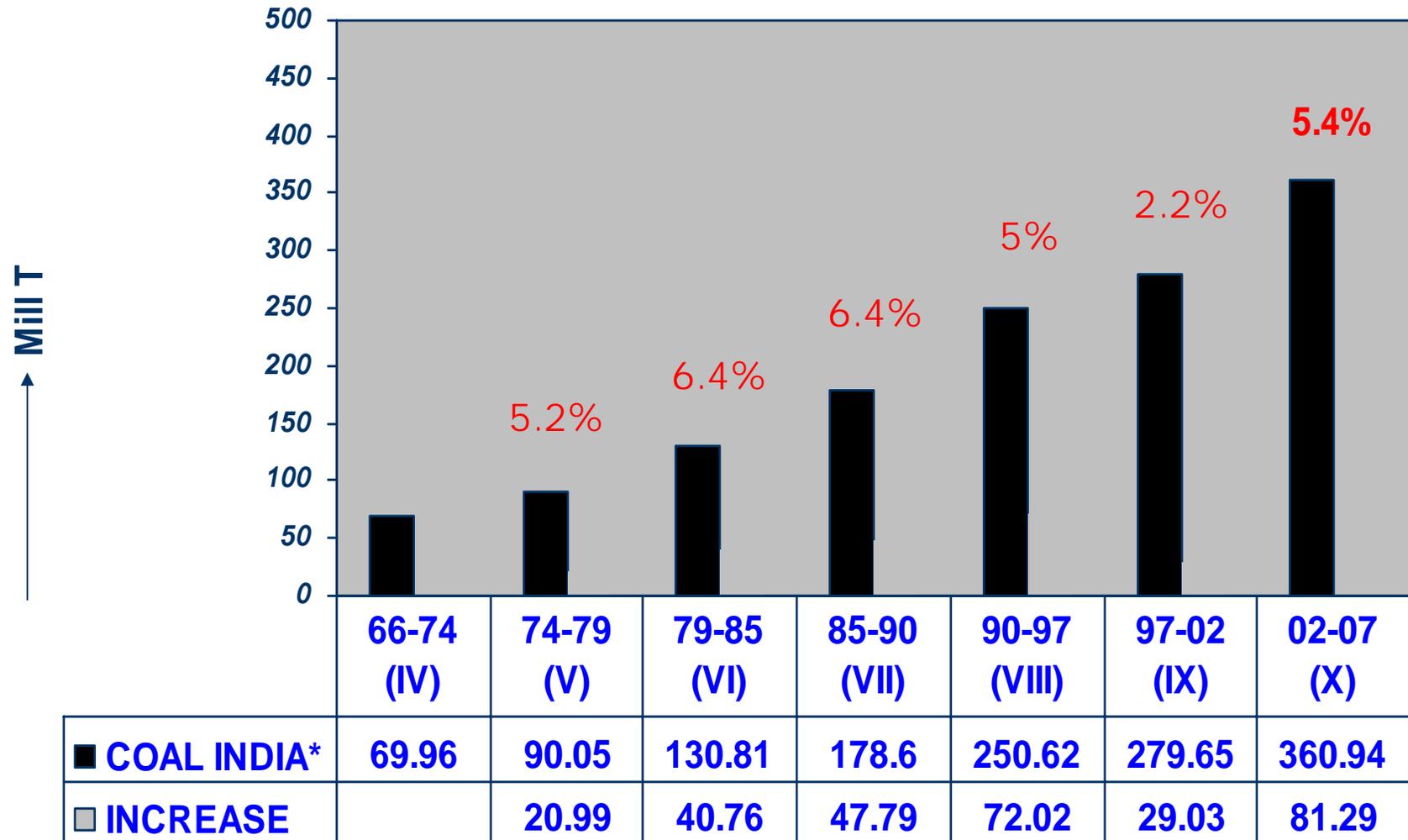
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- The efforts eventually led to consistent up-trend in all performance parameters and established credibility of CIL.
  - Govt. approved a restructuring package in 1996
  - Budgetary support completely phased out in 1996-97 as a fallout of liberalisation.
  - The situation enabled CIL to finalise a USD 1.06 bn borrowing programme with World Bank and JBIC to finance expansion of 24 viable opencast projects. Since then, Coal India has not looked back.
  - In the last decade CIL emerged as one of the largest tax and dividend paying PSUs.

## PRODUCTION GROWTH OF INDIAN COAL INDUSTRY&COAL INDIA LTD

FIG IN Mill T.

YEARWISE PRODUCTION	ALL INDIA (MILE STONES)	COAL INDIA
1947	>30	-
1974-75	>90	79
1977-78	>100	89
1989-90	>200	179
1999-00	>300	261
2005-06	>400	343

# PLANWISE PRODUCTION AND ANNUALISED GROWTH



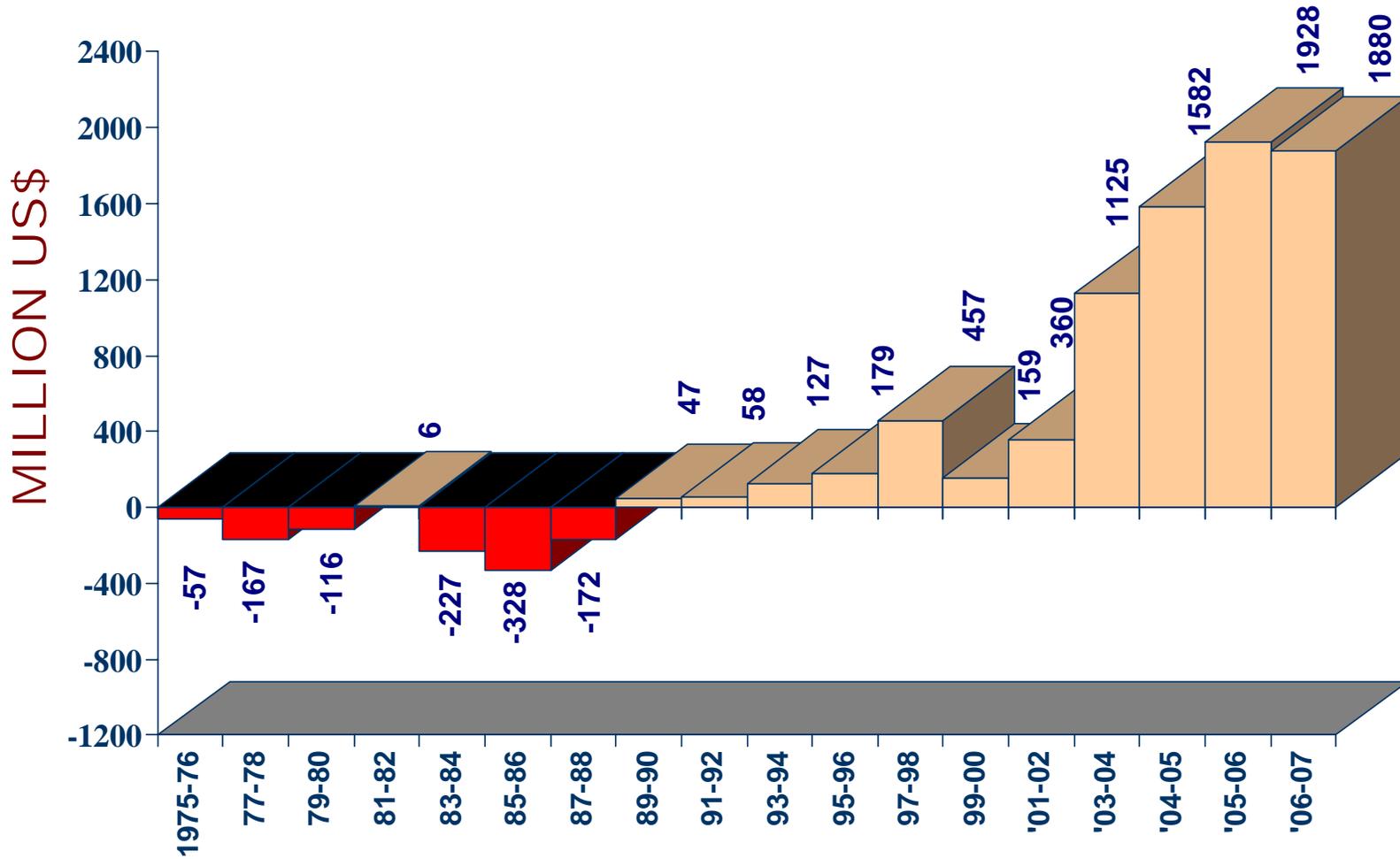
**Five Year Plan period**

**\* Production figures – For terminal year of the plan period**

## X PLAN PERFORMANCE

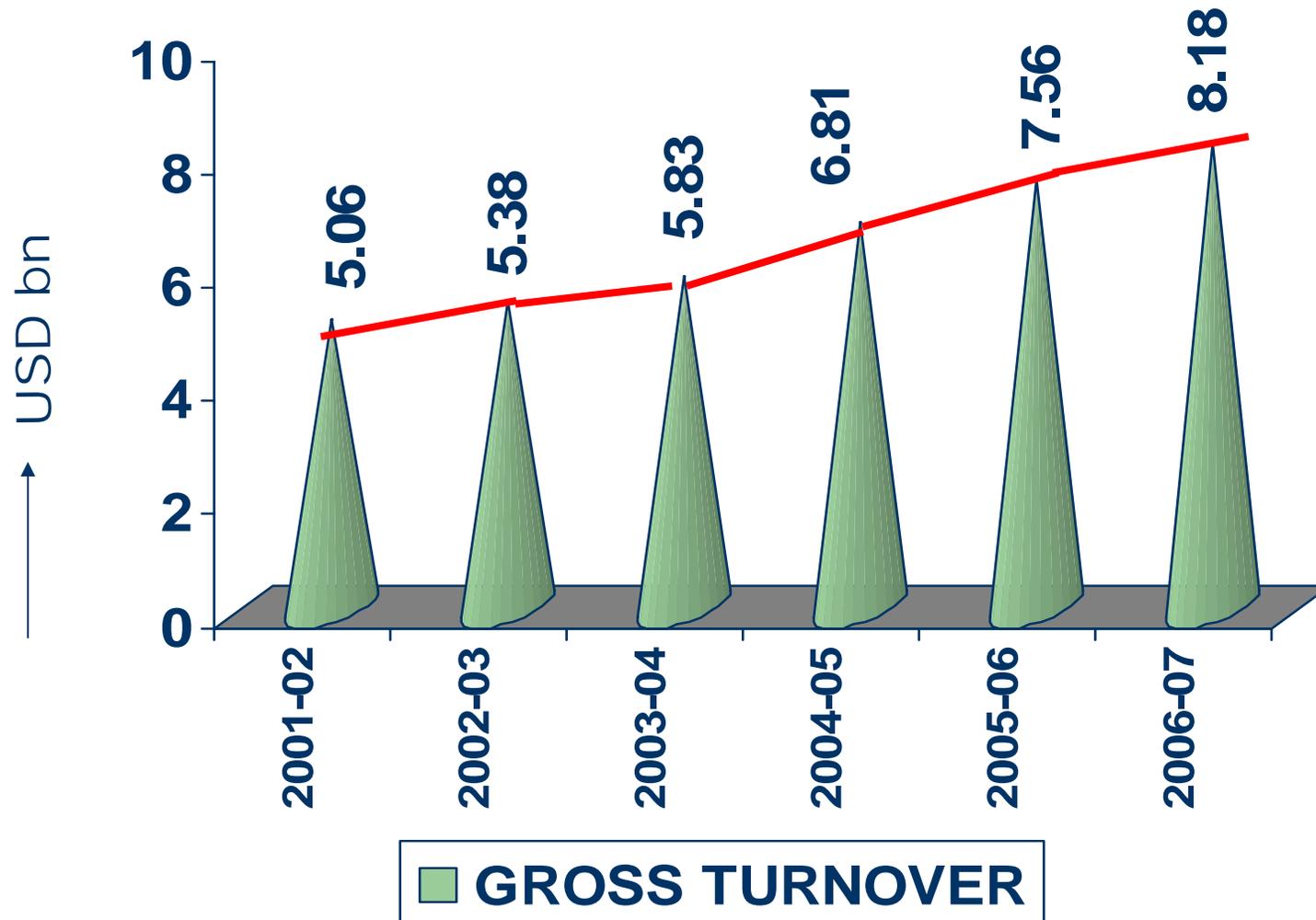
- During X Plan period the company has augmented coal production by 81 Mill T.
- Aggregate payment to the Govt. of India by way of corporate tax, dividends and tax on dividend Rs.164 bn (USD 3.66 bn)
- In 06-07 alone CIL earned pre-tax provisional & estimated profit of Rs. 82.12 bn (USD 1.88 bn)
- Paid Rs. 30.20 bn (USD 0.69 bn) as corporate tax, dividend and tax on dividend.

# YEAR WISE INCREASE IN PROFITABILITY (PROFIT BEFORE TAX)



- CIL has secured AAA the highest credit rating by CRISIL in 2005-06 reaffirmed for 06-07
- Highest credit rating LAAA↑ by ICRA.
- This is despite CIL supplying coal to its core sector consumers at a competitive price per energy unit at consumption point vis-a-vis imported coal.

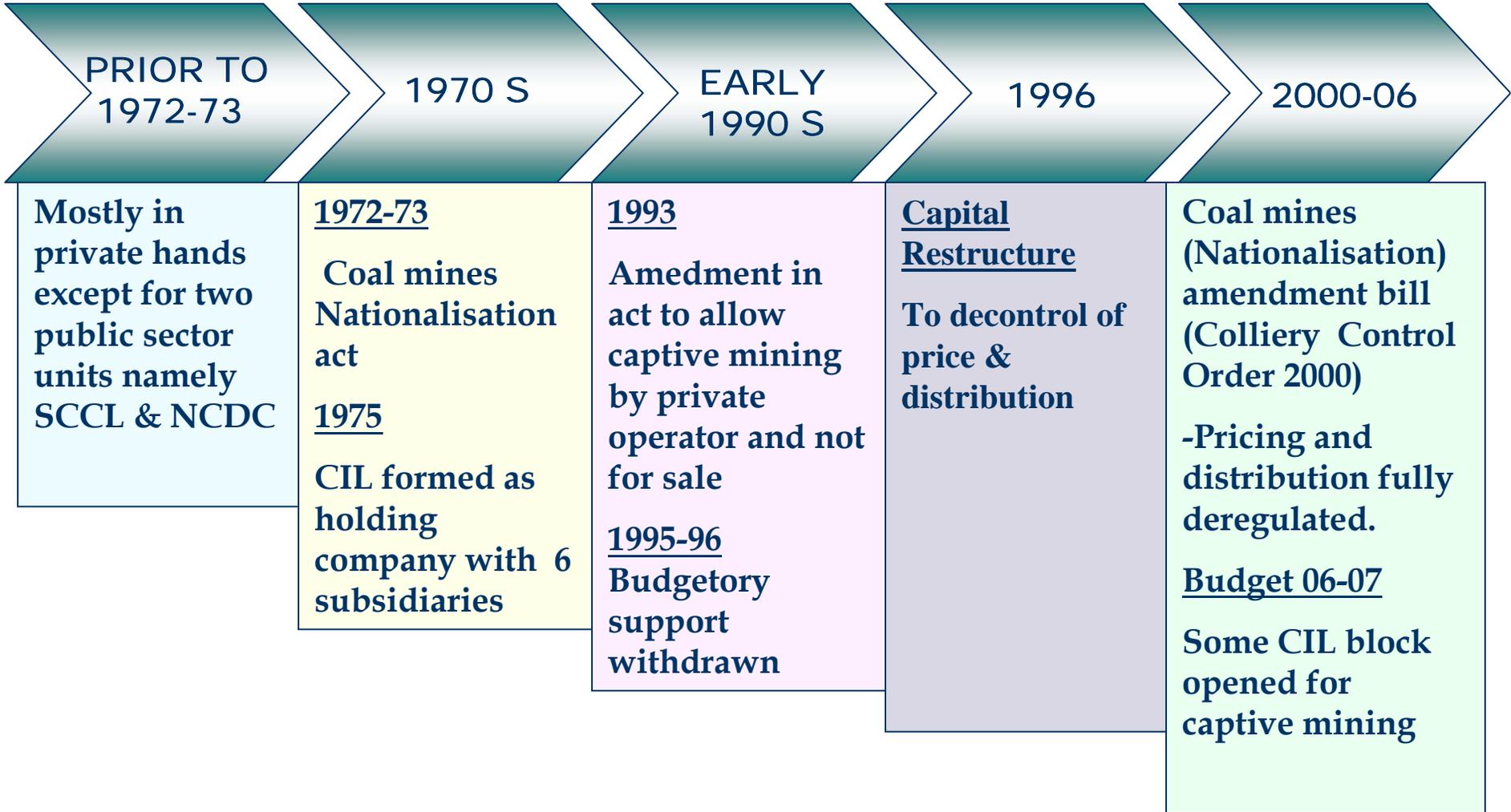
# GROSS TURN OVER FOR LAST SIX YEARS- COAL INDIA LIMITED





# Demand and production projections

# DEVELOPMENTS IN COAL INDUSTRY



## PROJECTED PRODUCTION OF COAL BY DIFFERENT AGENCIES

- **Integrated Energy Policy** envisages a coal demand of 1.5 Bill T in 2031-32 under the least coal intensive option or 2.6 Bill T otherwise.
- As projected in **Coal vision 2025** document, the demand at 8% GDP will be 1.25 Bill T by 2025.
- **Working group on coal & lignite (WG)** has detailed the demand/ production scenario upto the terminal year of XIIth plan as below:
  - In 2011-12 the projected demand is 731 Mill T that rises to 1125 Mill T in 2016-17.
  - All India production during 2011-12 and 2016-17 are 680 Mill T and 1055 Mill T , leaving a gap of 51 and 70 Mill T respectively.

## ALL INDIA COAL CONSUMPTION/DEMAND BY WG

Mill T

SECTOR	CONSUMPTION		DEMAND	
	IX PLAN (01-02)	X PLAN (06-07)	XI PLAN (11-12)	XII PLAN (16-17)
<b>POWER</b>	<b>249.23</b>	<b>312.80</b>	<b>483</b>	<b>750</b>
<b>POWER (CAPTIVE)</b>	<b>16.02</b>	<b>26.30</b>	<b>49.66</b>	<b>85</b>
<b>CEMENT</b>	<b>15.22</b>	<b>18.33</b>	<b>39.30</b>	<b>50</b>
<b>STEEL</b>	<b>29.84</b>	<b>17.60</b>	<b>68.50</b>	<b>105</b>
<b>OTHERS</b>	<b>41.6</b>	<b>45.18</b>	<b>90.64</b>	<b>135</b>
<b>TOTAL</b>	<b>351.91</b>	<b>420.21</b>	<b>731.10</b>	<b>1125</b>

## GROWTH OF MAJOR COAL CONSUMING SECTOR (AT 8% GDP)

<b>SECTOR</b>	<b>GROWTH (CAGR)</b>	<b>ASSESSED OUTPUT (2024-25)</b>
<b>POWER (UTILITY)</b>	<b>7.11%</b>	<b>2058 BU</b>
<b>POWER (CAPTIVE)</b>	<b>11.17%</b>	<b>753 BU</b>
<b>STEEL/HOT METAL</b>	<b>5.68%</b>	<b>83 Mt</b>
<b>CEMENT</b>	<b>9.18%</b>	<b>765 Mt</b>
<b>BRICK</b>	<b>6.63%</b>	<b>548 BU</b>

# COAL PRODUCTION TREND/ PROGRAMME (WG)

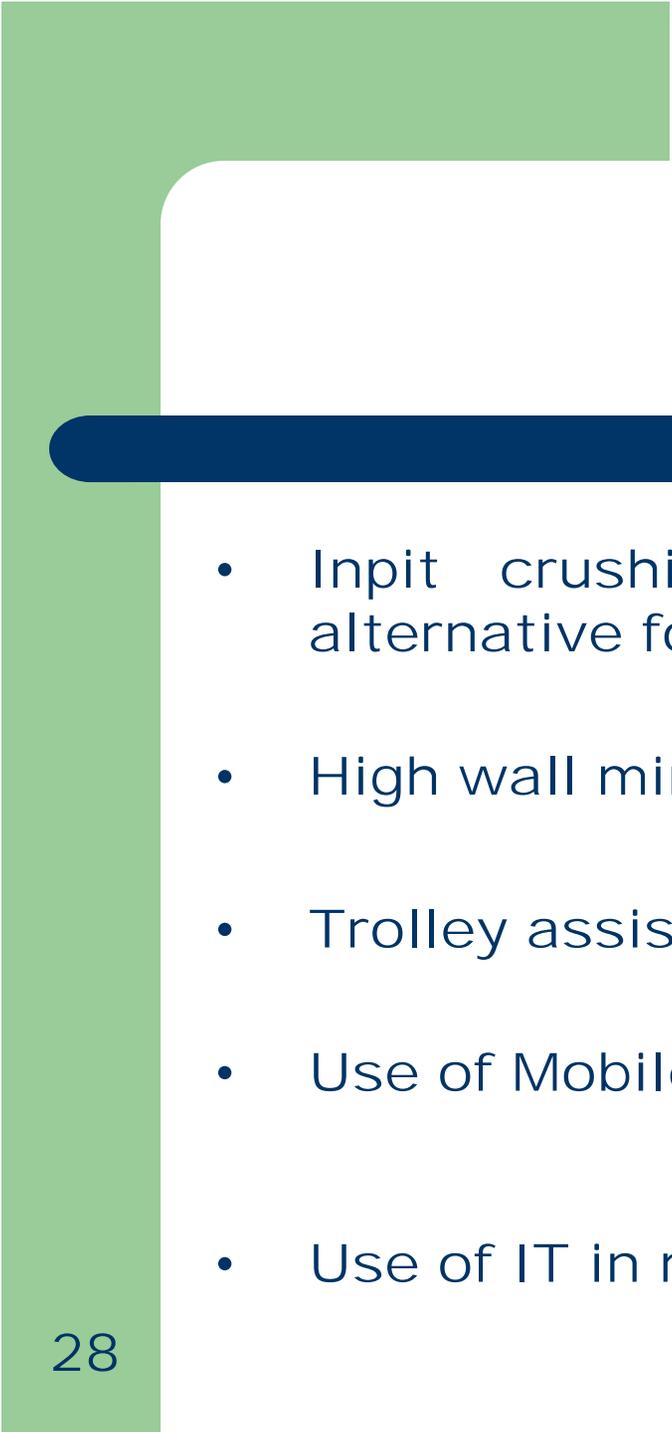
Mill Tonnes

COMPANY	ACTUAL		PROGRAMME		
	IX PLAN (01-02)	X PLAN (06-07)	XI PLAN (11-12)	XII PLAN (16-17)	
<b>CIL</b>	<b>279.65</b>	<b>360.9</b>	<b>520.50</b>	<b>664.00</b>	
<b>S.C.C.LTD</b>	<b>30.81</b>	<b>37.7</b>	<b>40.80</b>	<b>45.00</b>	
<b>OTHERS</b>	<b>17.33</b>	<b>31.9</b>	<b>119.70</b>	<b>346.00</b>	
<b>TOTAL</b>	<b>327.79</b>	<b>430.5</b>	<b>680.00</b>	<b>1055.00</b>	
<b>CAGR</b>	<b>2.53</b>	<b>5.7</b>	<b>9.47</b>	<b>9.18</b>	
<b>GROWTH IN PRODUC- TION</b>		<b>XTH OVER IXTH PLAN</b>		<b>XITH OVER XTH PLAN</b>	
		<b>ABS</b>	<b>%</b>	<b>ABS</b>	<b>%</b>
	<b>CIL</b>	<b>81.25</b>	<b>29</b>	<b>143.50</b>	<b>28</b>
	<b>ALL INDIA</b>	<b>102.71</b>	<b>31</b>	<b>375.00</b>	<b>55</b>

# THRUST AREAS

## NEW STRATEGIES FOR INCREASING COAL PRODUCTION (OPENCAST MINES)

- Production growth envisaged from 06-07 level is 148 mill.t in XI Plan (2011-12) i.e 47% and further 141 mill.t in XII Plan (2016-17)
- This Necessitates Introduction of higher size equipment to work at a larger Stripping ratio in mines with capacity not less than 10 mtpa
  - Draglines with bucket capacity of 45-55 cum.
  - Rope shovel up to 42 cum
  - Rear dumper- 240 t
  - 10 cum rope shovel & 85t/100t/120t dumper to continue as backbone
  - 10-15 cum hydraulic shovel with 850 hp dozers
  - Life cycle MARC with OEM.

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- Inpit crushing & conveying technology as an alternative for large volume handling
  - High wall mining
  - Trolley assist dump trucks for long distance haul
  - Use of Mobile crushing unit
  - Use of IT in mining operation.



## EXPECTED POPULATION OF DRAGLINE IN CIL

YEAR →	2006-07	2011-12	2016-17
55 M <sup>3</sup>			3
45 M <sup>3</sup>		2	2
30 M <sup>3</sup>	2	-	-
24 M <sup>3</sup>	15	15	12
20 M <sup>3</sup>	7	7	7
15 M <sup>3</sup>	3	2	2
4-10 M <sup>3</sup>	15	16	16
TOTAL	42	42	42
Capacity(MCum)	112	119	133



## EXPECTED POPULATION OF ELECTRIC ROPE SHOVEL IN CIL

YEAR →	2006-07	2011-12	2016-17
42 M <sup>3</sup>		10	19
20 M <sup>3</sup>	9	21	42
12.5M <sup>3</sup>	9	-	
10 M <sup>3</sup>	111	228	294
<10 M <sup>3</sup>	197	134	113
TOTAL (Rope Shovel)	326	393	468
HYDRAULIC SHOVEL	356	200	189
SHOVEL-TOTAL	682	593	657
Capacity(MCum)	686	843	1082



## EXPECTED POPULATION OF DUMPER IN CIL

YEAR	2006-07 (Existing)	2011-12	2016-17
240T	-	55	95
170T	44	125	250
120/110T	268	400	600
<110T	3001	2975	2975
TOTAL	3313	3555	3920



## EXPECTED POPULATION OF DOZER IN CIL

YEAR	2006-07 (Existing)	2011-12	2016-17
1000HP		14	29
770-850HP	8	43	61
<770HP	1023	748	777
TOTAL	1031	805	867



## EXPECTED POPULATION OF DRILL IN CIL

YEAR	2006-07 (Existing)	2011-12	2016-17
400 MM	-	14	29
311 MM	16	43	61
<311 MM	823	598	627
TOTAL	839	655	717

## TENTATIVE REQUIREMENT OF OTR TYRES UPTO 2016-17 (REPLACEMENT)

<b>TYRE SIZE EXISTING</b>	<b>06-07</b>	<b>07-08</b>	<b>08-09</b>	<b>09-10</b>	<b>10-11</b>	<b>11-12</b>	<b>TOTAL UPTO 11-12</b>	<b>16-17</b>
40.00 X 57 (240T)	0	59	71	82	94	106	412	129
36.00 X 51 (170T)	76	92	92	223	236	260	979	310
30.00 X 51 (120T)	756	688	685	874	912	964	4879	1028
24.00 X 49 (85T)	1864	1824	1823	2129	2580	2838	13058	3161
<b>TOTAL</b>	<b>2696</b>	<b>2663</b>	<b>2671</b>	<b>3308</b>	<b>3822</b>	<b>4168</b>	<b>19328</b>	<b>4628</b>



## PROCUREMENT POLICY FOR CAPITAL EQUIPMENT/ OTR TYRES OF COAL INDIA LIMITED

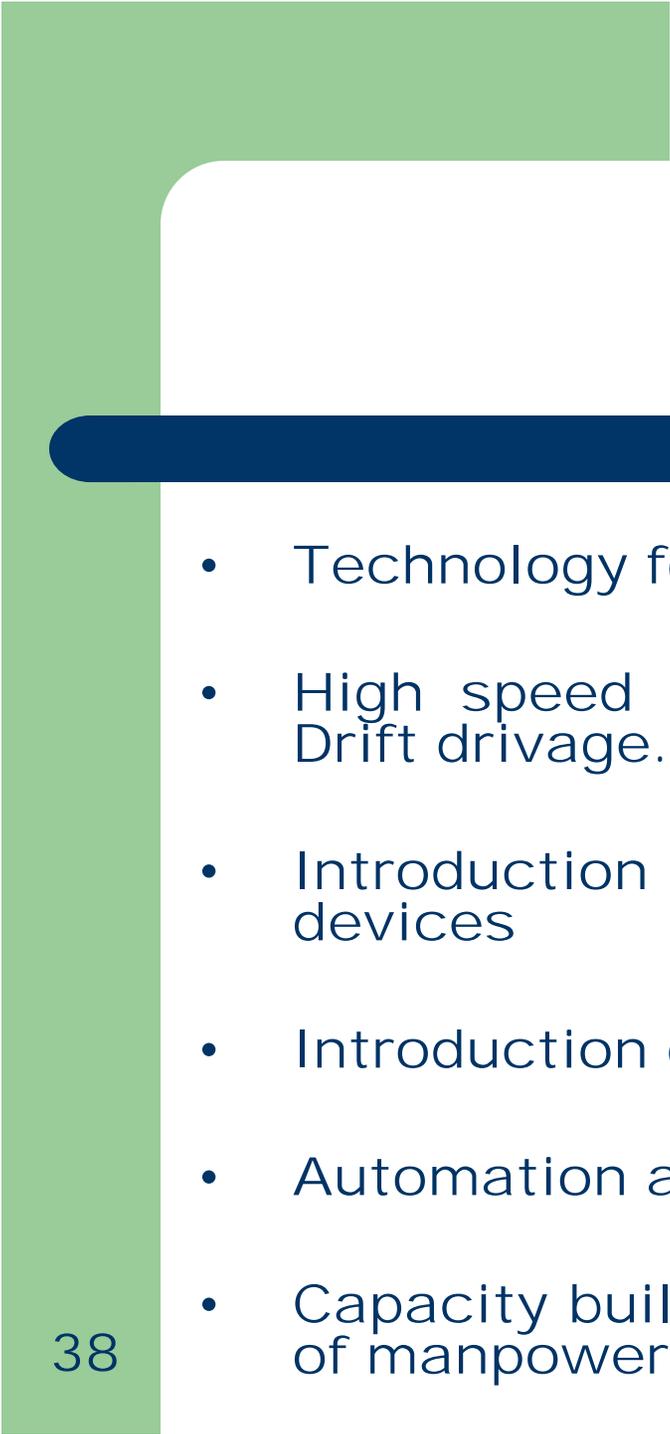
- **Global tender inviting offers in two covers**
  - I. Techno-commercial bid**
  - ii. Price bid**
- **Price bids opened for techno-commercially acceptable firms**
- **Evaluation of price offers done on landed basis**
- **Orders placed on lowest offer basis**
- **Overseas orders placed on f.O.B. Port of shipment basis**
- **Domestic orders placed on f.O.R. Destination basis**
- **Overseas suppliers paid through letter of credit**



- The supplies carry a warranty period of 12 months from date of commissioning or 18 months from date of dispatch which ever is earlier
- Bank guarantee for 10% of the value of order kept as performance coverage of the contract and released after fulfilment of all contractual obligations.
- Supply to be within agreed scheduled time & price.
- In case of non-execution of order- damages prescribed for both purchaser & seller

## STRATEGIES FOR INCREASING COAL PRODUCTION (UNDERGROUND MINES)

- Development of underground projects with Longwall/ Mass production technology on risk/gain sharing basis
- Application of Longwall/Shortwall technology in extraction of pillars
- Existing Bord & Pillar & Longwall to Continue
- Intensify mechanised Roof Bolting
- Opening large Longwall mine (2-10 Mill T) within XIth plan period .
- 100% mechanisation by 2017

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- Technology for deep Shaft Sinking
  - High speed tunneling machine for faster Incline / Drift drivage.
  - Introduction of state-of-the-art Safety Monitoring devices
  - Introduction of Man Riding systems in mines.
  - Automation and use of IT
  - Capacity building through training and redeployment of manpower.

# BENEFICIATION OF NON-COKING COAL

- Study by Planning Commission concluded that carrying beneficiated coal > 400 kms is more attractive.
- 70% Thermal coal move > 400 km but only 20% of coal is beneficiated at present
- ROM coal is usually not consistent in quality thus affecting Power Plants adversely.

# BENEFICIATION OF NON-COKING COAL

- **Dispatching washed coal shall also:**
  - **Reduce strain on Railways.**
  - **Reduce pace for investment by Railways to augment coal transportation infrastructure and thus save on interest/opportunity cost**
  - **Reduce diesel, maintenance cost per K.Cal-KM of transport**
- **Ideally CIL should supply only washed Thermal coal to all Power Stations except for those at pitheads and also generate power from rejects**
- **Formulation of roadmap for the same is being taken up.**



## COAL BENEFICIATION

- **Coking Coal**

- CIL's Washed coking coal during 2006-07 expected to be 5.45 Mill T
- Likely to reach to a level of 7.42 Mill T by 2011-12
- Additional availability of 5.14 Mill T expected from other sources.

- **Non-Coking Coal**

- At present installed capacity is 104.8 Mill T
- About 85 Mill T is in private sector
- Additional 140 Mill T/Annum required by 2011-12.

# CLEAN COAL TECHNOLOGIES

- **CBM /CMM/AMM EXPLORATION & EXPLOITATION, R&D PROJECTS.**
- **UNDERGROUND COAL GASIFICATION.**
- **COAL LIQUEFACTION.**

# CBM RELATED ACTIVITIES

- **A UNDP/GEF/GOI funded demonstration project under implementation for production & utilisation of CBM.**
  - **Drilling complete in one site. In progress at the second site.**
  - **Three more boreholes are to be drilled.**
- **CIL entered into JV with ONGC for development of CBM in 2 blocks.**
  - **1<sup>st</sup> phase drilling complete (CIL- 8, ONGC – 12 BH)**
  - **Report for pilot commercial plant prepared by ONGC**
- **A perspective plan for harnessing CMM/AMM from CIL command area.**

# UNDERGROUND COAL GASSIFICATION

- ONGC & GAIL pursuing UCG in collaboration with CIL.
- MOU signed between CIL & ONGC for a pilot project in JV mode.

# COAL LIQUEFACTION

- **4 plants currently operational in USA and South Africa for Coal Liquefaction**
- **6 mt coal can produce 3.6 million barrel of Diesel at NEC & Naptha at a cost of Rs.1532 (USD 35) to Rs.1751 (USD 40) per barrel.**
- **CIL and Oil India limited to sign an MOU for a 5000 barrels/ day.**
- **Availability of 3 Mill Tonnes coal being explored**
- **Meeting held with Govt. of Meghalaya and Arunachal Pradesh for availability of coal.**

# COAL VIDESH

- **CIL Board approved formation of a subsidiary 'Coal India Videsh Ltd' which is presently under consideration of Government.**
- **Objective is to acquire overseas reserve, produce and import Coking and high grade Non-Coking coal to India.**
- **To contribute 10 mt of coal by 2011-12 and 50 mt by 2020**
- **Destination :**
  - **Coking coal : Australia, Zimbabwe, Mozambique, Russia, Kazakhstan, Canada, Venezuela.**
  - **Thermal coal : Indonesia, South Africa**
- **Panel of Investment Bankers & consultants created for due diligence studies.**
- **Fact-finding Mission team from Coal Videsh Dept. visited target countries**



THANK YOU