

## Report (Part-II)



## The Expert Committee on Road Map for Coal Sector Reforms



Ministry of Coal  
Government of India, New Delhi  
October 2007

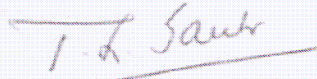


Report (Part II)

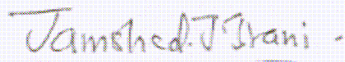
The Expert Committee on Road Map  
for Coal Sector Reforms

Ministry of Coal  
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We, the Members of the Expert Committee hereby submit the final Report Part-II on Road Map for Coal Sector Reforms.



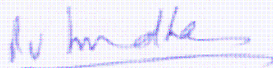
Shri T.L. Sankar, IAS (Retd)  
Chairman, Expert Committee



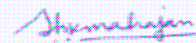
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Dr. Suraj Seth  
Additional Secretary, Ministry of Coal  
Member Secretary of the Committee.

Dear Prime Minister,

On behalf of the members of the Committee set up to suggest a road map for the reform of Coal sector, I submit herewith the final Part II of the Report of the Committee. Part I of the Report was submitted to you in December 2005.

In this report the committee has examined the medium and the long term (up to 2031-32) demand–supply situation of coal in India and has suggested measures that should be taken NOW to ensure that coal remains the primary source of commercial energy in India on economic consideration over the next 25 years. The energy policy may, however, require re-examination in light of the economic growth that we actually deliver over this period. The Committee has made recommendations towards restructuring the administrative, operational and regulatory structure of the coal sector. The Committee has explored ways in which cost of coal production could be reduced and productivity improved to global standards. The Committee has drawn attention to the emerging serious shortage of qualified manpower in the coal industry and recommendations have been made for strengthening the education base in coal mining, incentivising young professionals to opt for coal-mining and coal industry adopting a number of modern methods for recruiting, training and retaining operational and managerial professionals in the coal industry. To promote long term development of the coal industry and for ensuring sustained energy security the Report has prioritized a few of the cutting edge coal technologies like in-situ gasification, deep underground mining, coal to gas conversion, and some of the emerging clean coal technologies including those which must be done with collaboration with the power sector like carbon sequestration and storage (CSS).

I set out some of the important findings and recommendations, which deserve your urgent attention.

1. The demand forecasts for the Eleventh and Twelfth Plans for coal would call for an increase in consumption from an annualized rate of 5.2% in the past, to over 7%. While plans are afoot to maximize production within India, there would be need to import both metallurgical coal and power grade coal. The Committee finds that if current steps to increase the number of players in coal mining are successful, India's domestic production may yield a more balanced demand-supply scenario. However, the continuation of the policy of importing power grade coal for consumption in power plants at certain coastal locations in the states of Gujarat, Maharashtra, Karnataka, Kerala and Tamilnadu is considered necessary for enhancing fuel diversification and energy security. India's dependence on imports for metallurgical coal is also likely to increase.
2. Attention has been drawn to the gaps in our knowledge of coal resources in India. While the available data is adequate to rely on coal as the primary source of supply of commercial fuels for the next 25 years, we have to use this period to explore and add substantially to our "proved" reserves to provide the confidence to continue the primacy of coal in the energy policy at

least till 2031-32. Towards this end, a time bound plan to complete the regional survey of all coal-bearing areas in the country by GSI and to accelerate the pace of detailed exploration and mine planning by public and private sector agencies is necessary. A separate revolving fund of at least Rs.500 crores, recommended in Part I of this Report has been reiterated in this Report for this purpose. The exploration efforts of CMPDI and SCCL should be supplemented by bringing in the entrepreneurial skills of private sector through leasing of unexplored potential coal blocks through procedures similar to NELP in the oil and gas sector. A brief note on the procedure for this is included in the Report.

3. The achievement of the high targets calls for major changes in the procedures for the timely clearance of the coal mine project proposals by the environment, forest and mine approval agencies. The coal ministry website should update on a monthly basis the progress made in respect of each of the ongoing mining proposals, from the time of allocation of a coal block till full production is achieved.
4. The cyclical shortage and surplus in coal sector is mainly due to the lack of synchronized development of coalmines and the power generation plants to which they are linked. This problem could be resolved only if the large users of coal who are to have long term contracts are compelled to enter into a Fuel Supply and Transport (FSTA) arrangement in which the coal supply in quantity and quality terms is specified with firm supply commitments that bind all three parties. It is also necessary to implement, without further delay, the decision already taken to give up the UHV system of grading of coal and move to the international norm of pricing coal based on its Gross Calorific Value (GCV) and other relevant parameters such as ash and moisture.
5. The prospects for rapidly accelerating the rate of growth of coal production in India has become possible because of the encouragement given during the Tenth Plan for captive coal mining and de-blocking CIL blocks for allotment to captive producers. The huge interest shown by private sector to take up coal mining even on the basis of captive mining by end users like power, steel and cement plants suggests that this policy should be pursued vigorously.
6. The Committee has flagged the importance of underground coal mining and has proposed a model similar to the Ultra Mega Model of the power sector to bring in the state of the art mechanized underground mining technology for large UG mines into the country. The Committee has recommended that at least two ultra-mega underground coal projects should be initiated in the Eleventh Plan itself.
7. Regarding restructuring of CIL, the Committee felt that it may not be appropriate to initiate any major restructuring of the existing legal and administrative arrangement of CIL at this time. It is however, suggested that some adjustment in the Board level should be made by making the CMD of CIL, Chairman of the Boards of all the subsidiaries and designating Chairmen of the subsidiaries as Vice Chairman and MD. By this arrangement the CMD of CIL could be held accountable for the achievement of the targeted performance in all subsidiaries. In return, CMD of CIL would be empowered

to make all major decisions on manpower, technology, machinery and finances of the various subsidiaries. As CMPDIL would remain part of CIL, the responsibilities it now handles in respect of non-CIL mines should be separated and entrusted to the proposed Regulatory agency. Besides expanding CMPDIL's capacity to render some of the requirements of the private sector units for detailed exploration and mine planning services, another competing company on the lines of CMPDIL should soon be set up to ensure sustained improvements in efficiency of our consulting companies in the coal mine sector. The Legal structure of CIL, CMPDIL, SCCL and NLC could remain unchanged.

8. The Committee has examined in consultation with all stakeholders the issue of having a regulatory body for the over-sight of coal sector. Except those representing the major producers (CIL and SCCL), all others are in favour of a regulatory mechanism for the coal sector. Considering the large number of new and smaller entrants from the private and state level public sector units that are likely to play a significant role in coal production in the coming years, the Committee has recommended the creation of a regulatory authority which would have powers to comprehensively handle coal resource development and regulation of its extraction and use within the policies formulated by the Government. This regulation authority would deal with:
  - a) the collection, collation and unbiased dissemination of the data generated by different agencies
  - b) systematic assessment and classification of coal resources as per international standards
  - c) defining the boundaries of coal mines
  - d) regulating and monitoring certain aspects of adherence to environmental conditions imposed on the mines while approving the mine plan
  - e) assisting the government in drawing up principles and procedures for allocating coal blocks to all companies both private and public and adjudicating disputes arising in the allocation
  - f) laying down the principles of pricing coal and assisting in finalizing the price of coal under long term FSTAs if the parties to such contracts are not able to settle prices through negotiation
  - g) regulating the sale through e-auctions

In effect, the Regulator would combine the work of the coal controller and some responsibilities of CMPDI, DGMS and MOEF. This agency could be called Coal Governance and Regulation Authority (CGRA).

The suggestion is not to duplicate the agencies or increase the number of executives and operatives currently attending to these functions under the control of different departments/ministries, but to move these functionaries from their respective organizations to work under one umbrella called CGRA. The persons who are brought into CGRA would continue to be on the roles of the respective departments and would be placed with CGRA only to deal with Coal Industry issues under the overall guidance of the Authority. This arrangement could be similar to the Financial Advisors in the ministries of GOI.

9. Government should set up an advisory board in which all stakeholders who are involved in coal resource exploration, coal mine planning, coal mining, safety and environmental regulation and the user ministries like power, steel, railways and industries could be represented. It should be called the National Coal Council of India (NCCI) on the same lines as the National Coal Council in USA. It should be presided over by the Prime Minister or his representative and should have a part-time Hon. Executive Chairman who has sound knowledge of coal sector and is respected for his objectivity. This advisory Board could advise the Government on a policy framework for the sector.
10. The Committee has drawn attention to the abysmally low levels of productivity in the Indian coal sector and has suggested specific measures, and procedures to be introduced to ensure that heavy earth moving equipment with state of art IT technologies such as global positioning systems (GPS) are introduced in PSU coal mines. In most cases such equipment could be obtained along with a Maintenance and Repair Contract (MARC).
11. With a view to plan for the long time sustained development of coal for different new users, the Committee has prioritized the following cutting edge technologies for special attention:
  - a. In situ gasification
  - b. Coal bed methanation
  - c. Coal to gas technologies
  - d. Clean coal technologies especially carbon sequestration and storage (CSS) which would require the collaboration with the power sector agencies.

For administering an intensive R & D programme in Coal, a high level Empowered Committee of concerned Secretaries to GoI and eminent scientists in the coal sector should be set up with a fund of Rs.1000 crores to be spent as per their directives. The Empowered Committee would not need any approval or prior clearance for sanctioning R & D projects. This Empowered Committee should prioritize the research projects and attempt to enlist all relevant individuals and institutions in these activities. The best way appears to be to call for National Competitive Bidding (NCB) for these projects setting out clearly the outputs expected and the datelines. If the NCB does not bring in the appropriate response, the projects should be let out on International Competitive Bidding (ICB).

Sir, the Committee of experts have strived hard to formulate their recommendations keeping in view the broad socio economic policies of the government and the implementation problems which any reform efforts encounters. The Committee regrets the delay in submission of the report, which was essential due to our awaiting the conclusions of the Integrated Energy Policy Committee and the Working Group on Coal for the 11<sup>th</sup> Five Year Plan. We feel the recommendations are practical and if implemented could lead to accelerated development of our coal resources which in turn could significantly contribute to the energy security of the country.

The members without any staff assistance and without employing consultants prepared the report. The members, who are busy with their own work, gave me unstinted cooperation for which I am greatly indebted to them. The officials of the Ministries of Coal and Planning rendered valuable help and assistance. I would like to place on record the invaluable contributions made to this report by Shri Surya Sethi, Principal Advisor Energy Planning Commission, Shri S.K. Mahajan former Joint Advisor Planning Commission and Shri P.R. Mandal Advisor Projects, Ministry of Coal.

I take this opportunity to thank you and your Government for having given me an opportunity to re-visit the issues of coal Industry which I had the opportunity to study initially, decades back, during my association with Professor Sukhomoy Chakravarti and Shri Mohan Kumaramangalam.

With regards

A handwritten signature in black ink, reading "T.L. Sankar", with a horizontal line underneath the name.

**T.L. SANKAR**



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# CONCLUSIONS AND RECOMMENDATIONS – PART II REPORT

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## CHAPTER-I

In Chapter I, the Committee has examined the targets of coal production for XI Plan, XII Plan and for the long-term upto 2031-32. The Committee has also evaluated the feasibility of achieving the targets and the environmental impact of such a large accelerated increase in the consumption of coal.

1. The committee has critically examined the coal demand forecasts for XI and XII plan periods and the targets for production (to sustain 9% growth of GDP) for the short, medium and long term have been set out as follows:
  - a) For the XI Plan (2011-12) the Committee has recommended that coal production target could be kept at 680 million tonnes for meeting the demand forecast of 731 million tonnes made by WG XI Plan. The gap could be bridged by imports of coking coal of about 25 mt and non-coking coal of 25 mt. (Para s 1.2, 1.4, 1.5)
  - b) For the XII Plan (2016-17) the committee has suggested the acceptance of Working Group forecast of demand estimated at 1125 million tonnes and production of 1055 million tonnes. The committee has recommended these figures as working hypothesis which should be subjected to annual review and revision. (Para s 1.6, 1.8)
  - c) For the long term the committee has suggested the acceptance of IEP forecast of coal demand in 2031-32 as 2223 million tonnes (excluding lignite consumption estimated at 150 million tonnes) assuming sustained 9% growth in GDP from the beginning of XI Plan onwards. (Para 1.13)
2. The committee has cautioned that the achievement of production targets depends on the early and timely clearance of the project proposals by the Environment and Forests agencies and the mine approval agencies. Streamlining of the procedures for giving a decision on the application for mining of coal in a block within a specified time by the State and Central Ministries of Environment and Forests at the State and India level is absolutely necessary, if any of the production forecasts indicated in Para 1 above are to materialize. (Paras 1.5, 1.10)
3. The setting up of an appropriate mechanism in the coal ministry with co-operation of the power ministry is essential to keep a continuous monitoring of the synchronized progress of mine development, power project construction and transport facilities development. A monthly progress report should be placed in the Website of Ministry of Coal. (Para. 1.5)
4. The large users of coal whose output prices are controlled such as power generation should only be serviced, if they enter into a Fuel Supply and Transport Agreement

(FSTA). The Committee has no objection if large coal users (using more than 1 lakh tonnes of coal annually) also enter into FSTAs with coal producing companies if we are to have a rational planning procedure for coal sector and power sector. It is desirable that the quantity of coal required at each power generation plant is calculated with reference to the energy planned to be produced and not with reference to the plant capacity. (Para 1.7)

5. The achievement of long-term targets would involve careful planning implementation and reviews at regular intervals. Identification of adequate commercially exploitable coal deposits to support this level of production and building up the infrastructure for mining and transporting such large quantities have to be meticulously pursued. The Committee is of the view, that the increase in the rate of growth required does not appear very daunting, but the projected production targets can be achieved only by taking up well-planned exploration, mine development and mining efforts without any delays. The planning cycle for coal production and power generation in each Five-year plan should be initiated one Five Year Plan ahead of each Plan period.

(Para 1.13)

6. An objective and critical examination of the current status of knowledge of coal resources in India has led the Committee to conclude that data on India's inventory of coal reserves as also the estimates of extractable reserves could benefit immensely by an independent assessment. However, the available data confirms the earlier premise that coal shall remain India's primary source of commercial energy supply. For the next fifteen years, the "proven" coal reserves are adequate to rely on coal based power generation. In order to derive the level of confidence needed for continuing the policy beyond fifteen years, the Committee has recommended that a time-bound plan to cover the entire country by regional mapping in 15 years should be prepared by GSI, CMPDI and MoC. Funding for this should commence from the 2007-08 budget itself. The MoC must launch a program of detailed exploration and drilling, in the 11th Plan, aimed at increasing proved category reserves by ten billion tonnes each year. The Committee reiterated the recommendation made in Part-I of their Report for the creation of a Revolving Fund of Rs. 500 crores for this purpose.

(Paras 1.18, 1.20)

7. Moreover, efforts need to be made to reduce the drilling requirements by using modern tools of exploration such as airborne and surface geophysical methods appropriate for coal exploration in an area and applying principles of the new science of geostatistics. Exploration can be speeded up by drilling significant proportion of boreholes required to be drilled through non-coring drilling supplemented by borehole



geophysics. It is further learnt that samples from all borehole intersections are often not analysed for testing the quality of coal seams even in terms of proximate analysis and GCV is often not determined experimentally because of coal quality testing capacity constraints. As such some GRs may have to be finalized without the receipt of some quality data from the laboratories. Therefore, not only the exploration capacity in the country needs to be enhanced, the whole system of coal exploration established in the country needs to be overhauled with significant augmentation of coal testing facilities. (Para 1.20)

8. The Committee noted that out of total potential coal bearing area in the country now estimated at 17300 sq km (earlier estimated in X Plan at 22400 sq km), that needs to be explored through regional/promotional exploratory drilling, nearly 12000 sq km has already been regionally explored leaving a balance area of only 5300 sq km still to be explored and the basement has been hit at a depth of about 300 meters in 65% of the coalfields identified till now. There is thus very limited scope for additional coal resource accretion only in the balance 5300 sq km area yet to be explored regionally. It is learnt that the prospective coal bearing area of 17300 sq km area is the area having "viable" coal resources within 900 meter depth although GSI prepares coal inventory upto a depth of 1200 meters. According to GSI there are several coalfields such as Talchir, Ib Valley, South Karanpura etc. where coal bearing Karharbari, Barakar and Raniganj formations occur at depths exceeding 1200 meters under cover of younger sediments. United States Geological Survey and similar agencies of many European countries assess their coal and lignite resources upto a depth of 1800 meters or more. It is, therefore, time that coal and lignite resource assessment in India is also extended to a depth of at least 1800 meters considering the likelihood that such deep seated coal and lignite resources could be harnessed for CBM recovery and deployment of UCG technology when it is firmly established. This would considerably expand the potential area to be explored not only in the Gondwana sedimentary basins but also in Tertiary coal and lignite basins in Assam and other NE states, Tamil Nadu, Gujarat and Rajasthan to maximise the coal resource base of the country. (Para 1.21)

9. CMPDI is reportedly facing severe shortage of skilled professionals (surveyors, geologists, geophysicists, drilling and mining engineers) and this situation is likely to become more acute since a large number of such experienced professionals in CMPDI would be superannuating within the next 5-6 years. The committee would therefore recommend that steps should be initiated immediately for recruitment of required number of professionals to handle the envisaged workload so that newly

recruited professionals could have the opportunity of working with the experienced professionals for some time before their superannuation. Even the coal Wing of GSI is facing shortage of geologists, geophysicists and drilling personnel in a similar manner.

(Para 1.23)

10. Taking note of the enthusiasm for coal mining among the major coal users, their efforts should be enlisted even for exploration for coal resources. There is need therefore to introduce exploration -cum-mining leases in coal industry on the lines of NELP (New Exploration Licensing Policy) in the Oil Sector. (A note elaborating this suggestion is given in this Report as Enclosure I to Chapter I. (Para 1.25)

11. On the basis of the discussions and the documents studied, the committee assessed the demand for lignite in India as per assessment based on data available in IEP Report and consistent with 9% growth in GDP would be:

2011 –12	45.2 Million tonnes
2016-17	59.4 Million tonnes
2031-32	150.0 Million tonnes

The forecast of lignite demand for the XI and XII Plans made in XI Plan WG is much higher at 55.6 MT and 88.2 MT respectively. Known lignite resources in the three states of Gujarat, Rajasthan & Tamil Nadu are adequate to meet the projected demand. As per XI Plan WG there should be no difficulty in meeting the higher demand projected in the Working Group Report. (Paras 1.31, 1.32, 1.34, 1.35)

12. Unlike inventory of coal resources which includes resources upto a depth of 1200 meters the inventory of lignite resources include resources limited to a depth marginally exceeding 300 meters against international practice of assessing lignite resources upto a depth of 1800 meters or more. Again, unlike coal resource assessment, no information is available about total surveyed area having lignite bearing Tertiary sedimentary formations all over the country and the potential lignite bearing area corresponding to 300 m or more depth of lignite seams and the area which has been explored regionally or through detailed exploration or about the number of blocks delineated on the basis of regional exploration. Information is also not available on the seam thicknesswise distribution of categorywise geological reserves or about total and balance extractable reserves of lignite available in the country. Life of lignite resources is difficult to assess in the absence of requisite knowledge about balance extractable/recoverable reserves as on date.

(Para 1.36, 1.38)

13. India is in a position to play a crucial role in the world coal market of the future. In terms of coal consumption, China is number one with over 2 billion tonnes and US is number two with 1300 million tonnes, India is the third largest consumer with only 460 million tonnes which is way behind US. Given the very meager resources of Hydrocarbons, India and China would continue to consume more of coal and the entire country should be made aware of the importance of coal so that the appropriate policies at the national and state level could be taken in various matters which support the sustained production of coal. Coal should be given due recognition in all the discussions on energy security in our country. (Para 1.40, 1.41)
14. India is not the only country which has substantial quantities of relatively poor quality coal resources. Low quality coal is produced in 28 countries of the world. In the US coals having ash content greater than 33% are not included in the coal resource assessment unless these can be easily washed to produce saleable coal. Indian Gondwana coals are of much better quality compared to that of South America (Brazilian coals generally have high ash and high sulphur) and these low grade coals are being used for generating power. (Para 1.43)
15. The concerns raised by environmentalists on the need to avoid using larger quantities of coal in view of climate change and carbon emission implications have been carefully examined. These issues are not related to coal use alone. They are matters, which are discussed in several international forums and are settled in agreements between countries on the basis of the Kyoto protocol and India is not among the countries, which need to arrest the level of carbon emission to a specified rate. The total carbon emissions per year and the per capita, CO<sub>2</sub> emissions of the three large users of coal are listed below:

**Table: Carbon Dioxide Emission in USA, China, India**

Name of the Country	Total Emission in Million Tones/ Year			Per Capita Emission in Tones/Year		
	1990	2002	2005	1990	2002	2005
China	2241	3376	5323	1.95	2.63	4.07
United States of America	5001	5763	5957	20.00	20.03	20.14
India	575	1015	1163	0.69	0.98	1.07

The widely accepted data set out in the Table reveals that, India's contribution in terms of total CO<sub>2</sub> emission and per capita emission would be far below the current level in US and in China. However, India should assume their role of a responsible user of coal taking every effort to reduce the emission level or to eliminate it by developing and adopting clean coal technologies at the stage of production of coal as well as its consumption. (Para 1.45)

## CHAPTER-II

In Chapter II, the Committee has enquired into the causes for long delays in the approval of Coal mine plans and issue of the environmental and forest clearances. It has made some recommendations to avoid such delays, as the Committee considers it very essential to speed up the approval process, if the coal production targets are to be realized.

The rules and procedures for taking up Coal mining now in force require:

- a. Administrative approvals from the Boards of Management of the subsidiaries/CIL and the Government;
- b. Clearance from environment angle which involves approval of the Environmental Impact Analysis (EIA) and the Environment Management Plan (EMP); and
- c. The Forestry Clearance, if any forest area needs to be acquired to set up the proposed mine. (Para 2.2)

The Committee has examined current procedures in respect of these three clearances and has made the following recommendations:

1. For approval of new mines or expansion of old mines, the limits of authority must be enhanced to Rs.500 crores for all subsidiaries of CIL, SCCL and NLC. CIL must be authorized to approve projects upto Rs.1000 crores. This could be appropriately changed when these companies get their Navaratna status, which has been recommended by the Committee. (Para 2.3)
2. As there is very little budgetary support to the PSUs in the coal sector, they should be given full flexibility in selecting specific mines and planning the relative priority and allocation of funds for expenditure. CIL and SCCL should be held fully accountable to fulfill the total targets in general and meeting the loading point wise targets in respect of the long term FSTAs they had entered into with the large consumers. Information regarding mines and production plans of the companies should be posted on Ministry's web site. (Para 2.4)
3. CIL subsidiaries and SCCL should be authorized to produce as much as possible, even more than targets set for them, subject to environmental and commercial considerations. To help such efforts Environmental Clearance and other approvals should be obtained for 20% over and above the normal production capacity of each mine. They should be allowed to offer to the consumers the extra production through



e-auction or any alternative methods of placing coal in a transparent market.

(Para 2.4)

4. The project planning procedure should invariably explore the total potential for mining in the specific area not only in horizontal but in vertical terms also, the availability of coal resources at different depths in the same mine should be carefully explained and justification given as to how the proposed mining methods would not lead to any abandonment/sterilization of resources but would lead to the exploitation of the total resources optimally in a phased manner. The mine plans and proposals for large mines of 5 million tonnes and above should also be examined and evaluated by a group of experts constituted specifically for each mine proposal but with the direction that the report be completed within four months. The cost estimates should be made on the basis of comparison with the current cost of equipment in the international market. (Para 2.5)

5. Several major problems which caused delay in environmental clearance have been addressed in the new EIA 2006 with the prescription of alternate route to the conduct of public hearing (PH) like constitution of alternative Committee in the event of delay as well as assigning time schedule and deemed clause of acceptance of proponent's submission if the time schedule assigned are not met with by the concerned SPCB. The Committee commends the new procedure and would urge that the time schedules prescribed should be strictly adhered to by the Central and State Government agencies. (Paras 2.7, 2.9)

6. Central Government should issue specific national R&R policy for coal mining and State Governments should issue strict instructions that the Public Hearing (PH) should focus on relevant environmental related issues and the entire proceedings video-graphed and preserved for future reference. (Para 2.10)

7. The procedures of mining in forest areas are governed by the Forest (Conservation) Act 1980 and the Forest (Conservation) Rules 2003. The Committee appreciates the need for preserving our forest wealth and ensuring that the forest resources are not denuded by developmental efforts in coal or any other sector. The attempts to ensure compensatory afforestation and collection of Net Present Value (NPV) of the forest yields are steps in the right direction but the rational utilization of funding should be monitored by the Coal Regulator or any other designated agency. (Para 2.13)

8. Issues related to Forest (Conservation) Act 1980 on various accounts are pending with the Supreme Court. It would be worthwhile to revisit the Forest (Conservation)

Act 1980 and preferably re-engineer it taking on board stakeholders' views and the impact that the Scheduled Tribes (Regulation of Forest Rights) Bill would have on the process of diversion of forestland for non-forest purposes. (Para 2.14)

9. The Committee feels that all the government agencies in charge of forests should look upon forest as a national resource like any other resource and could be used for other purposes provided the use is regulated in such a manner that it ultimately leads to the long term preservation of forest wealth and enlarged energy security. Towards this end the following measures should be taken:

- The forest area should be totally surveyed and digitized forest maps should be created for the whole country at the earliest possible time. Priority for such mapping and digitalization should be given to areas with mineral wealth like Bihar, Orissa, Chattisgarh, MP, Jharkhand, and Andhra Pradesh.
- The forest may be classified into three categories:

**Category A: Totally prohibited areas** – These will be genuinely selected after due process and public notice of areas where there is valuable bio-diversity or having flora or fauna of great value which have to be protected. In the assessment of coal resources of the country the resources found in such Category A forests may be removed and shown in a separate footnote.

**Category B: Forest Areas** which are **having reasonable forest growth** and needs to be preserved but which could be released for non-forest uses, if legitimate users could establish that the economic value added by such use, would exceed the value received by retaining it as forest land; the release of the land would be subject to the creation of a compensatory forest area and payment of the prescribed compensation.

**Category C: Forest areas where the forests have been depleted** and are available for allocation for non-forest purposes on payment of compensation and can be allocated towards compensatory forest to be created by users who are given approval for conversion of forest land to non forest users.

(Para 2.17)

10. The Committee recommends the acceptance of the above suggestions and placing the information regarding such classifications in the public domain and should be used by those individuals or agencies who seek permission for forest clearance. Needless to say, in the case of an application for Category A, it will be returned with a rejection note explaining the cause. Applications in respect of category B lands, should take some time to assess the value of the tree growth and fix the compensation, etc. Applications in respect of Category C lands should be given automatic approval on payment of the necessary fees and compensation amount

(Para 2.18)

11. The following issues/problems are encountered by project proponents specifically related to forestry clearance:

- a) Coal Production exceeding approved capacity/Level of production
- b) Permission for conducting coal exploration in forest areas
- c) Mine closure and restoration of mined-out areas
- d) Compensation for forest land used for coal mining
- e) Rationalization of levies.

12. The issue of excess production should be overcome in one way by Coal companies while taking and seeking such permissions, ask for a production limit of say 20-25% above the planned capacity. Alternately, temporary work permits may be freely issued for capacity to exceed upto 20-25% above the original sanctions in some years, if the MoC recommends such proposals. (Para 2.23)

12. The exploration for coal by public agencies could be done by taking up drilling and even now it does not attract the full provisions of the Forest Conservation Act, if drilling is done for 10 boreholes of maximum 4-inch diameter per 100 sq. kilometers. Coal companies point out that such drilling will be inadequate to validate the data. The committee recommends that this provision may be modified to drilling of 50 boreholes per 100 sq. kilometer area with maximum of 6 inch diameter in order to carry out coal exploration in forest areas in any meaningful and scientific manner. (Para 2.24)

13. To ensure proper mine closure and restoration of mined out areas.

- a. Each mining lease should include a good description of the land used, whether there are large grown up trees, shrubs or no-vegetation. The conditions to which the lessee should restore the mines should be spelt out in detail.
- b. The methods of calculating the net present value of income foregone should be rational and based on actual figures of income.

In all mining cases including underground mining, there is some degree of restoration, which goes hand in hand with coalmine production. The Coal Regulatory Authority should be given the responsibility to monitor the restoration work going along side with the mine development. The Regulatory agency should also certify that the mine has been fully worked out by taking out all possible coal resources from the area and should be treated as completed. The restoration must be done by the lessee and only if it is approved the lessee will be permitted to hand over the land and close the mine.

(Para 2.26)

14. A fee of Rs.10 per tonne of coal mined as Mine-restoration levy and this should be collected annually and remitted into a fund managed by the Regulator. The Regulator would release as grants or soft loans, funds which are requested by the state

government or forest department to improve the conditions of the completed mines in order to bring the area to fruitful uses such as agricultural or horticultural use or as real estate uses or for recreational uses including creating water-bodies. (Para 2.27)

15. As per the present rules, in respect of any forest land to be released for coal mining two monetary compensations are to be paid by the proponent: NPV and compensatory afforestation cost. Net Present value (NPV) for forestlands is paid for the governments – State and Centre which owns the forestlands from which they derive a certain income should be compensated for the loss of their revenue. It should vary with the extent of income that is actually received by the State and Central Government. The NPV has been fixed under the directions of the Court at values ranging from Rs.5.8 to Rs.9.20 lacs per hectare, depending on the crop density of forests. There is no third party assessment of the loss. There is a clear case for a review. In addition to NPV, there is a Compensatory Afforestation levy which is prescribed at Rs.1, 25, 000/- per hectare with 25% solatium in the case of irrigated forestry land. In the case of non-irrigated forestry land, the compensatory afforestation has been fixed at Rs.25,000/- per hectare plus 25% solatium. Such ad hoc levies only add to the cost of coal without significantly achieving the objectives of such levies.

(Paras 2.29, 2.33)

16. Main levies which are directly related for purposes of coal mining should be limited to:

- a. Payment of discounted cash flow of the income foregone from the land taken away either from the private landholder or state government or the forest department. This amount will go to the respective agencies, which lost income stream.
- b. A quit rent or land rent for the use of the surface rights of the total area leased out for the mining purpose. This fund will also go to the agency to which the ownership belongs which is the State government in the case of acquired land or revenue land and forest department in case of forestlands. This will be a stream of annual payment.
- c. A levy of Rs.10 per tonne of coal mined, which should be collected and remitted into the fund administered by the Regulator. This fund would be kept in reserve and along with the accumulated interest used for giving back to the State government or forest department on a case by case basis for the restoration of the mined out land area to more useful public purposes. (Para 2.32)

17. It is noteworthy that there is no specific levy for restoring the mined area to useable levels after the mine is “closed”. The Committee has recommended that all these levies should be reviewed quickly and reduced to three levies:



- i. Levy to recover the annual revenue income lost by diversion of the mining area from its present use to mining. This could be on the basis of categorizing the land into high income, middle income and low-income categories.
  - ii. An afforestation levy of say Rs.25,000 per hectare for non-irrigated shrub forests and say Rs.1, 00,000 for richer forests.
  - iii. A mine-area restoration fund levy of, say, Rs.10 on each tonne of coal mined by open cast mining irrespective of the area from which it is mined.
18. The present system of mining companies applying for opening new mines having to show equivalent land for compensatory afforestation leads to a lot of delay. Since the coal mining agencies are aware of their likely requirements in the next five years and even in the period thereafter, they can be encouraged to take up afforestation in advance and given “green credits” for specific acres of new forest created. These could be used in lieu of compensatory of afforestation when new applications are made. The State Governments and the forest departments can notify areas where the creation of forests and maintaining the trees for a period of five years would entitle the parties for “green credits”. In fact a market may be created for “green credits” which will bring in institutions knowledgeable in afforestation to take this up as a useful venture. (Para 2.34)
19. The Committee has strongly urged that all measures should be taken to simplify and accelerate the procedures of giving all clearances for opening up of coalmines.

### **CHAPTER-III**

In Chapter III, the Committee addressed the following two items included in its terms of reference:

- a) How to convert CMPDIL into a centre of excellence for Planning and Research in coal sector
- b) Restructuring of CIL to make it a World-class company.

The Committee after a detailed analysis of the various issues involved and holding wide consultations with all stakeholders has made the following recommendations:

1. The Committee examined if the present size of operations of CIL was inhibiting its becoming a World class company. The Committee concluded that if CIL is treated as one company with all its subsidiaries; it has an effective size adequate to be a world-class company. (Para 3.5)

2. This Expert Committee examined de novo the issue of CIL structure as a holding company with several subsidiaries and whether it should be restructured. The Committee took note of the various earlier Reports on the issue and had wide consultation with the management and workers of all Coal entities including CIL, CMPDIL, operating subsidiary companies of CIL, SCCL and NLC. Taking all the suggestions and fears and threats as perceived by the Coal Industry executives and workers, the Committee felt that while entrusting a very onerous responsibility to increase Coal India's coal production from the current level of about 360 million tonnes to nearly 670 million tonnes in the next ten years, it would not be appropriate to make major changes in the structure of CIL. The Committee therefore recommended that the issue of major restructuring of CIL should be considered during the 12th Plan Period. However, the Committee felt that the current structure of CIL and the role and responsibility given to the CIL as the Corporate Company and the subsidiaries would require some changes at the corporate level only.

(Paras 3.9, 3.10 and 3.11)

3. The Committee recommended that Chairman CIL should be made Chairman of all subsidiary companies. As he may not be able to attend all the meetings, he should have the facility and power to send an alternative to the Boards of the subsidiaries or for each of the companies there could be a chairman and another representative of CIL on its Board. The current CMD of the subsidiaries can be re-designated, as Vice Chairman and Managing Director (VC and MD). The Chairman, CIL should be given the authority to transfer functional directors of the subsidiaries from one company to the other. CIL should be given the authority to encourage and approve the subsidiary companies taking up coal mining activities in the geographical command area of the other subsidiaries.

(Para 3.13)

4. The cadre of executives from level M1 i.e., executive engineers should be maintained centrally to avoid promotional discrepancy at the subsidiary level. This becomes necessary as CIL might have to take up coal mining activity in different regions on the basis of readily available resources and the growth rates of the companies would tend to be different over time. The entire training function above the level of executive engineers and the recruitment and training of all executive level posts would be done by CIL's Corporate Office.

(Paras 3.15, 3.16)

5. On considering all the views of stakeholders, the Committee felt that the knowledge and database, which is available within CMPDI, should be made available nationally by making it an independent company, which is outside the control of CIL. The Committee felt that conferring total autonomy to CMPDIL would also enable it to retain

its expert staff and augmenting their available talents by offering them better emoluments in keeping with compensation levels in consultancy companies of similar nature. With its very large size and diversified activities, it should enter into collaboration with Mine Planning and Development companies abroad which have long experience in mechanized underground and open cast mining. This view was unanimously opposed by all the employees of CMPDIL. (Paras 3.20 and 3.21)

6. The Committee in deference to the views expressed by a majority of executives and employees of CIL and CMPDIL and not to impair in any way the efforts for accelerating coal production already initiated by CIL has recommended that CMPDIL structure and the interface with CIL may be retained as it is today. In view of this recommendation, there is need to make some changes in the functions of CMPDI by separating all functions of CMPDI in advising Govt in respect of approval of mine plans of companies other than CIL. This is to avoid any conflict of interest.

(Para 3.22)

7. A serious crisis is looming for CMPDIL in the immediate future which could jeopardize its becoming a centre of excellence (unless remedial measures are immediately not initiated) due to shortage of qualified, trained and experienced professionals (surveyors, geologists, geophysicists, remote sensing experts, drilling personnel or mine planners) because recruitment of such qualified professionals has not taken place for the last more than 10 years. The crisis is likely to deepen further with the likely exodus of qualified and experienced professionals from CMPDIL to private and public sector captive coal producing organizations. Further, some experienced professionals may have to be posted with the proposed CGRA when it is set up. The Committee would, therefore, recommend that action may be immediately initiated for large scale recruitment of such qualified professionals so that these newly recruited professionals could be adequately trained by experienced professionals before they retire in the next few years.

(Para 3.23)

8. There is urgent need to have other organizations with adequate capability especially in the planning and executing underground mines. Mine Planning Division of Singareni Collieries Company Ltd is one such organization which could be strengthened to perform such a role either with its own funds or with additional support from Ministry of Coal. An amount of Rs.500 crores has been indicated as the fund requirements for this purpose during the Eleventh Plan period.

(Para 3.24)

9. All the organizations engaged in Coal mine planning and development should be provided level playing field to encourage healthy competition among them. All the data collected relating to coal and kept in the CMPDIL till now should be retained by them only to the extent necessary for the work of CIL. All other data should be kept in the public domain preferably in the resources management and statistics divisions of the proposed Coal Governance and Regulation Authority (CGRA). (Para 3.25)
  
10. The Committee recommends that the current structure and arrangement may be continued in respect of SCCL. The Committee would suggest that CIL and SCCL arrange for greater co-operation and coordination in respect of recruitment, training, mine planning and heavy machinery acquisition. (Paras 3.26, 3.27)
  
11. The Committee recommends that in respect of NLC also the current structure of the company may be continued without change. (Para 3.28)
  
12. The Committee, however, would like to point out that the limits of Authority fixed with respect to CIL and the subsidiaries is very out of date and needs to be redefined. The Committee considers it absolutely essential that CIL should be given the status of a “Navratna” company and its Board empowered to take all decisions in respect of investments when once the Government gives in principle approval to the investment. There should be only one Director from the Government on its Board. The Board may have besides the Chairman up to five full time directors and three part time directors including the Govt. nominee. Besides these, there should be at least two Independent Directors. The operating subsidiaries of CIL, CMPDIL and SCCL should be given the Mini-Ratna status. The boards of management can be patterned on lines similar to CIL. (Paras 3.29, 3.30)
  
13. The whole organization should adopt a new spirit of élan as a major contributing agency to India’s energy security and accept changes in all its procedures and work systems so that it could be benchmarked against the best coal companies of the World. The HR issues need to be given highest priority. These are discussed in chapter VII later in this report. (Para 3.32)

## **CHAPTER-IV**

“Regulation and Governance in the Coal sector” have not been included as items in the TOR of the Committee. The Committee however considered the issue as one of utmost importance and examined the issue at length in Chapter IV of the Report.

1. This Committee analysed the current governance structure in Coal sector and found that various aspects of governance are dealt with in different agencies functioning under diverse Ministries without any co-ordination. The coal industry which is becoming the main pillar of our national energy security, needs a new and comprehensive governance structure which could attend to all issues relevant for development of coal resources, regulation of coal price (wherever necessary), and nurturing level playing field between the entrenched large public sector coal companies and the emerging small coal companies in the State public sector and the captive mining sector. (Para 4.3)
2. The Committee found that the agencies for governance and regulation in the coal sector are many and these operate with reference to the specific legal enactment (Act) with which they are concerned and are only driven by the requirements of their particular Ministry or Department. There is inadequate appreciation in these agencies of the important role they should play in accelerating Coal production and ensuring energy security. The Committee appreciated the fact that rights and duties assigned to different agencies under different Acts cannot be transferred to single agency immediately. The Committee, therefore, recommended the setting up of a central coordinating agency and gradually strengthening it. (Para 4.8)
3. All stakeholders other than coal producers are in favour of a neutral body to determine the coal prices in a transparent manner. The Coal producers point out that the industry has been empowered a few years back to set and regulate the price of coal and CIL as the largest producer of Coal has emerged as the Price leader. There is however need for price regulation now. This Committee had recommended in Part-I of the Report that procedure for an administered price of Coal for users in strategic industries like Power, whose prices are controlled and who require regular supply of very large quantities of Coal every year, which has to be arranged with the cooperation of the providers of infrastructure for the transport of such Coal. The Committee has recommended that the price for such Coal should be negotiated on a long-term basis with formulae for revision of the price periodically. These coal supply arrangements should be covered by FSTAs. (Paras 4.10, 4.12 )
4. The Committee however felt that till the Coal supply and demand comes to an equilibrium state the agency would need to regulate the price, in respect of the major bulk consumers of Coal, especially the consumers whose output prices are strictly controlled - as in the Power Sector. In all such cases where the parties do not settle the price issue by themselves through bipartite/tripartite negotiations an Independent body to determine the fair price is necessary. The rest of the coal users could obtain

coal to meet their requirements from e-auction market or the alternate to e-auction, which is likely to be decided by the Government soon. (Para 4.11)

5. The three parties to a long term Coal supply contract would first negotiate a settlement for an FSTA. If the tripartite negotiations fail, the Regulator, on their request, or suo-moto can take up the issue and resolve the differences. In the case of other industries the Regulator has to play a lead role in the evolution of a competitive market in coal, as per the recommendations of the Special Committee. There would be in the early years of regulation, several occasions when the Regulator would have to resolve disputes between buyers and sellers. The regulator would also issue clear direction regarding the procedures to be adopted for negotiations as well as competitive bidding. (Para 4.13)

6. Taking all these facts and the experience in other countries into account the Committee recommended that a mechanism created for price regulation could also evolve as the coordinating agency for all aspects of regulation in the coal sector. The various agencies which are currently governing and regulating the systematic assessment of all coal resources (CMPDI, GSI), collating the information (Coal Controller), defining the boundaries of coal blocks/mines (CMPDI) and regulation of coal mine safety and working conditions of miners (DGMS), ensuring the restoration of open cast mine areas after completing the mine operations and providing adequate safety in case of exhausted underground mines (CMPDI, MoC) and to resolve disputes between any stakeholders in the Coal industry (MoC) should be brought together under a single agency. The Committee therefore recommends the setting up a Coal Governance and Regulation Authority (CGRA). It should not be a mere regulating organisation, but a development and regulation organisation as in the case of re-designed UK Institutions for gas and electricity. (Para 4.14)

7. The suggestion is not to duplicate the agencies or increase the number of executives and operatives currently attending to these items of work under the control of diverse departments/ministries but to move these functionaries from the respective organisations to work under one umbrella called CGRA. The persons who are brought into CGRA would continue to be on the rolls of the respective departments but would be placed with CGRA only to deal with Coal industry issues under the overall guidance of the Authority. (Para 4.15)

8. The Committee recommends that all issues connected with the governance of coal sector and its development to serve the energy security interests of the country

should be brought together under one Authority (CGRA). The Authority with five directorates under it would deal with the subjects as set out below:

1. Coal Resources Management
2. Safety, Health and Employment
3. Prices, Taxes and Royalty etc.
4. Environment Management
5. Policy – Legal, Public Relations, Statistics & Dispute Resolution

(Para 4.16)

9. Private sector participation in all activities in the coal supply chain from exploration, mine identification and setting up and operating of efficient coal and lignite mines and coal washeries/coal preparation plants is recommended by this Committee. If these recommendations are to materialize all the information and data relating to Coal and Lignite resources, coal and lignite blocks in possession of different agencies, Coal and Lignite mines in operation, the details of their production etc., should be available to all the players in the coal sector in the same manner. The Committee is of the view that the scope of data to be collected under the CoS Act be widened to include ALL data relating to coal sector and the responsibility entrusted to the Coal Regulator. The data collection functions of CMPDIL for coal and NLC for lignite should be transferred to the Regulator.

(Para 4.17)

10. The Committee has recommended that in areas not covered by Proven Reserves with GRs (Geological Reports) private sector may be invited to take up exploration and mine development at their risk partly shared with the Government on the lines of the New Exploration Licensing Policy (NELP) followed in the oil sector. The role of the Director General Hydrocarbons (DGH) would have to be played by the Regulator in the Coal Sector. The Regulator should, after open hearing of the different stakeholder interests, formulate the principles and procedures and also act as the appellate authority in cases where the mine-owners are aggrieved by the decisions of the mine approving agency. The oversight by CGRA would remedy the shortcomings in the present system regarding utilization of funds collected by State and Central governments from coal sector under different statutes. (Paras 4.18, 4.19, 4.21)

11. The Ministry of Coal will have powers to issue directions on policy matters to any agency including CGRA. All such directions should be in writing and should be placed in the Parliament and public domain without delay.

(Para 4.23)

12. CGRA as well as Ministry of Coal should get advice from an Advisory Board which may be called the National Coal Council of India (NCCI) in which all stakeholders are

duly represented. The experience of USA which has a similar arrangement could provide some pointers of how this could be structured. (Para 4.25)

13. These two new institutions proposed namely, CGRA and National Coal Council of India (NCCI) would greatly help the Ministry of Coal to achieve the accelerated growth of coal industry with a sense of commitment and inclusiveness of all parties.

(Para 4.30)

## **CHAPTER-V**

In Chapter V, the Committee has examined the methods of improving productivity and cutting costs in coalmines in India. The committee has recommended the following:

1. The high coal production targets proposed in the next two plan periods and further in the period upto 2031-32 can be achieved only by focusing on improving the technology and productivity in both underground and open cast mines. Measures should therefore be designed and implemented effectively to increase the level of mechanization, introducing the state-of-the-art machines in the mines and ensuring better utilization of machine capacity which should be benchmarked against international standards. (Para 5.3)

2. Coal companies have been slow in adoption of emerging new techniques and increasing the size of equipment. Often the geological/geomining characteristics of OC and UG mines in India are cited as reasons for not shifting to more modern equipment. The Committee finds that even under our conditions, it is possible to use more modern and larger machines. The Committee has strongly urged the acceleration of the shift to more modern equipment of higher productivity. (Para 5.4)

3. The process and procedure of the equipment selection at the stage of Mine planning and approval and the monitoring the performance of Heavy Earth Moving Machinery (HEMM), needs revision to help the acceleration of the pace of shift to more efficient equipment. (Para 5.5)

4. Effective and efficient usage of HEMM and elimination of idle time is to be ensured for maximizing productivity. Objective should be to monitor and identify bottlenecks/areas of improvement and exercise greater control over equipment and operations on a real time basis. Online information provided by the modern equipment is a fundamental and strategic step towards changing the nature of technical and operational decision making at mining operations. Advanced satellite technology, e.g. global positioning systems (GPS) based mine management along with Truck Dispatch system (TDS) is a common facility in many large opencast mines in Australia, South Africa and USA.



Indian coal industry has just started looking towards these technologies. The time taken in most cases for ordering new hitherto untried equipment has been very long. The specter of vigilance enquiry is often cited as the cause for such long delays. There is need to have permanent cell for technology evaluation and monitoring and improving the systematic operating procedures for modern new equipment procurement. (Para 5.9)

5. The thrust area for UG mining may be the replacement of the B&P methods with higher degree of mechanization like, Continuous Miner (CM) technology. However, the use of Longwall technology, wherever geo-mining conditions permit, will be continued as a mass production technology, particularly for deep-seated reserves. So we will have a judicious mix of B & P with CM, B&P with SDL/LHD combination, mechanized Longwall and other special mining methods. In the area of underground mining, new technologies will have to be introduced in mine development to reduce the gestation period of underground mines, introduce better mine support through appropriate strata control investigation, development of suitable methods for induced caving such as hydro-fracturing for hard roof management for shallow and medium depth of cover and also in the other areas like drilling and blasting, transportation, etc. (Para 5.11)

6. There is need to provide special incentives to stimulate interest in large-scale underground coal mining in India. The procedures followed in the power industry to mobilize investment for ultra mega power projects provides a model, which could be adopted in coal industry. At least two ultra mega UG mines may be taken up for allotment on this basis in the XI plan period and on the basis of experience of such projects and procedures could be continued in the subsequent periods for setting up large UG mines. (Paras 5.12, 5.13)

7. A specially designed “UG COAL INITIATIVE” should be launched to increase the share of UG mine production gradually from the current less than 15% to 25 % in the next fifteen years. The Initiative suggested should examine comprehensively the suggestions discussed in paras 5.12, 5.13 and 5.14 of Chapter V especially the training of large number of engineers within the country and abroad in mechanized state-of-art UG mining for various seam thickness ranges – thin seam, normal thickness seam and thick seam mining , especially in multi-seam environment. (Para 5.14).

8. MoC in consultation with CIL and SCCL and DGMS should immediately evolve a clear contracting system and an evaluation system of equipment of high value different

kinds for a specific use and most of the equipment in use in other countries should be evaluated in advance. In all cases efforts should be made first to procure high cost equipment on the performance based payment basis. Furthermore, the staff posted to operate the new HEMM should be given adequate training, orientation and should be rewarded for performance, if they maintain or exceed the production fixed as per the norm. (Paras 5.15, 5.16)

9. An alternative approach to sourcing of reliable and highly productive equipment is for CIL to enter into Joint Ventures with equipment manufacturers of repute for OC and UG mining equipment for which there is huge demand to ensure secured supplies of equipment and spares at reasonable prices and to diversify the sources of supply. This option is now feasible since CIL is anticipated to be flush with surplus internal resources which can be gainfully employed instead of keeping them in bank deposits or to invest them in mutual funds, which have recently been allowed by the Government. (Para 5.17)

10. MoC should review coal washing on BOO basis and introduce incentives for producers like CIL or other users of coal to set up washeries. It is estimated that out of the demand of 540 MT of coal for power sector at the end of XI plan 150 MT would be required for use in power stations beyond 1000 kms. CIL should be persuaded to wash the coal for these destinations before dispatch. MOEF directive on moving only beneficiated coal beyond 1000 Kms should be tightened gradually during XII Plan. (Para 5.18)

11. The characteristics of Indian coals are by and large similar to South African coals (poor quality with high as content upto 45% or more but low sulphur content). South African coal preparation industry is far advanced as it is able to produce export quality washed coal (<14% ash) from ROM coals containing ash as high as 40% with yield levels higher than 75% in the case of easy to wash coal seams and yield levels lower than 40% for difficult to wash coals since export quality washed coals fetch a price 3 times higher in the export market compared to that of lower quality washed coals sold in the domestic market. Indian UHV based pricing system with very wide bands does not offer a significantly higher price for washed coals. Coal pricing reform (fully variable GCV based pricing of Indian thermal coal) would alone give a boost to Indian Coal Preparation Industry. (Para 5.19)

12. The railway tariff should be subjected to a review at least in respect of coal. The other ways of bringing down the cost of coal transport by having special railway corridors have been thought of. The implementation of these good proposals for coal should be

expedited and enlarged in scope to cover the transport from all coal mines in the east to consuming centers in western and southern destinations. Furthermore, a well thought out railway-cum-sea route to southern and western ports should be given consideration in the 11th and 12th Plans. (Para 5.20)

13. Out sourcing should be differentiated from contract labour employment. It is not a method to extract more work and pay less to unskilled and semi skilled labour. In fact, it becomes relevant and inevitable in tasks, which call for specialized skills. (Para 5.22)

14. There is need to maintain strict vigilance through Cost control and Monitoring committees involving all stakeholders in all public sector coal companies. (Para 5.22)

15. It is to be emphasized that the achievement of the production targets set for coal industry would be possible only if there is a conscious all out effort made to eliminate delays in every stage of the coal production chain. (Para 5.23)

## **CHAPTER-VI**

In Chapter VI the Committee has examined relative level of R&D in coal sector in India and the attention now paid to cutting edge technologies, which are emerging in coal sector in the world.

1. The Committee has identified the following for detailed consideration:

- a. R&D in Coal sector-The approach and expenditure.
- b. In-situ Gasification (Underground Coal Gasification).
- c. Coal Bed Methanation (CBM)
- d. Clean Coal Technologies – Carbon sequestration and storage (CSS)
- e. Coal to Oil Technologies (CTL)
- f. Coal to Gas Technologies (CTG) (Para 6.1)

2. The Committee considered it imperative that the simpler ones among the new R&D projects listed for the XI Plan are separated and responsibility and leadership entrusted to one Coal Company for each item. The expertise and knowledge available in the coal companies could be supplemented by various research institutions and universities, which should be co-opted in the R&D efforts. The more fundamental and complicated issues should be separately listed. Then each proposal should be delineated clearly setting out the expected outcomes and the datelines to be adhered to. First, each proposal should be put out for National competitive bidding and if the response is not adequate International competitive bidding should be

- invited. All public sector organizations including CMPDIL should be eligible to participate in the bids. (Para 6.5)
3. The Committee has strongly recommended that a Coal R&D fund should be created whereby half of one percent of the turnover of all coal companies in the public and private sectors is deposited. The companies paying the levy should be encouraged to set out their perceived research & development priorities and get such projects included in the list and bid for taking up the projects when the bids are invited. CGRA could manage the funds. (Para 6.6)
  4. The Committee feels that the action on identifying the possibilities and appropriate technology for UCG is of great urgency and importance. The work of developing UCG technology suitable for India should be taken up on a Technology Mission Mode and given a time line of three years to achieve certain milestones. (Para 6.10)
  5. The reliability of estimated CBM resources (3381 BCM) that have been prognosticated over an area of 35,326 sq. km. needs to be established. (Para 6.11)
  6. A number of constraints limit the fast development of CBM technology. These are:
    - a) The data base is inadequate.
    - b) Availability of Infrastructure: Service providers within the country are few and the gas distribution net works have to be developed over extended coverage. As such, there should be a national policy in place to connect the CBM blocks to national pipeline grid, as is the practice in USA. This will facilitate the CBM producers to have a net-work for marketing.
    - c) The boundaries of some of the CBM blocks overlap to some extent with the boundaries of coal mining blocks resulting in jurisdictional problems as to who can undertake mining first – the CBM operator or the coal mining block allottee. (Para 6.14)
  7. The Committee has examined all the ongoing efforts in developing Carbon Sequestration and Storage (CSS) technology. India has the capability to undertake such research and develop equipments, which will suit Indian conditions. The Committee has recommended that MoC should arrange to move as early as possible towards setting up a comprehensive coal production- washing-power generation plant incorporating all features of clean coal technologies including CSS on the lines of clean coal technology plant in China. (Para 6.30)
  8. The Department of Science & Technology has sent a communication to the Committee indicating that it has taken up an in-depth Study on Clean Coal Technology Initiative in 2006. (Para 6.31)

9. The Committee appreciated that there are a number of initiatives taken by different departments towards reducing GHG emission and Carbon sequestration. The ongoing efforts and studies for carbon storage should be well coordinated by a high power committee and results published in, say, five years. The steps leading to this end are:

- Constituting a National Level Task Force comprising members of Planning Commission, concerned ministries like Ministry of Coal, Ministry of Power, Ministry of Environment & Forests, Geological Survey of India and concerned industries etc.
- Identifying the areas for carbon sequestration and carry over the feasibility of the identified practices.
- Assignment of the activities to various stakeholders for the carbon sequestration
- Implementation.
- Monitoring. (Para 6.32)

10. Oil is a convenient form of fuel that is essential for transport sector. Transportation of oil and oil products is relatively the easiest among all sources of primary energy. The Coal To Liquids (CTL) technology was developed during World War II by Germany for producing essential petroleum products from its abundant coal resources. The technology was perfected in South Africa during the apartheid years. Given record prices for crude, several countries today are looking at the technology to address energy security concerns. (Para 6.33)

11. Salient conclusions of the Planning Commission's review of CTL project proposed by TATA-SASOL Group are as follows:

- a) As per the proposal coal would be mined from the block to be allotted to the Group as per their choice. The mined coal would be beneficiated and gasified and the produced gas would be converted to petro products, mainly diesel. The process would consume 31 MT of ROM coal to produce 3.6 MT of petro products and 1400 MW of electricity for sale (6.67 MT of ROM coal would be used to produce only 1 MT of petro products)
- b) CTL process merely converts one form of primary energy (coal) into another form of primary energy (liquid fuels). Comparison of net energy balance in terms of electricity generated using coal directly and using diesel etc. produced by the CTL project shows that the total electricity equivalent of CTL project (including electricity produced for sale) is only 67% of electricity that can be produced directly from 31 MT of coal used in CTL project assuming a very high conversion efficiency of 50% from liquid fuels to electricity (Excluding electricity produced for sale by CTL project, the electricity produced from petro products would only be 57% of that generated from 24 MT of coal used in production of petro products). In case petro products are utilised for any other end use the overall thermal efficiency of CTL project would be still be lower.
- c) India's energy security is not enhanced by CTL project as the country does not have surplus coal for production of synthetic petro products from coal. In fact,

India may have to import coal for electricity generation to meet rising demand for electricity.

- d) Viability of CTL project depends heavily on specific taxes and duties incentives sought for the project which are not available to coal mining projects (for power generation) and these incentives would also be applicable to surplus power cycle of the project which has nothing to do with CTL production cycle. There is no parallel between the proposed CTL project and Ultra Mega Power projects since the latter are competitively bid projects whereas CTL project is not.
  - e) The risk sharing profile of the proposed project is also asymmetrical as GoI is supposed to absorb the full market risk and capital cost overrun risk within a price band of \$40-\$55/bbl of crude oil. In fact price guarantee of \$55/bbl of crude is sought as long as crude price remains in the \$40-\$55/bbl price band. But benefits beyond crude price of \$55/bbl would not be shared evenly and any benefit GoI got from the proposed agreement would lapse after 10 years.
  - f) Enhanced liquid fuel security can better be ensured by using domestic coal for power generation and resorting to import of liquid fuels from CTL plants located abroad as opposed to importing coal for electricity generation and diverting domestic coal for conversion to liquids.
  - g) CTL technology does not offer any larger spin off for India. Large scale application of this technology which has been around for several decades has remained primarily confined to South Africa. Gasification of coal, in situ or plant based has much greater relevance for meeting India's energy needs than converting the gas to synthetic liquid fuels whereby much lower overall thermal efficiency is achieved. (Para 6.40)
12. CTL fuels also produce significantly lower levels of carbon monoxide, nitrous oxide and particulate matter than even low sulphur diesel. However, production of CO<sub>2</sub> during conversion of coal to liquids is twice that produced during refining of petroleum to petro products. Moreover, the CTL technology involves very high capital and operating and maintenance costs and these will be significantly enhanced if attempt is made to reduce pollution load by capturing CO<sub>2</sub> and sequestering it. (Para 6.41)
13. In view of persisting high crude oil prices for the last 3 to 4 years and recent measures taken by US Government (as elaborated in para 6.41 of Chapter VI) a number of CTL projects are under development in the US. A large number of CTL projects are also planned to be set up in China. However, both these countries have large balance recoverable coal resource base of relatively good quality coals which reduces the coal requirement for conversion to liquids whereas India cannot afford such luxury with the coal resource base currently available with relatively poor quality coal. (Para 6.42)
14. Currently interest in coal gasification has been revived due to growing relevance of introducing fuel efficient IGCC power generation. In addition in situ gasification of

coal is of interest to India in order to enhance its resource base and tap coal and lignite that would not be economical to mine otherwise. (Para 6.44)

15. The Committee would like to recommend a coordinating and monitoring mechanism for R&D in coal sector. The Committee would like to suggest the setting up of a high level Empowered Committee of concerned Secretaries to GOI and eminent scientists in the coal sector and entrust a fund of Rs.1000 crores to the Empowered Committee to be spent as per their directives. The Empowered Committee would not need any approval or prior clearance for sanctioning science or Research projects. This Empowered committee should prioritize the research projects and attempt to enlist all individuals and institutions in these activities. The best way appears to be to call for National Competitive Bidding (NCB) for these projects setting out clearly the outputs expected and the datelines to be met. If the NCB does not bring in the appropriate response the project should be let out on International Competitive Bidding (ICB).

(Para 6.46)

16. The Committee would like to reiterate the need for a time-bound programme of R&D in coal sector in India. This could be achieved only by following the route of competitive bidding for issues to be researched or methods to be developed with certain expected deliverables. Seeking aid from foreign agencies, both government and non-government, for R&D may not get us the best of the sources of technology already available and best supplies of machinery. The Empowered Committee may be authorized to seek the best possible solution to each research problem.

(Para 6.47)

## **CHAPTER-VII**

The Committee in the discussions with Coal companies in the public sector and the other stakeholders in coal industry found that the Sector as a whole has not kept pace with other industries in updating the human resource management practices. The Committee felt that unless this shortcoming is immediately remedied, the entire long term plans for Coal development would be jeopardized. In Chapter VII the Committee has examined the HR issues in Coal sector and has made the following recommendations:

1. The overall performance of CIL has been good in many aspects of management in the last decade. However, CIL has not been paying adequate attention to several dimensions of corporate management, which could ensure continued good performance over a long period and help to make the company a world-class company. The weakest link in the chain of management functions of CIL has been its

management of Human Resources. Existence of substantial unutilized and underutilized manpower coupled with heavy losses in subsidiaries like ECL, BCCL and CCL, having bulk of CIL's manpower, prompted CIL to put major thrust on reduction in manpower. Retirement schemes in different forms were introduced from time to time and targets of manpower reduction based on expectation of response from these schemes were set. With overwhelming concern to meet the target for manpower reduction, other aspects of human resource management didnot receive proper attention.

The aspects which needed far more attention are:

- Manpower Planning and HRM Strategy
  - Recruitment
  - Training and Development
  - Motivation and Communication
- (Para 7.1)

2. Major reduction in manpower over a relatively short period of time coupled with absence of a long term manpower planning resulted in some mismatch between required skills and the available skills resulting in gaps between requirement of manpower in higher skills, arising from technology upgradation and intake of larger and more sophisticated equipment and availability of such manpower. There is also a manpower imbalance across executive levels, i.e. E1 to M3 in CIL. This is largely because of absence of any long term executive manpower plan spelling out requirements in different disciplines and at different levels keeping in view the pace with which the company has been growing.

(Para 7.5)

3. The large scale regular recruitments have been given up for several years, and fresh induction of employees has been rare. This policy has resulted in severe shortage of skilled and experienced professionals (surveyors, geologists, geophysicists, drilling and mining engineers) in CMPDIL (as already highlighted in Chapter I) which is likely to assume crisis proportions unless immediate remedial measures are not taken. Shortage of skilled manpower in various critical disciplines in different subsidiaries of CIL needs to be identified expeditiously and measures taken to correct this manpower imbalance.

(Para 7.6)

4. Based on the discussions with the Officers and Workers Associations the following important measures have been identified as the urgent ones to be taken as the first steps towards CIL re-designing the HRM strategies for the future:

- The manpower planning process at CIL needs to be thoroughly reviewed and strengthened.



- CIL will have to undertake a scientific study to identify the manpower surplus based on potential job requirements during the next ten years. This will need to be harmonized with the future projections of the production targets, technology shifts and skill requirements to efficiently manage the new equipment that might be introduced. .
  - CIL has to revise its promotion policy and evolve incentives, which do not lead to imbalances in the ratio of officials occupying different levels of hierarchy. This is particularly relevant for officers of mining engineering stream whose promotion to management cadre should be based on recognised basic engineering degree and/or post graduate engineering/management degree. It is learnt that in the present system diploma holders and field candidates (who do not hold any diploma or degree) manage to get promoted to management cadre only on the strength of First Class Mines Managers Certificate of Competency (Coal) issued by DGMS which is not recognized by any professional body dealing with technical education in the country.
  - CIL should devise a well thought out HRM plan would gradually groom the employees to take up higher responsibilities by stepping up their limits of authority steadily as they move up the career ladder. The difference in power held and decision-making responsibility between the top management and the second line of managerial staff is inordinately large and needs to be modified. (Para 7.7)
5. It is imperative that Coal industry in general and CIL and SCCL in particular, take up immediately measures designed to improve the Image of the industry and the companies and to recruit, train and retain on a massive scale technical staff of appropriate quality. Towards this end, the following measures are recommended:
- a. CIL in collaboration with private Coal Companies should organize a programme of providing 100 new scholarships per year to students who opt for coal geology/coal mining/coal exploration specialization. Of these students a small number, who show outstanding performance should be assured of executive posts in CIL and other participating coal companies.
  - b. The enthusiasm of young bright persons to opt for coal geology/coal mining/coal exploration as an avocation would require the creation of a regular annual opportunity for them to compete in a competitive examination and on the basis of merit enter CIL at the highest possible entry level. The Indian Administrative Service attracts a very large number of young people to compete for entrance because there is regular selection for a number of vacancies to the highest entry level into government service. The Committee recommends the creation of a SENIOR MANAGEMENT SERVICE for technical and administrative cadres in CIL and SCCL and the remuneration package and service prospects for persons in this service should not be less than any other government service and should be on par with those in the best private sector organizations.
  - c. CIL should undertake a talent search for senior level engineers, preferably of Indian origin, who could come to work in CIL on contract basis for 3 to 5 years to put the working systems in place in large size UG mines which are likely to be taken up in the XI plan period.
  - d. With a view to get youth of good quality to middle and junior level posts CIL should sponsor a large number of polytechnics and Industrial Training Institutes in all the districts where there are coal mines and make an assurance that the best performing 10 to 20 students in each institution will be getting employment.

- e. The work force itself should have educational and aspiration levels much higher than what they were a few years earlier because they have to handle sophisticated technologies, which calls for higher level of skills and responsibilities in the workers. CIL should work closely with Polytechnics to modify and upgrade the contents of their courses in the area of mine operations.
  - f. CIL should follow the most modern methods of recruitment and take up more sophisticated advertising regularly for recruitment and image building.
  - g. The challenge is to develop a culture within the Coal organisations conducive to the development of an individual and fulfillment of his aspirations through meaningful individual roles and team spirit. (Para 7.10)
6. Indian Institute of Coal Management (IICM) should be given a greater role in functioning as a central apex training institution for coal industry and all facilities for training in Technical and Managerial aspects of the industry. For this it should design several new programmes and redesign several others in collaboration with the best institutions providing such programmes in the world. Steps should be initiated now itself to make IICM an university called UNIVERSITY OF COAL TECHNOLOGY AND MANAGEMENT (UCTM). The proposed University should develop an integrated MBA course which should not be confined to knowledge of different coal energy forms and their extraction or recovery technologies, but should also include thorough knowledge about the other associated technologies, machineries, finance, and personnel management aspect of the Mines. This degree program should be developed in collaboration with the best of such institutions in the world. (Para 7.1.2)
7. All other training institutions in CIL should be expanded as per a well-designed programme. This could be done by a Committee with some outside experts to review and draw up plans keeping in view the national expectation of increasing coal production and consumption to 2000 million tonnes by the year 2030 and the new technologies that are likely to be introduced. (Para 7.13)
8. CIL should encourage prestigious technical institutions like Indian Institute of Science, IITs, IIMs to design programmes which could expose the senior level management to emerging ideas in technology and management and officers' cadre at the beginning of their career in the senior positions should be sent to these specially designed programmes. These should be modeled as mini-MBA programmes with special inclusion of subjects relevant to coal industry. (Para 7.14)
9. The non executive staff should undergo training courses of one week to 4 weeks duration which are to augment their skills or expose them to new technological developments related to their jobs/work or give them skills to prepare to take up higher responsibility. The middle management levels should undergo every year a two-week programme specially designed to improve their capacity to handle better

their present jobs and to equip them to take higher responsibilities. The training programmes for the middle level should emphasize the importance of working as a team. (Para 7.15)

10. The Public Sector Coal companies should take up a programme to upgrade the management capabilities of the senior level executives. To begin with from 2007-08 at least ten officers should be sent every year for Senior management programmes organized by prestigious academic institutions like Harvard, Stanford, London Business School and at least twenty should be sent to similar institutions in India. The senior management programmes have to provide the concerned officials the knowledge about various related sectors whose progress determines the potential for growth of coal sector. (Para 7.16)

11. Internal corporate communication systems should be reorganized to bring the large number of executives and a huge work force spread around the whole country to come closer emotionally to exchange views and notes and develop a sense of pride in belonging to an industry which is playing an important role in the socio-economic development of the country. Each worker and each executive should become familiar with the acceleration in the pace of growth of their organisation and attempt to maximize their contribution to the achievement of the corporate goal. (Para 7.19)

## **I – Long Term Coal Demand and Supply Prospects**

1.1 The Government of India while constituting the Expert Committee set out as its first term of reference “recommending measures for meeting the demand-supply gap in Coal in the short, medium and long term”. In Part I of the Report, the Committee critically examined the short and medium term management of coal demand and supply (Chapter III of Part I of the Report). The Committee pointed out that the coal production target in the Tenth Plan document had set out a gap of over 35 million tonnes by the end of plan period between demand and production plus planned imports targets, probably keeping in view the performance of the power sector in previous plans which often fell short of the targets. The demand for power coal in the 10<sup>th</sup> Plan, however, increased faster than anticipated mostly due to better performance of existing generating plants and in the mid term appraisal (MTA) of 10<sup>th</sup> Plan, coal production target was increased from 405.0 million tonnes to 431.5 million tonnes for the terminal year 2006-07. The actual anticipated production most likely to materialize was assessed by our Committee in Part I of the Report as 430.0 million tonnes against anticipated consumption of 460 million tonnes, which would result in a gap between demand and supply which could be bridged only by imports. The Committee recommended that immediate arrangement should be made to import the deficit supply. Furthermore, the Committee pointed out that due to the power projects which are not likely to be completed by the end of Tenth Plan, would get commissioned in the first two years of the Eleventh Plan and the thermal coal import to the extent of 30 to 40 million tonnes would be required to alleviate the looming shortages during the early years of the Eleventh Plan.

## Box No. 1: Targets for Coal Production in India

### Coal Industry as Arjuna hitting a moving target

The Working Group of the Tenth Plan proposed a target for coal production of 399.73 million tonnes against anticipated coal demand of 453.29 million tonnes. This was increased to 405 million tonnes in the Tenth Plan document against projected demand of 460.5 million tonnes. The mid-term appraisal increased the coal production target to 431.5 million tonnes against revised projected demand of 473.18 million tonnes. The Expert Committee assessed the likely demand to be falling short and set the likely production as 430 million tonnes. The current anticipated total coal demand is likely to be only 460 million tonnes (thermal or non-coking coal demand is likely to be only 417 million tonnes) resulting in accumulation of stocks at the pit heads in several places.

### 1) COAL DEMAND FOR XI PLAN

- 1.2 The Eleventh Plan targets have been worked out ab-initio by the Working Group on Coal for the Eleventh Five Year Plan (WG XI Plan). The demand as received from the concerned agencies which use coal was as usual over optimistic, as indicated in the table below:

**TABLE 1.1:** Demand for Coal in XI Plan as assessed by Users

Figures in Million Tonnes

Sector	IX Plan (Actual)	2005-06 Actual	X Plan 2006-07		Projected Demand XI Plan (2011-12)			
	2001-02 Actual		Target	Antic.	As indicated by user Agencies	Assessed by WG	Coal Vision- 2025 @ 8% GDP	Expert Comm. on Coal Sector Reform#
					SCN – I	SCN – II		
Steel & Coke oven	29.84	33.80	42.70	43.00	68.50	68.50	54.24	51.53
Power(Utility)	249.23	299.89	322.00	310.00	540.00	483.00	427.16	502.91
Power Captive (CPP)	16.02	24.13	28.26	31.50	49.66	57.06 \$	44.33	45.00
Cement*	15.22	18.33	25.40	25.00	45.42	31.90	39.39	30.81
Sponge Iron	41.60	57.38	54.82	50.50	28.96	28.96	64.51	80.00
Others					61.68	61.68		
<b>Non-coking – Total</b>	<b>322.07</b>	<b>399.73</b>	<b>430.48</b>	<b>417.00</b>	<b>725.72</b>	<b>662.60</b>	<b>575.39</b>	<b>658.72</b>
<b>Grand total</b>	<b>351.91</b>	<b>433.53</b>	<b>473.18</b>	<b>460.00</b>	<b>794.22</b>	<b>731.10</b>	<b>629.63</b>	<b>710.25</b>

**Note:**

- \$ XI Plan coal demand for CPP assessed by WG includes demand of Fertilizer and Cement sector CPPs (7.40 MT)
- \* Coal consumption for cement includes coal requirements of CPPs of cement sector except for XI Plan assessment made by WG, Coal Vision document and Expert Committee

- # Assessed on the basis of plantwise specific consumption norms for identified utilities power generating plants most likely to be completed by the end of 11<sup>th</sup> Plan and trend growth of other coal consuming sectors.

- 1.3 The WG XI Plan exercise has assessed the demand at 731 million tonnes. The increase in each of the use sector is set out below:

**Table 1.2: XI Plan Coal Demand as per Working Group**

Sector	Figures in Million tonnes		
	2006-07: Anticipated	2011-12: Assessed	CAGR (%) of coal requirement
Power Utilities	310.00	483.00	9.27%
Power Captive *	31.50	57.06	12.62 %
Cement	25.00	31.90	5.00%
Sponge Iron & Others	50.50	90.64	12.41 %
Total Non-coking	417.00	662.60	9.70 %
Coking –Steel	43.00	68.50	9.76 %
<b>Total</b>	<b>460.00</b>	<b>731.10</b>	<b>9.71 %</b>

The demand forecast of 731 million tonnes made by WG XI Plan is much higher than the forecast of 691 million tonnes (for 9% growth of GDP) made in Integrated Energy Policy Report which is inclusive of projected consumption of lignite amounting to about 38 million tonnes for power generation (coal demand net of lignite consumption being 653 Mt.) whereas 731 million tonnes projected demand as per WG XI Plan is exclusive of lignite consumption. It is also significantly higher than coal demand of 710 million tonnes projected by Planning Commission for the Expert Committee on Coal Sector Reforms. The difference in the level of coal demand likely to materialize by the end of XI Plan in the two forecasts made by the WG and IEP report is quite large at 78 million tonnes on like to like basis. IEP forecast based on past behaviour is quite conservative whereas the forecast made by WG based on identified power generating stations likely to be commissioned during XI Plan as per CEA assessment and capacities planned for other user sectors is rather optimistic and may materialize provided planned capacities of user sectors also materialize. The actual coal consumption by the end of XI Plan may be somewhere between these two extremes depending on the performance of user sectors. Ministry of coal should publicize the quantity of coal likely to be available for cement, captive power and sponge iron plants and clearly indicate that any demand above the linked quantity should be procured by these industries on their own effort and no request for additional linkage or short-time linkage would be entertained.

## 2) **Coal Production potential in XI Plan Period**

1.4. The WG has also analyzed the production feasibility from domestic sources during the XI Plan. In the terminal year of X Plan (2006-07), all India coal production is likely to be 432.50 Mts. as against original target of 405 Mts (projected at the time of preparation of X Plan document) as can be seen in Table 1.3 below. Expected growth in coal production is 5.70% per annum during the plan period as against original projection of 4.46%. This is a considerable improvement over the 2.53% growth achieved in the IX Plan. Despite delay in commissioning of many new mines due to delay in obtaining environmental and forest clearances, land acquisition, rehabilitation plan approval, etc., this substantial increase in production in CIL mines has been possible due to improvement of operational efficiency in the producing mines. Again growth of production of captive mines is also remarkable. Production from Captive mines/Tata Steel/IISCO etc. is now expected to reach 31.20 Mt in 2006-07 as against original projection of 18.87 Mt.

**TABLE 1.3: PRODUCTION FEASIBILITY –COMPANYWISE (1996-2011)**

Fig. in Million Tonnes

	1991-92	VIII Plan (1996-97)	IX Plan (2001-02)	X Plan (2006-07)	Growth	XI Plan (2011-12)	Growth	
	Actual	Actual	Actual	Anticipated	%	Projected	Addl. Tonnes	%
CIL	204.15	250.62	279.65	363.80	5.40	520.50	156.70	7.43
SCCL	20.58	28.73	30.81	37.50	4.01	40.80	3.30	1.70
Others	8.09	9.97	17.33	31.20	12.48	118.70	87.50	30.63
<b>TOTAL</b>	<b>232.82</b>	<b>289.32</b>	<b>327.79</b>	<b>432.50</b>	<b>5.70</b>	<b>680.00</b>	<b>247.50</b>	<b>9.47</b>

The Committee analysed the supply forecast for XI Plan made by the WG with reference to past trends of production group-wise. The anticipated production in companies other than CIL and SCCL appearing under “others” prima facie seems very high. It is, however, an achievable and realistic target if we take into consideration the potential production from captive blocks. Analysis of the status of coal blocks released from CIL to captive mining sector and the credentials of the allottees of blocks allotted suggests that the expectation from the sector will be fulfilled. Coal sector has, no doubt, a past dismal record of performance in “captive mining”, which was the result of very poor blocks allotted and lack of proper conditions in the allocation order to enforce a time-bound approach to coal mining by the allottees. The Committee considers that in view of the very high price differential between coal as power fuel and other alternative fuels and the

conditions introduced in the new leases given for captive mining would ensure the achievement of the targets set for captive mining provided environment and forest land use change approvals are expedited. Out of 127 captive blocks allotted so far, about 60 have already submitted mine plan to Coal Controller's Organization, indicating production projection of about 104 Mt. Remaining block-holders are also expected to submit mine plan shortly. As such, production from Captive blocks and sources other than CIL & SCCL has been projected at 118.70 Mt for XI Plan by the WG and the Committee considers this target as achievable.

- 1.5 ***In the light of these discussions, the Committee recommends that for the XI Plan, coal production target should be kept at 680 million tonnes inclusive of production of captive coal mines leaving a gap of about 50 mt between demand and supply as projected by WG of which nearly 25 mt would be the provision for import of coking coal and the balance shortfall of about 25 mt or so would be bridged by import of thermal coal. The committee would, however, caution that the achievement of production targets depends on the early and timely clearance of the project proposals by the Environment and Forests agencies and the mine-approval agencies. The committee recommends the setting of an appropriate mechanism in the coal ministry with co-operation from power ministry to keep a continuous monitoring of the progress of mine development, power project construction and transport facilities development. A monthly progress report should be placed in the coal ministry's web-site.***

### **3) COAL DEMAND FOR XII PLAN**

- 1.6 Projections of coal demand for terminal year of XII Plan were also made by the Working Group on Coal (Planning Commission) on the basis of following assumptions:

Requirement as projected by CEA for power sector and likely requirement of other sectors through trend analysis of growth, keeping demand projections of them for XI Plan as benchmarks.

Considering same growth trend that has been projected for XI Plan for all sectors, including power, the coal demand assessed for XII Plan is as follows:



**Table 1.4: Projection of XII Plan Coal Demand by WG**

Sector	Million Tonnes				
	X Plan 2006-07	XI Plan 2011-12	CAGR (%)	XII Plan 2016-17	CAGR (%)
	Anticipated	Assessed		Projected	
Power Utilities	310.00	483.00	9.27%	750.00	9.20%
Power Captive	31.50	57.06	12.62%	85.00	8.30%
Cement	25.00	31.90	5.00%	50.00	9.40%
Sponge Iron & Others	50.50	90.64	12.41%	135.00	8.29%
Total Non-coking	417.00	662.60	9.70%	1020.00	9.01%
Coking-Steel	43.00	68.50	9.76%	105.00	8.92%
<b>Total</b>	<b>460.00</b>	<b>731.10</b>	<b>9.71%</b>	<b>1125.00</b>	<b>9.00%</b>

The WG projection is much higher than the forecast of 915 million tonnes made in IEP (to be consistent with 9% growth), which is inclusive of projected consumption of lignite amounting to about 50 million tonnes for power generation (coal demand net of lignite consumption being 865 Mt.). The difference between the two forecasts is rather very large amounting to nearly 260 mt. The likelihood of materialization of coal demand projection made by WG for XII Plan would be rather high in case the demand forecast of 731 mt for XI Plan made by the WG actually materializes; otherwise the forecast of coal demand for XII Plan would have to be correspondingly brought down. It would depend upon how successful are we in installing the envisaged additional coal based power generating capacity as well as additional capacities in steel and cement sectors. ***The Committee recommends that the WG projection of coal demand for the XII plan period can be approved as a working hypothesis but should be subjected to annual review and revision.***

- 1.7 The Committee feels that the current procedures of setting targets for production for CIL and SCCL first and then making the coal allocation and linkage would lead to gross over estimate of demand from different consuming sectors and creating a syndrome of shortages which undermines the governance in coal sector. The fact that over 80% of coal demand is from a handful of large users like power plants, steel plants and a few large cement plants simplifies the problem. ***The Committee has therefore suggested that coal requirements of these large users can only be serviced if they enter into a FSTA arrangement. The Committee would like to reiterate that the mandatory introduction of FSTAs for large coal users is of utmost importance, if we are to have a rational planning procedure for coal sector and power sector. It is desirable that the quantity of coal required at each power generation plant is calculated with reference***

**to the energy planned to be produced and not with reference to the plant capacity.**

#### 4) Coal Production Potential during XII Plan

1.8 Working Group has also assessed the coal production potential from domestic sources during XII Plan considering achievement of production level of 680 mt by the end of XI Plan. Total production potential by the end of XII Plan has been assessed at 1055 mt with CAGR of 9.08% over the base year production of 680 mt. The contribution from captive mining and others is estimated at 346.0 mt with CAGR of 23.86% as can be observed from the table 1.5 below:

**Table 1.5: Production Feasibility Companywise (2006-2016)**

	(Million Tonnes)						
	X Plan 2006-07 Anticipated	XI Plan 2011-12 Projected	Growth		XII Plan 2016-17 Projected	Growth	
			Additional Tonnes	%		Additional Tonnes	%
<b>CIL</b>	<b>363.80</b>	<b>520.50</b>	<b>156.70</b>	<b>7.43</b>	<b>664.00</b>	<b>143.50</b>	<b>4.99</b>
- Existing Mines/ Completed Projects	241.82	185.97	(-) 55.85	(-)5.12	151.49	(-) 34.48	(-) 4.02
- Ongoing Projects	102.41	165.31	62.90	10.05	181.59	16.28	1.90
- New Projects	19.57	169.31	149.65	53.97	320.92	151.70	13.66
<b>SCCL</b>	<b>37.50</b>	<b>40.80</b>	<b>3.30</b>	<b>2.70</b>	<b>45.00</b>	<b>4.20</b>	<b>1.98</b>
- Existing Mines	29.64	18.86	(-) 10.78	(-)	6.98	(-) 11.88	(-)18.03
- Ongoing Projects	7.86	13.62	5.76	8.69	6.34	(-) 7.28	(-) 14.18
- New Projects	-	8.33	8.33	11.62	31.68	23.35	30.63
				Indet			
<b>Captive &amp; Others</b>	<b>31.20</b>	<b>118.70</b>	<b>87.50</b>	<b>30.63</b>	<b>346.00</b>	<b>227.30</b>	<b>23.86</b>
- Captive Mining Producers	17.55	104.08	86.53	42.76	331.38	227.30	26.06
- Other Public/ Private Producers inclu TATA/DVC	13.65	14.62	0.97	1.38	14.62	0.00	0.00
<b>Total</b>	<b>432.50</b>	<b>680.00</b>	<b>247.50</b>	<b>9.47</b>	<b>1055.00</b>	<b>375.00</b>	<b>9.18</b>

#### 5) Managing Demand and Supply in XI and XII Plan Periods

1.9. The Committee has carefully reviewed the process for the frequent public discussions specially in the media regarding coal shortages and finds that much of these are due to lack of clearly legally binding supply contracts between the coal producers and the major bulk consumers of coal. As indicated elsewhere it is possible to have from the first year of the Eleventh Plan clear Fuel Supply Transport Agreement to which the coal supplier, the consumer and the railways who transport the coal would be the signatories. Such FSTAs would specify the quantity of coal to be supplied and the quantity to be transported by rail and the quantity and quality of coal which the consumer should receive when it is

delivered. There should be some penalty for non supply, non transport, or non acceptance of the coal by the three parties when the supply is done as per the FSTA. The Committee appreciates that power and cement demand would vary with season and there may be cyclical variations in coal demand for cement and power. But these should be taken note of at the beginning of each year and suitable provisions could be made in the FSTAs. The coal not accepted by the receiving party when supply is as per the FSTA should be offered in e-Auction at the risk of the receiver of coal.

- 1.10 About one third of the production of coal targeted for production in XI Plan is from the mines which have still not received all the necessary approvals. *The Committee will be making specific recommendations towards expediting the permission for mining in lands under the State agencies namely, Revenue Department and Forest Department. **Streamlining of the procedures for giving a decision on the application within a specified time by the State and Central Ministries of Environment and Forests at the State and India level are absolutely essential if any of the production forecasts indicated in the discussions above are to materialize.***

## **6) Long Term Coal Demand (upto 2031-32)**

- 1.11 The Integrated Energy Policy (IEP) Committee, in its report in May 2006, has projected the total energy demand in terms of different fuels with reference to a GDP growth of 8% and 9%. This Committee considers the assessment made in IEP report as adequate for purposes of planning at this stage. The broad basis of the IEP demand assessment for coal is set out below. IEP started with the forecast of Total Primary Commercial Energy Supply (TPCES), based on the past relationship between percentage growth of TPCES and that of GDP. This relationship may be called the elasticity of Total Energy with reference to Total GDP. In view of the past elasticity getting to be slowly falling over time as observed in other countries also, the IEP forecast of the relationship as follows:

**Table 1.6: Elasticity for TPCES to GDP**

Period	TPCES-1 (Falling elasticities)	TPCES-2 (Constant elasticities)	Electricity (Falling elasticities)	Electricity (Constant elasticities)
2004-05 to 2011-12	0.80	0.80	0.95	0.95
2011-12 to 2021-22	0.75	0.80	0.85	0.95
2021-22 to 2031-32	0.67	0.80	0.78	0.95

The Committee agrees with IEP report that it would be prudent to adopt the falling elasticity assumption. Based on that, the IEP has projected the TPCES and electricity demand with reference to 8% and 9% growth of GDP. This Committee felt that the forecast for coal should be made first with reference to TPCES demand and electricity demand with 9% GDP growth assumption. The projections are set out below in Table 1.7.

**TABLE 1.7: Projection of TPCES and Electricity requirements upto 2031- 32**

Year	Population Millions	GDP Rs. Billion	TPCES (MTOE)	Total Electric Energy Requirement Bkwhr	Projected Peak demand GW	Installed capacity required GW
2006-07	1114	18171	397	774	109	155
2011-12	1197	27958	551	1167	168	233
2016-17	1275	43017	748	1687	250	337
2021-22	1347	66187	1015	2438	372	488
2026-27	1411	101867	1360	3423	522	685
2031-32	1468	156689	1823	4806	733	960

MTOE = million tonnes of oil equivalent; bkw hr = billion kilowatt hours; GW = thousand megawatts

1.12 The forecast implies that the TPCES growth rate will be 6.46% (corresponding to 9% growth in GDP) per year in the first fifteen years but would average out as 6.29% during the next 25 years. This is against an observed growth rate of around 5% per year in the last 25 years. In respect of electricity as against the observed past growth rate of around 6.5%, the growth rate is likely to be 7.94% in the first fifteen years and around 7.58% in the total 25 year period. The Committee considers these projections as reasonable and accepts these as the basis of projecting the long-term coal demand.

1.13 IEP has estimated first the electricity generation possible from non fuel sources, namely, hydro, nuclear and renewables. The remaining electricity generation requirements have to be produced from fossil fuels, namely, coal and natural gas. The IEP has assumed that the share of gas based generation would increase to 20% of thermal generation from the current 12% and the coal based generation would be 80%. The electricity generation from hydro, nuclear and renewables derived from non fossil fuel are projected to be maximized during this period. In pursuance of this policy, the electricity generation from hydro is proposed to be increased from 74 bkw hr in 2003-04 to 401 bkw hr in 2031-32 at CAGR of 6.22% over the next 28 years. The nuclear will increase from 17 bkw hr in 2003-04 to 375 bkw hr in 2031-32 at CAGR of 11.17%. Similarly, renewables including wind will increase from 3 bkw hr to 24 bkw hr.

In the discussions which followed the publication of IEP, there were some doubts expressed regarding the very optimistic forecast on the possible growth on nuclear power and hydro electric power. There were also criticisms that the forecast of possible increase in renewable energy (including wind) was unduly conservative. The Committee examined these and felt that while they were justified on the basis of past trends, a very well planned approach to the development of these resources can result in the levels of growth increasing as anticipated. Therefore, for the purposes of this report, the Committee would agree with the total anticipated supply of electricity in the terminal year of XV Plan 2031-32 from non fuel sources to be 800 bkw hr as per the IEP report leaving 3693 bkw hr (consistent with 9% GDP growth) to be supplied by thermal resources.

The IEP Report has estimated that the coal requirements for power generation would then be 1659 million tonnes and the gas requirements would be 134 BCM by 2031-32. This coal requirement excludes the non power use of coal to the extent of 684 million tonnes. The total coal demand in 2031-32 thus adds upto 2343 million tonnes which includes lignite anticipated to be consumed in that year for power generation amounting to 120 million tonnes (coal demand net of lignite consumption being 2223 MT.). Another 30 million tonnes of lignite would be consumed in industries which in any case is not included in coal requirement of non power uses. The total coal requirement for power generation as per IEP Report should have been 1539 (1659 – 120) million tonnes assuming 9% growth in GDP. However, any shortfall in the production of electricity from non fuel resources would have to be met from coal. Therefore, the Committee feels that the total demand for coal for 2031-32 can only be noted in broad magnitudes. *In*

*the Committees' view, the total demand for coal including both non-power and power uses in 2031-32 adds up to 2373 million tonnes inclusive of lignite consumption of 150 million tonnes. The rate of growth implied in this forecast of coal demand is around 6.50% per year as against 5.2% achieved in the past 25 years. **The Committee would recommend that this target of 2223 million tonnes of coal demand (excluding lignite) should be taken for long term planning. Such long term planning would involve identification of adequate deposits to support this level of production and building up the infrastructure for mining and transporting such large quantities. The Committee is of the view, that the increase in the required rate of growth of coal production does not appear very daunting. However, the projected production target can be achieved only by taking up well planned exploration, mine development and mining efforts right from now on taking the planning cycle for coal production and power generation one Five Year Plan ahead of each plan period.***

- 1.14 The Committee recommends that from the Eleventh Plan onwards there should be concerted efforts for each plan period to make a detailed projection of coal needs for each power project of over 100 MW capacity and identify the source of coal supply from public sector mines planned to be in production in those years. The concerned coal company and power companies should be made to agree to a well-designed Fuel Supply & Transport Agreement (FSTA). Wherever such FSTAs are not concluded, it would be the responsibility of the Coal user to make his own arrangements to import or procure coal through e-Auction. Government should facilitate coal import to the extent needed by developing coal importing and exporting capability and port infrastructure to handle the surplus and deficit during this period.

## **7) Pre-conditions for achieving Long term Coal Targets**

- 1.15 The achievement of the long term coal production targets will not be easy unless detailed planning and necessary procedural changes are introduced at the earliest. Important requirements are that we should firm up our data regarding the availability of coal resources and the mineability on commercial basis. Simultaneously, there is need to streamline and simplify the procedures for giving necessary sanctions and approvals for taking up mining of coal by private and public sector. The issue of assessment of coal resources is discussed below in this chapter. The second pre-condition is dealt with in chapter II. The recommendations of both Parts I and II of the Report of Coal Sector Reforms

should be considered and early decision taken, if the coal sector is to deliver the expectations of the Nation.

## **8) Assessment of Availability of Coal Resources**

1.16 The achievement of the production level of 2223 million tonnes of coal (exclusive of lignite production target) in 2031 -32 would be feasible only if adequate deposits of proved coal resources are established and the Geological Reports (GRs) and mine development (project) reports are completed about one Plan Period ahead of the Mines identified for production. The present unsatisfactory nature of our knowledge of the Coal Resources in India has been discussed in detail in Part I of this Report.

An extract of the relevant paragraphs of Part-I of this report is given below:

CMPDI has given a tentative estimate of extractable reserves in the country as a whole in the Coal Vision document 2025 as on 1.1.2005 on the basis of the following criteria:

- Detailed exploration connotes confidence level of 90% in the proved reserves established.
- Regional exploration establishes the reserves in Indicated and Inferred categories. Confidence level of 70% is placed for Indicated reserves and 40% for Inferred reserves as worked out by the Association of German Metallurgists and Mining Engineers. (There is no indication whether the norms adopted by that body for defining Proved, Indicated and Inferred category reserves are the same as given in ISP 1957 and/or its modified version)
- Average RP (Reserves to Production) ratio of 4.7:1 is assumed in making a broad assessment of production possibilities from Proved, Indicated and Inferred reserves. This establishes CMPDI's extractable reserves although this ratio would vary widely for individual projects. Application of uniform RP ratio of 4.7:1 for reserves beyond 300 meters depth, however, would need justification.

The extractable reserves so worked out possibly include the coal reserves already depleted by mining. Precise assessment of balance recoverable/extractable reserves as on date is thus not known. In the Chari Committee Report it is stated that out of 67 bt of proved reserves upto 600 metres depth as on 1.1 1995 about 7.7 bt had been depleted and additionally about 2.5 bt would have been depleted by 2005 thus giving aggregate depletion of about 10 bt till 2005 but these would be extractable reserves and equivalent in place coal reserves would be much larger quantities, precise assessment of which is not available.

Table 1.8 below gives the National inventory of Extractable Coal Reserves as estimated by CMPDI upto 1200 m depth.

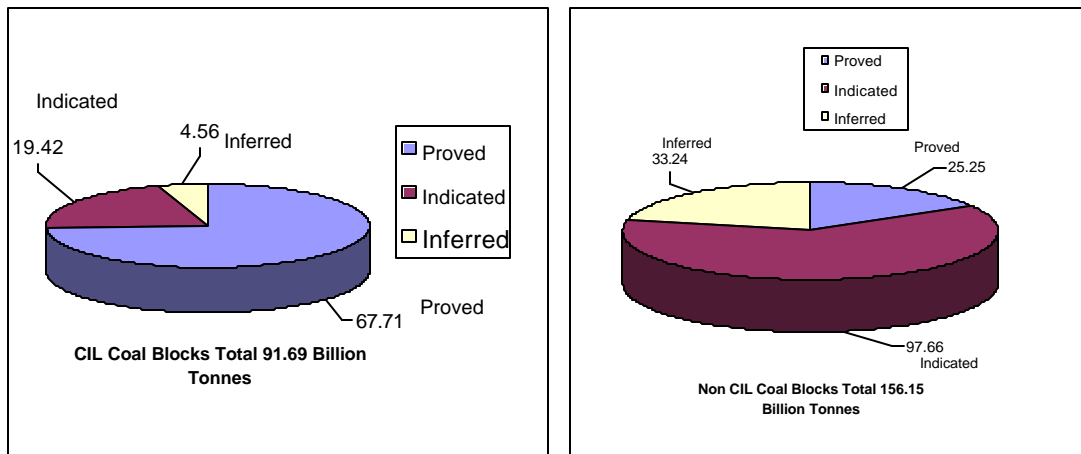
**Table 1 .8: Tentative Extractable Reserves of the National Coal Inventory**

Area	Geological Reserves as on 1.1 2005 *				Extractable Reserves*
	Proved	Indicated	Inferred	Total	
CIL Blocks	67.71	19.42	4.56	91.69	30.03 **
Rest	25.25	97.66	33.24	156.15	22.21 @
Total	92.96	117.08	37.80	247.84	52.24

\* These also include reserves “standing on pillars” in several underground mines that had been closed down after partial extraction of reserves during mine development stage without recovering the extractable reserves during depillaring stage prior to nationalization of coal mines.

\*\* Based on 2004 CMPDI study of 287 blocks proposed to be retained by CIL and existing CIL mines to enable it to give sustained coal production of 470 mt by the end of XI Plan till 2036-37 and reportedly exclude the reserves depleted till 2002 estimated at 3.77 bt.

@ Based on 2001 CMPDI study of 114 CIL Blocks projectised till 1998 out of 231 blocks explored by CMPDI till 1996 which analysis justified the assumption of R/P ratio of 4.7:1



1.17 The tentative assessment of extractable reserves for blocks other than those reserved for CIL for exploitation is based on 2001 CMPDI study of actual mineable/extractable reserves broadly on the basis of analysis of 114 Geological Reports of CIL projectised upto the year 1998 and the nature and the results of their projectisation. Overall extractable reserves in open cast mines in this study ranged from 19% to 90% of in place geological reserves and that from underground mines varied from 9% to 53%. The weighted average of extractable reserves in OC mines was estimated at 63% and in underground mines at 26%.



Most of the GRs projectised are limited to a depth of 200 m for open cast projects and 350 to 400 m for underground mines. Findings of this study have been extended to deep seated reserves upto 1200 m depth in the absence of any other data. Moreover, GRs prepared for SCCL command area where contribution of underground mining is substantially higher have not been included in this study. .

A different methodology of assessment of extractable reserves has been applied for CIL Blocks based on 2004 CMPDI study according to which out of total reserves of 92.55 bt estimated in 287 blocks (proposed to be retained by CIL) and existing CIL mines/projects as on 2002 (out of total geological reserves of 234 bt assessed for the entire country and now reported to be 91.69 bt out of total reserves of 247.84 bt) 9.01 bt are unavailable for mining due to surface constraints, 30.34.bt are not extractable due to technical constraints and 19.41.bt cannot be extracted economically. Further, 3.77 bt of reserves are stated to have been depleted till 2002 (cumulative production of coal since nationalization till 2002 would actually be in excess of 5.8 bt and production since independence till 2002 would be in excess of 8.5 bt and another 0.7 bt of coal would have been produced in the twentieth century prior to independence) giving net extractable reserves of 30.03 bt for CIL Blocks/mine/projects. Such a level of extractable reserves would effectively mean R/P ratio of 2.52:1. The extractable reserves may in fact be significantly lower since average recovery ratios for reserves amenable to open cast and underground mining have apparently not been applied. In case R/P ratio of 4.7:1 is used the extractable reserves of CIL blocks would get reduced to 16.25 bt. thereby reducing aggregate extractable reserves to 38.46 bt.

The methodology adopted for assessment of extractable reserves in CIL Blocks is in line with an alternative approach to assessment of extractable reserves by evaluating the reserves unavailable for mining due to surface and geotechnical constraints enumerated in para 2.31 of Chapter II of Part I of this Report and applying average recovery ratios to mineable reserves amenable to open cast and underground mining on techno-economic considerations. Extractable reserves would increase in case it is possible to divert, reroute or otherwise to get around the surface constraints. It is also necessary to work out balance recoverable reserves taking into account reserves already depleted minewise. Such an exercise would not be too difficult if annual audit of reserves is conducted for each mine regularly as is the international practice (reserves are treated as a kind of capital asset of wasting nature).

- 1.18 The discussion above clearly highlights the fact that the **data on India's inventory of coal reserves as also the estimates of extractable reserves could benefit immensely by an independent assessment.** As a matter of institutional design, any structure wherein all detailed exploration for coal is done exclusively by a single entity is bound to be sub-optimal. This would be so in any field and though CMPDI is a highly competent coalmine-engineering group one cannot act always on the opinion of that single agency. The situation is further complicated by the fact that CMPDI is a subsidiary of CIL, the dominant player in the sector. There is a strong feeling among the new aspirants for coal mining, that CMPDI, under the given structure, is likely to be guided by what is technically feasible and economically advantageous for Coal India. One cannot hope for anything better under the prevailing structure but clearly the entire debate on India's coal reserves, optimal strategy for extracting these reserves and the appropriate mining technology need to be debated more openly. There should be multiple technical agencies to assist India in strategizing coal exploration and exploitation efforts. Most importantly, if one accepts CMPDI's estimates of extractable reserves and domestic production is assumed to increase by 5% per annum, India's coal reserves may serve us only for 30-40 years which will of course get extended as CMPDI every year adds around 2.8 to 3.0 billion tonnes of proved in place reserves, the quantity of extractable reserves however would be much smaller. While, our knowledge as mapped by CMPDI does not support the view that we have "huge resources", it does provide confidence that at least in the next thirty years coal requirement of all sectors including power could be met from our resources. This opens the window of opportunity to speed up our efforts to accelerate the pace of regional surveys and drilling to complete the comprehensive coal resource assessment exercise and to re-examine the foundations of our energy security policies and programmes.
- 1.19. During the discussions, officials of CMPDI stated that it is planning to double its exploration and drilling capability which is only 2 billion tonnes per annum now. The Committee is unable to agree with this since for a country of India's size and the need for exploration and drilling for all minerals including coal is so large, there is considerable scope for increasing the drilling capacity several fold with the assistance of CMPDI and with the introduction of private parties in exploration for minerals.
- 1.20 **The Committee, on the basis of the above analysis, concluded that the earlier premise that coal shall remain India's primary source of commercial energy**

**supply is equally relevant even today. In order to derive the level of confidence needed for this and make this a reality, the Committee recommends that a time –bound plan to cover the entire country by regional mapping in 15 years should be prepared by GSI, CMPDI and MoC. Funding for this should commence without any further delay. The MoC must launch a program of detailed exploration and drilling, in the 11<sup>th</sup> Plan, aimed at increasing proved category reserves. The Committee recommends the creation of a Revolving Fund of Rs. 500 crores for this purpose.** The fund would recover the outlays once the mining leases are granted on the reserves so proven. **Such an enhancement in the capacity for detailed exploration could potentially add about 10 billion tonnes of coal to the proven category annually.**

Besides upgradation of drilling capabilities requiring additional budgetary outlays **it may be possible to minimize drilling requirements and speed up exploration activities by using geophysical tools** (integrated surveys using one or more tools such as 2-D, 3-D reflection seismic, refraction seismic, High Resolution seismic and In-seam Seismic, Gravity, Magnetic, Electromagnetic (EM), Electrical - Resistivity, Induced Polarisation and Self Potential – Magneto-telluric as well as Ground Penetrating Radar surveys etc.) **in conducting coal exploration. The new science of geostatistics could also be helpful in minimizing exploratory drilling requirements.** Magnetic, gravity and seismic data could help in delineation of incrop areas, faults and igneous intrusives such as dykes and sills and other features of sub-surface geology thereby avoiding drilling of large number of diamond drill holes otherwise required to be drilled for this purpose (only a few boreholes for ground truthing would be required). GPR surveys together with helicopter borne EM surveys can be effectively utilised for mapping voids and flooded mine workings in coal bearing areas that have been extensively mined in the past (such as Jharia and Raniganj coalfields) and thereby enabling proper assessment of reserves standing on pillars in such areas and to plan most appropriate strategy for recovering them.

**Coal exploration could be speeded up and cost of exploration minimized by using some non-coring drilling through blast hole drills supplemented by borehole geophysical measurements** (in place of cent per cent coring diamond drilling).. Borehole geophysics could be extremely useful in correlation of various seams in a coalfield and in assessing the thickness and quality of coal seams and

the nature of their roof and floor strata even in cored boreholes where core recovery is poor (less than 90%).

**It is also observed that all borehole intersections are often not analysed for testing the quality of coal seams even in terms of proximate analysis (which analyses only ash, moisture, volatile matter and fixed carbon content of coal encountered in the borehole) and GCV is often not determined experimentally because of coal quality testing capacity constraints. As such some GRs may have to be finalized without the receipt of some quality data from the laboratories.**

In short, **not only the exploration capacity in the country needs to be enhanced, the whole system of coal exploration established in the country needs to be overhauled with significant augmentation of coal testing facilities.**

- 1.21 Some new facts regarding coal resource assessment and preparation of coal Inventory have come to light recently. In para 2.26 (a) of Chapter II of Part I Report it was stated that out of total surveyed area of 49000 sq km having coal bearing sedimentary formations of Gondwana Group and Tertiary formations only 22400 sq km is the total potential coal bearing area that needs to be explored through regional exploration followed by detailed exploration as per details furnished to Planning Commission at the beginning of X Plan and is also reported in Coal Vision 2025 document. This has now been reduced to 17300 sq km in the WG XI Plan (which was the figure given in IX Plan Working Group Report) out of which 12000 sq km has been regionally explored (60%) and of this 5570 sq km (46%) has been covered by detailed exploration. Further, out of 60 coalfields explored so far in the country basement has been hit at less than 300 meters depth in 39 coalfields (65% of all coalfields) but details about areas explored regionally and in detail and areas still to be explored coalfield wise are not available. The balance 5300 sq km area still to be regionally explored is planned to be covered by the end of XII Plan. **There is thus very limited scope for additional coal resource accretion only on the balance 5300 sq km area yet to be explored regionally.** Director Coal Wing of GSI in a paper presented at Coal Summit 2005 has stated that **prospective 17300 sq km area is the area having “viable” coal resources within 900 meter depth although GSI prepares coal inventory upto a depth of 1200 meters.**

**According to GSI there are several coalfields such as Talchir, Ib Valley, South Karanpura etc. where coal bearing Karharbari, Barakar and Raniganj formations occur at depths exceeding 1200 meters under cover of younger sediments but the drilling rigs available with GSI are not able to explore beyond 900 to 1000 m depth. USGS (United States Geological Survey) and many European countries assess their coal and lignite resources upto a depth of 1800 meters or more (several mines in Europe have been worked upto this depth in the past). Moreover, CBM resource assessment of a coal or lignite basin is possible only upto a depth to which the coal or lignite resources have been assessed. Besides CBM deep seated coal resources may be harnessed through innovative technologies such as UCG. It is, therefore, time that coal and lignite resource assessment in India is also extended to a depth of at least 1800 meters thereby considerably expanding the potential area to be explored not only in the Gondwana sedimentary basins but also in Tertiary coal and lignite basins in Assam and other NE states, Tamil Nadu, Gujarat and Rajasthan to maximise the coal resource base of the country.**

- 1.22 It is recently learnt from GSI that the data annually furnished by CMPDI on results of detailed and promotional exploration conducted by it/under its supervision gives details of depthwise, gradeswise and statewise proved, indicated and inferred reserves for incorporation in coal inventory but information on seamwise details of reserves are not made available to GSI. If this is true this will have implications for correlation of seams under detailed, promotional and regional exploration results since indicated and inferred category coal reserves are assessed by GSI for incorporation in coal inventory. In fact ISP (1957) had clearly stipulated that coal reserves should also be assessed seam thicknesswise which data is not available in the coal inventory prepared by GSI even though thickness data may be crucial in the choice of appropriate mining technology/equipment specification/configuration particularly for underground mining projects.
- 1.23 It is further learnt that **CMPDI is facing shortage of skilled professionals (surveyors, geologists, geophysicists, drilling and mining engineers) and this situation is likely to become more acute since a large number of such experienced professionals in CMPDI would be superannuating within the next 5-6 years** and the workload is likely to increase sharply with the envisaged growth of the coal sector. If this is true **the committee would recommend that steps would need to be initiated immediately for recruitment of required number of professionals to handle the envisaged workload so that newly**

**recruited professionals could have the opportunity of working with the experienced professionals for some time before their superannuation** and receive hands on training thereby averting a crisis in the making. **Even the coal Wing of GSI is facing shortage of geologists, geophysicists and drilling personnel** since many of the experienced professionals in GSI are also likely to superannuate soon.

1.24 Chari Committee in its Report on Integrated Coal Policy had made the following recommendations regarding coal exploration which deserve to be reiterated and some of which need to be focused:

- Identification of areas for detailed exploration is based on the analysis of regional exploration data of GSI (besides the promotional exploration conducted by MOC through CMPDI) but this data is made available only on prior payment. Since all the regional exploration data cannot be converted into detailed exploration prospects, exploitation agencies need to be provided substantial details of selected blocks for pursuing the matter further.
- Lack of infrastructure in outlying coalfields where sizeable reserves have been estimated by GSI/CMPDI, is restricting the scope of detailed exploration.
- Exploration operations in forest areas are becoming difficult in view of existing legal constraints. As a result major portions of the coal bearing areas under forest cover have remained unexplored.
- Foreign technology and capability would need to be enlisted to accelerate the speed of detailed drilling.
- Regional and detailed exploration activities of coal and lignite need to be integrated and brought under the control of an independent body. The body could be vested with the responsibility of getting the exploration activities conducted through Indian and foreign agencies at optimal costs by infusion of new technologies and induction of additional physical capabilities. Such a body should plan overall drilling programme, decide priority of development, and allocate work and resources for the regional and detailed exploration purposes to both private Indian and foreign and public sector exploration agencies. It can obtain inputs from GSI and CMPDI.
- To support the exploration activities in the absence of budgetary support, it is suggested that a surcharge of appropriate amount per tonne be levied on all coal produced in the country and separate exploration fund is created and placed at the disposal of the independent body.

1.25 The Committee would like to reiterate the recommendations made in Part I extracted above. ***The Committee would further suggest that in view of the enthusiasm for coal mining now appearing in the major coal users, their efforts should be enlisted even for exploration for coal resources. There is need therefore to introduce exploration -cum-mining leases in coal industry***

***on the lines of NELP (New Exploration Licensing Policy) in the Oil Sector***  
(See Enclosure-I to this Chapter for details).

The other pre-requisites relating to procedures are dealt with in the next chapter.

## **II – Lignite Demand & Supply Prospects**

- 1.26 In Part I of this Report the focus of attention was to study the coal demand and supply imbalances likely to arise in the short and medium term as per the TOR. However, it was mentioned in para 1.9 of Part I Report that the Committee would deal with the Lignite industry in Part II of the Report.
- 1.27 Consideration of lignite industry in this Report is necessary because while the short and medium term management of coal demand supply discussed in Chapter III of Part I of this Report did not include demand and production of lignite, the long term coal demand scenarios at 5 yearly intervals till 2031-32 discussed in para 2.22, Chapter II of Part I Report included lignite likely to be consumed for lignite based power generation in the relevant years but did not include lignite likely to be consumed in industry in the non power coal demand. In order to appreciate the long term coal demand supply scenario net of lignite to be consumed in power generation it is necessary to strip the coal demand figures of such lignite consumption. Further, lignite resources in India mainly occur in three states of Tamil Nadu, Gujarat and Rajasthan which are devoid of any coal resources and are situated far away from coal sources which are concentrated mainly in Eastern and Central regions of the country. Harnessing lignite resources thus helps in reducing the cost of transportation of coal for power generation and industrial uses even though it is a low calorific value fuel with 25% less heat value compared to average Indian coal being used in power generation. At present lignite production in the country constitutes 7.3% of coal production and 5.5% of coal production in terms of coal equivalent thermal value.
- 1.28 Production of Lignite commenced in the country at the beginning of III Plan (1961-62) when Neyveli Lignite Corporation (NLC) started its operation to produce lignite from Mine I with the setting up of 600 MW lignite fired power station in 1962-63 together with fertilizer plant using lignite feedstock (which plant was later closed down after the same was run on naphtha feedstock for some years). However, the production of lignite did not pick up till the middle of VI Plan until the problems posed in mining of lignite by artesian aquifer underlying the lignite seam were

resolved. Production picked up fast during the Eighties and Nineties not only because of expansion of NLC mines in Tamil Nadu but also with the commencement of lignite mining in Kutch region of Gujarat in 1977-78 for industrial uses besides power generation. The progress of lignite mining in India till the end of X Plan can be summarised as follows (Production of lignite in Rajasthan had started during IX Plan):

**Table: 1.9 Production of Lignite from III Plan Onwards**

Plan Period	Terminal Year	Production in Mty	Growth Rate (CAGR %)
III Plan	1965-66	2.56	-
IV Plan	1973-74	3.32	3.29
V Plan	1978-79	3.30	(-) 0.12
VI Plan	1984-85	7.84	15.51
VII Plan	1989-90	12.36	9.53
VIII Plan	1996-97	22.64	9.03
IX Plan	2001-02	24.81	1.85
X Plan	2006-07	31.57	4.93

## 9) Review of Lignite Demand Supply Targets for X Plan

1.29 Lignite demand target for the terminal year of X Plan was set at 57.79 Mt to meet the lignite requirements of projected lignite based generating capacity of 6380 MW with plans to add generating capacity of 3845 MW during X Plan to the capacity of 2535 MW already installed by the end of IX Plan. Additionally, provision was made for sharp increase in lignite use in industry, particularly in Gujarat (cement, textiles, chemicals, paper, bricks and ceramics and a host of other industries including solvent extraction, soda ash and captive power generation, etc.) with planned annual growth rate of 18.54% over actual demand in 2001-02 when 3.61 Mt of lignite was consumed in industry. As such a production target of 55.96 Mt was set for 2006-07 (against production level of 24.81 Mt achieved in 2001-02) with planned annual growth rate of 17.67%. However, the planned additional generating capacity did not come on stream and only total generating capacity of 3655 MW is likely to be installed by 2006-07, i.e. additional generating capacity of only 1120 MW is actually likely to be installed during X Plan. The growth in industrial use was also quite subdued, though fluctuating, during X Plan. Consequently, the Lignite demand by the end of X Plan is now likely to be only 32.40 Mt with production level of 31.57 Mt is anticipated to be achieved. The story



of lignite demand and production targets for the various Plan periods is thus similar to that of coal.

## 10) Lignite Demand and Production Targets for XI & XII Plans

1.30 Lignite is principally used for power generation at pit head power plants. The percentage of lignite actually used for power generation has varied from 80% to 86% since 2001-02 (more than 98% of lignite consumed in Tamil Nadu was for power generation during this period). Demand for lignite is thus governed mainly by lignite based generating capacity actually/planned to be installed. Statewise installed/planned capacity addition during X, XI and XII Plans is given in Table 1.10A and 1.10B below.

Table 1.10A: Installed Lignite based Generating Capacity till 2006-07

State	Installed Capacity at the end of 2001-02	Capacity addition during X Plan		Total installed capacity at the end of 2006-07			
		Planned	Likely		Planned	Likely	
			WG	Expert Committee		WG	Expert Committee
Tamil Nadu	2070	1670	670	670	3740	2740	2740
Gujarat	465	1250	264*	325*	1715	729*	790*
Rajasthan	-	925	125	125	925	125	125
<b>Total</b>	<b>2535</b>	<b>3845</b>	<b>1059</b>	<b>1120</b>	<b>6380</b>	<b>3594</b>	<b>3655</b>

Table 1.10B: Installed Lignite based Generating Capacity Likely by end of XI & XII Plans

State	Installed Capacity at the end of 2006-07	Capacity addition during XI Plan		Total capacity in 2011-12		Projected Capacity Addition During XII Plan 2016-17	Total capacity in 2016-17
		WG	Expert Committee	WG	Expert Committee		
Tamil Nadu	2740	500	500	3240	3240	2000	5240
Gujarat	790*	825	250	1615	1040	1250	2865
Rajasthan	125	925	625	1025	750	500	1525
<b>Total</b>	<b>3655*</b>	<b>2225</b>	<b>1375</b>	<b>5880*</b>	<b>5030</b>	<b>3750</b>	<b>9630</b>

\* WG has indicated the total capacity by 2011-12 as 5819 MW assuming likely installed capacity in 2006-07 as 3594 MW (729 MW in Gujarat as against likely installed capacity of 790 MW – one 200 MW and one 125 MW commissioned during X Plan in addition to 465 MW capacity existing as on 2001-02)

1.31 Lignite demand of 55.59 million tonnes has been made by the Working Group for the XI Plan assuming additional generating capacity of 2225 MW during XI Plan

over the likely total installed capacity of 3655 MW in 2006-07 (considering total installed capacity of 790 MW in Gujarat instead of 729 MW shown in WG) and sharp increase in lignite consumption in non power use estimated at 13.47 million tonnes. However, lower estimate of lignite demand of 49.68 million tonnes has been made in the Planning Commission for the Expert Committee on Coal Sector Reforms assuming that additional generating capacity of only 1375 MW as per the list of power plants identified by CEA that are most likely to come up during the XI Plan and more moderated lignite demand for industrial use. Details are given in Table 1.11 below. From the projections made in IEP for coal demand at five yearly intervals inclusive of lignite consumed for power generation applying growth rates for non power use of coal to for such lignite consumption estimated for 2003-04 the lignite demand for 2011-12 works out to 45 million tonnes assuming 9% GDP growth and 40 million tonnes assuming 8% GDP growth (see table 1.13A and 1.13B below for details)

**Table 1.11: Lignite Demand in XI & XII Plans**

(figures in Million Tonnes)

Sector	IX Plan (Actual)		X Plan 2006-07		XI Plan 2011-12		XII Plan 2016-17
	2001-02	2005-06	Target	Anticipated	Assessed By WG	Assessed By Expert Comm	Assessed By WG
Power (Utilities)	20.78	24.50	49.34	28.00	42.12	39.68	68.56
Growth Rate		(4.20%)	(18.88%)	(6.15%)	(8.59%)	(7.30%)	(10.23%)
Capacity (MW)	2535	3455	6380	3655	5880	5030	9630
Generation (B. U.)	17.32	20.41	41.28	23.34	35.03	32.85	57.36
PLF (%)	78%	67.4%	73.9%	72.9%	68%	74.6%	68%
Industries	3.61	6.00	8.45	4.40	13.47	10.00	19.67
Growth Rate		(13.54%)	(18.54%)	(4.04%)	(25.08%)	(17.84%)	(7.87%)
a) Cement					1.10		1.65
b) Paper					0.25		0.31
c) Chemicals					1.50		2.20
d) Textiles					2.82		4.14
e) Bricks & Ceramics					1.03		1.40
f) Other Industries					6.77		9.97
<b>Total</b>	<b>24.39</b>	<b>30.50</b>	<b>57.79</b>	<b>32.40</b>	<b>55.59</b>	<b>49.68</b>	<b>88.23</b>
Growth Rate		(5.75%)	(18.83%)	(5.84%)	(11.40%)	(8.92%)	(9.68%)
Share of Power Gen	84.5%	80.3%	85.4%	86.4%	75.8%	79.7%	77.7%

1.32 Also presented in Table 1.11 above is the lignite demand for XII Plan estimated by the Working Group based on the assumption that additional lignite based

generating capacity of 3750 MW will be installed during the XII Plan, the total installed capacity by the end of XII Plan would thereby aggregate to 9630MW and that non power use of lignite would increase from 13.47 million tonnes in 2011-12 to 19.67 million tonnes, mostly in Gujarat and Rajasthan. Analysis of IEP coal demand for 2016-17 shows that lignite demand would be about 60 million tonnes assuming 9% GDP growth and 53 million tonnes assuming 8% GDP growth.

## 11) Lignite Production Feasibility during XI & XII Plans

1.33 Except for 7.39 million tonnes of lignite to be produced from unidentified projects in Rajasthan in 2016-17 the Working Group has given minewise details of identified projects for lignite production targets set for 2011-12 and 2016-17 for the three states of Tamil Nadu, Gujarat and Rajasthan producing lignite as elaborated in Table 1.12 below. The Committee feels that the lignite production targets are achievable provided lignite demand targets are actually realised without any slippages in planned generating capacities (as had happened in X Plan when large chunk of capacity did not come on stream for various reasons) and non power lignite demand does not fall short of the estimates.

**Table 1.12: Lignite Production Feasibility in XI & XII Plans**

(figures in Million Tonnes)

State/Mine	X Plan				XI Plan	XII Plan
	2001-02 (Actual)	2005-06 (Actual)	2006-07		2011-12 (Proj)	2016-17 (Proj.)
			Target	(Antici)		
<b>Tamil Nadu</b>	<b>17.73</b>	<b>20.44</b>	<b>33.68</b>	<b>20.40</b>	<b>24.23</b>	<b>37.83</b>
Growth Rate (%)		(3.62%)	(13.69%)	(2.85%)	(3.50%)	(9.32%)
<i>a) Public Sector (NLC)</i>					24.23	31.03
Mine I					8.93	8.93
Mine IA					2.55	2.55
Mine I/II E					12.75	12.75
Mine III					-	6.80
<i>b) Private Sector</i>						6.80
Jayakondam					-	6.80

<b>Gujarat</b> Growth Rate (%)	<b>6.60</b>	<b>8.94</b> (7.78%)	<b>15.80</b> (19.08%)	<b>10.10</b> (8.88%)	<b>22.26</b> (17.12%)	<b>32.06</b> (17.57%)
a) <i>Public Sector (GMDC)</i>					11.50	14.50
Panandhro					3.00	2.00
Akrimota					1.50	2.00
Unarsar					1.50	2.00
Lakhpat					-	1.00
Mata no math					1.50	1.50
Tadkeshwar					2.00	2.00
Amod					1.00	1.00
Moran					1.00	1.50
Ghala					-	1.50
b) <i>Joint Sector</i>					4.67	4.67
Surka-I (GPCL –GMDC)					4.67	4.67
c) <i>Private Sector</i>					6.09	12.89
Khadsaliya-I,II (GPCL- Nirma)					2.49	2.49
Vastan (GIPCL)					1.80	1.80
Valia-Mangrole (GIPCL)					1.80	8.60
<b>Rajasthan</b> Growth Rate (%)	<b>0.48</b>	<b>0.69</b> (9.50%)	<b>8.60</b> (68.29%)	<b>1.07</b> (17.39%)	<b>8.47</b> (51.25%)	<b>19.69</b> (18.38%)
a) <i>Public Sector</i>					8.47	12.30
Giral (RSMML)					1.00	1.00
Matasukh Kasnau (RSMML)					0.60	0.60
Sonari (RSMML)					1.00	1.00
Gurah (RSMML)					1.00	1.00
Mokhala (RSMML)					0.30	0.30
Shivkar (RSMML)					1.00	1.00
Barsingsar (NLC)					1.78	1.78
Bithnoth (NLC)					1.79	1.79
Riri (NLC)					-	3.83
b) <i>Unidentified Projects</i>					-	7.39
<b>Total</b> Growth Rate	<b>24.81</b>	<b>30.07</b> (4.92%)	<b>55.96</b> (17.67%)	<b>31.57</b> (4.94%)	<b>54.96</b> (11.73%)	<b>89.58</b> (10.26%)
a) Public Sector					44.20	57.83
b) Joint Sector					4.67	4.67
c) Private Sector					6.04	19.69
d) Unidentified projects					-	7.39

## 12) Long Term Lignite Demand (Upto 2031-32)

1.34 IEP has not modeled lignite demand separately. While lignite used for power generation is included in the coal demand but that consumed for industrial use has not been considered. An attempt has been made in Planning Commission for the Expert Committee to segregate the lignite demand for power generation and to assess the non power lignite use. It is clearly stated in para 10 on page 22 of the IEP report that electricity generation from coal based stations also includes electricity generation from lignite. Coal demand (including lignite) for power generation (utilities plus non-utilities above 1 MW capacity) increases from a level of 318 Mt. in 2003-04 to 1659 Mt. in 2031 -32 @ CAGR of 6.08% consistent with 9% GDP growth. Applying this growth rate to lignite consumed in 2003-04 for

power generation estimated at 23 million tonnes the lignite demand for power generation works out 120 million tonnes in 2031-32 assuming 9% growth in GDP. Non power coal use increases from 91 million tonnes in 2003-04 to 684 million tonnes in 2031-32 giving CAGR of 9.47%. At this rate 4 million tonnes of non power use of lignite would increase to 30 million tonnes in 2031-32. Thus total demand of lignite in 2031-32 would be 150 million tonnes. Table 1.12A below gives details of total lignite demand as well as total coal demand (net of lignite consumed for power generation) at 5 year intervals upto 2016-17 and for 2031-32 consistent with 9% growth in GDP and Table 1.12B gives the same data consistent with 8% growth in GDP.

**Table 1.13A: Projection of Lignite Demand in 2031-32**

(As per IEP Data Base – Assuming 9% GDP Growth)

(Figures in Million tonnes)

Year	Coal Consumption (As per IEP)	Coal Consumption for coal based Generation	Lignite Consumption for power Generation	Non Power Coal Demand (IEP)	Non Power Lignite Use	Total Lignite Demand	Total coal Demand
2003-04	318	295	23	91	4	27	386
2006-07	379	351.6	27.4	123	5.4	32.8	474.6
2011-12	521	483.3	37.7	170	7.5	45.2	653.3
2016-17	678	629	49	237	10.4	59.4	866
2031-32	1659	1539	120	684	30	150	2223

**Table 1.13B: Projection of Lignite Demand in 2031-32**

(As per IEP Data Base – Assuming 8% GDP Growth)

(Figures in Million tonnes)

Year	Coal Consumption (As per IEP)	Coal Consumption for coal based Generation	Lignite Consumption for power Generation	Non Power Coal Demand (IEP)	Non Power Lignite Use	Total Lignite Demand	Total coal Demand
2003-04	318	295	23	91	4	27	386
2006-07	337	312.6	24.4	123	5.4	29.8	435.6
2011-12	463	429.5	33.5	164	7.2	40.7	593.5
2016-17	603	559.4	43.6	221	9.7	53.3	780.4
2031-32	1475	1368.3	106.7	562	24.7	131.4	1930.3

### 13) Assessment of Availability of Lignite Resources

1.35 The total in place geological reserves of lignite in the country is estimated at 38.27 billion tonnes as on 1.4.2006. The statewise and depthwise distribution of these reserves is given in Table 1.14 below:

**Table 1.14: Inventory of Lignite Geological Reserves**  
(As on 1.4.2006)

State	Proved		Indicated		Inferred		Total	
	Amount	%age to total	Amount	%age to total	Amount	%age to total	Amount	%age to total
<b>Tamil Nadu</b>	<b>2.831</b>	67.78	<b>16.954</b>	83.69	<b>11.138</b>	80.49	<b>30.923</b>	80.79
0-150 m	2.831		1.981		0.819		5.631	
150-300 m	-		6.742		1.526		8.268	
>300 m	-		8.231		8.793		17.024	
<b>Rajasthan</b>	<b>0.561</b>	13.43	<b>2.620</b>	12.93	<b>1.054</b>	7.62	<b>4.235</b>	11.06
0-150 m	0.556		0.828		0.164		1.548	
150-300 m	0.005		1.433		0.360		1.798	
0-300 m	-		0.358		0.505		0.863	
>300 m	-		0.001		0.025		0.026	
<b>Gujarat</b>	<b>0.785</b>	18.79	<b>0.259</b>	1.28	<b>1.618</b>	11.69	<b>2.662</b>	6.96
0-150 m	0.315		0.062		0.045		0.422	
150-300 m	0.001		-		0.008		0.009	
0-300 m	0.469		0.197		1.565		2.231	
<b>Pondicherry</b>	-		<b>0.406</b>	2.00	<b>0.011</b>	0.08	<b>0.417</b>	1.09
0-150 m	-		0.406		0.011		0.417	
<b>Kerala</b>	-		-	0.00	<b>0.010</b>	0.07	<b>0.010</b>	0.03
0-150 m	-		-		0.010		0.010	
<b>Jammu &amp; Kashmir</b>	-		<b>0.020</b>	0.10	<b>0.007</b>	0.05	<b>0.027</b>	0.07
0-150 m	-		0.020		0.007		0.027	
<b>Total</b>	<b>4.177</b>	100.00	<b>20.259</b>	100.00	<b>13.838</b>	100.00	<b>38.274</b>	100.00
0-150 m	3.702	88.63	3.297	16.28	1.056	7.63	8.055	21.05
150-300 m	0.006	0.14	8.175	40.35	1.894	13.69	10.075	26.32
0-300 m	0.469	11.23	0.555	2.74	2.070	14.96	3.094	8.08
> 300 m	-	0.00	8.232	40.63	8.818	63.72	17.050	44.55
<b>%age to Total</b>	<b>10.91</b>		<b>52.93</b>		<b>36.16</b>		<b>100.00</b>	

1.36 Unlike inventory of coal resources which includes resources upto a depth of 1200 meters the inventory of lignite resources include resources limited to a depth marginally exceeding 300 meters against international practice of assessing lignite resources upto a depth of 1800 meters or more. Further, only about 11% of total lignite resources have been proved as against more than 37% of total coal resources having been proved and these are restricted to the three states of Tamil Nadu (68%), Rajasthan (13%) and Gujarat (19%) and these are largely limited to a depth of 150 meters except for Gujarat where nearly 60%

of proved reserves are estimated upto a depth of 300 meters. Nearly 53% and 36% of total lignite resources are placed in Indicated and Inferred categories, a very large proportion of these resources are beyond 150 meters depth, especially in Tamil Nadu and Gujarat. **Again, unlike coal resource assessment, no information is available about total surveyed area having lignite bearing Tertiary sedimentary formations all over the country and the potential lignite bearing area corresponding to 300 m or more depth of lignite seams and the area which has been explored regionally or through detailed exploration or about the number of blocks delineated on the basis of regional exploration.**

- 1.37 A number of thick lignite seams have reportedly been encountered in oil and gas exploration wells in Tamil Nadu, Gujarat and Rajasthan at depths exceeding 1000 meters and some of the potentially CBM bearing blocks have been allocated for CBM exploitation by DGH under NELP. These lignite resources do not form part of lignite inventory at present in the same manner as some of the coal seams encountered in oil and gas exploration wells in the Cambay basin in Gujarat.
- 1.38 **No information is available on the seam thicknesswise distribution of categorywise geological reserves or about total and balance extractable reserves of lignite available in the country.** The problem of depletion of lignite reserves is not as severe as coal reserves since production of lignite started only about 45 years ago and for first 20 years production did not exceed 3 million tonnes per year. Cumulative production of lignite since 1961-62 till 2005-06 would be a little over 500 million tones which is about 12% of proved lignite resources as on 1.4. 2006. However, knowledge about lignite resources of the country is deficient in a manner similar to that of coal resources. **Life of lignite resources is difficult to assess in the absence of requisite knowledge about balance extractable/recoverable reserves as on date.**

#### **14) The need for a mind-set change**

- 1.39 The Committee is concerned that erroneous perceptions regarding coal industry persists among a wide section of officials including (officials working in the coal sector) and a large section of civil society, because of biased misinformation widely publicized by the media without any effort on the part of public sector coal industry to correct these. The reality is that coal industry has been performing as per the directions of the Ministry and the level of efficiency is not very different from that of other public sector undertakings. There is need for a concerted effort to disseminate the right information regarding coal industry's performance and

failures periodically with an analysis of causes for the same. This is important as the Committee considers that the coal has to serve as the main foundation on which energy security of our country would depend.

### Box 2: Coal Industry in USA

US Coal Production has increased from 560 million tonnes in 1950 to 1130 million tonnes in 2005. There are a large number of private companies engaged in coal production in USA and only ten major companies account for 70% of coal production. The Energy Information Agency (EIA) in the annual Energy Outlook 2006 gives the forecast that the production will increase at the rate of 1.1% per year upto 2015 and then 2% per year upto 2030. The production in 2030 is likely to be over 1600 million tonnes.

The Coal production in the western region will grow because of lower sulphur content and coal transport to the east will grow rapidly as the power plants are coming mostly in the east. The average cost of production of coal in USA at the mine head was reported to be \$18 per ton (\$ 2002). The EIA projects this to be stable over the next 25 years.

Source: Gathered by T.L. Sankar from Internet

1.40 Furthermore, India is in a position to play a crucial role in the world coal market of the future. Among the commercial fuels, coal is the most abundant even as per the information now available which is partial and needs to be improved by accelerated exploration and drilling efforts. As per current knowledge, India is the third largest producer of coal and the fourth largest holder of coal reserves. The world recoverable coal reserves are reported as follows:

**Table 1.15: World Recoverable Coal Reserves**

Region/Country	Coal	Lignite	Total
World Total	<b>827.4</b>	<b>173.4</b>	<b>1000.9</b>
United States	234.7	36.0	270.7
Russia	161.6	11.5	173.1
China	89.1	20.5	126.2
India	99.3 *	2.6	101.9

\* Total Proved In Place reserves instead of balance recoverable reserves relevant for other countries

India is also a large user of coal, as seen from table below:



**Table 1.16: Population and Coal Consumption**

Name of the Country	Population in Millions			Total Coal Consumption in Million Tonnes		
	1990	2002	2003	1990	2002	2005
China	1155	1296	1299	1004	1415	2150
United States of America	254	289	291	904	1066	1295
India	849	1064	1070	256	431	461

- 1.41 As seen from the table, in terms of consumption, China is number one with over 2 billion tonnes of coal and US is number two with 1300 million tonnes, India is the third largest consumer with only 460 million tonnes which is way behind US. Given the very meager resources of Hydrocarbons, India and China would continue to consume more of coal and the entire country should be made aware of the importance of coal so that the appropriate policies at the national and state level could be taken in various matters which support the sustained production of coal.

### Box No. 3: Coal Production in China

Coal production in China varied on year to year basis between 1000 and 1400 million tonnes in the period 1994-2000. Between 2000 and 2005, the production increased very rapidly each year to 2150 million tonnes in 2005. China's coal production comes from three categories of coal mines, viz., 1. Major Central owned Coal Mines; 2. Local State owned Coal Mines; and 3. Village and Town Coal mines. From 2000 to 2005, the Village and Town Coal mine production increased from about 260 million tonnes to 835 million tonnes within six years. In 2005 coal production from fully mechanized coal mines was only 578 million tonnes.

China has planned the development of mining machinery industries in China and is emerging as an important exporter of coal mine equipment including underground mining equipment.

China's record of safety in coal mines is poor. But it claims that the mortality rate per million tonne of coal produced is gradually getting increased from 2005 to 2006. Policies and programmes have been introduced for continuous improvement of mine safety and occupation safety and health.

- 1.42 Characteristics of Indian coals in terms of quality are in general similar to that of South Africa. Yet South Africa is a major exporter of quality coal. India on the other hand produces coals, both metallurgical and thermal, which are far from being of export quality mainly because of low importance being attached to coal preparation/beneficiation as an integral part of coal mining operations.

## **BOX No. 4: South African Coal Industry**

### **South African (SA) Coal Characteristics similar to Indian coals**

Coal is the primary fuel produced and consumed in South Africa (meeting more than 70% of total SA primary energy demand) and is the second largest foreign exchange earner (after gold). SA is a major coal exporter and its coal industry, which is totally private, produces at a low cost. Exports (nearly one third of total production) are shipped almost exclusively through the Richards Bay Coal Terminal (RBCT), the world's largest coal export facility.

South Africa's coal reserves are mainly bituminous of relatively poor quality with high ash content (about 45%) but low sulphur content (about 1%) and largely difficult to wash coals. SA deposits are very diverse in their characteristics with large variation in washability characteristics from seam to seam and even within a seam (these could change dramatically from one place to another over a short distance due to irregularity of seam quality). Indian coals share these characteristics with SA coals.

South Africa's total mineable coal reserves are estimated at over 100 bt, located mostly in the former Transvaal region and in the (Orange) Free State. Three coalfields of Waterberg, Witbank and Highveld hold 70% of total recoverable reserves.

Because of the significant variation in quality of the seams a variety of coals are produced in most mining operations. Bulk of domestic coal market is represented by pithead power plants taking low quality coal and no washing is necessary to supply such plants. Export oriented mines are allowed to mine larger number of coal seams thus increasing extraction and recovery rates and reducing costs and in the process of washing most of the rejects are captured as middlings to be burned in power plants thereby the cost of producing domestic coal would be lower than that of producing export coal. Export quality clean coal with 14% ash is produced in coal washeries using DMS (Dense Media Separation) technology from difficult to wash ROM coals containing 35% ash with yield levels of more than 40% and yield is as high as 80% for easy to wash coals. Recently improved air pulsating jigs, especially modular plants, are making a comeback in SA (mechanical jigging plants were earlier closed down because of lower yields for difficult to wash coals despite lower operating and maintenance costs of jigging plants) for washing moderately difficult to wash coals and for destoning the feed to DMS washery plants thereby expanding their capacities.

SA coals as well as Indian coals were formed in what was Gondwanaland continent located near the then South Pole some 230 my ago before the continent was split up and started drifting northward toward the Laurasian continent. These "southern hemisphere" bituminous coals were formed from the degradation of plants that grew in a climate of cool-cold temperature in short growing seasons unlike the coal genesis conditions of "northern hemisphere" coals of Europe, North America and China. Degradation occurred rather slowly in stable continental regions within fluvial (riverine tracts), lacustrine (lakes), deltaic and coastal back swamps with fresh as well as marine waters. Geothermal heat occurred preferentially from local crustal fractures and igneous intrusions rather than deep burial and pressure.

Source: Compiled by S.K. Mahajan from Internet

**1.43 India is not the only country which has substantial quantities of relatively poor quality coal resources. Low quality coal is produced in 28 countries of**

**the world. In the US coals having ash content greater than 33% are not included in the coal resource assessment unless these can be easily washed to produce saleable coal. Indian Gondwana coals are of much better quality compared to that of South America (Brazilian coals generally have high ash and high sulphur) and these low grade coals are being used for generating power.**

### **Box No. 5: Use of Low Grade Coals in Brazil**

Coals are considered to be of low quality when they have a high content of ash, moisture and/or sulphur. Such coals usually have a calorific value of less than 16 MJ/Kg (3872 Kcal/Kg). Approximately one third of coal produced in the world, except for China, is low grade and is produced in about 28 countries. Because of low energy content these coals are typically used in pithead thermoelectric plants.

Brazilian coals characterized by high ash (>50%). Sulphur (between 0.5% and 8%) and moisture (5-16%) are classified as low quality coals. These coals are also mostly difficult to wash and are generally used in pithead thermoelectric plants as ROM coals. However, washed coal is also used in thermoelectric plants located at a distance from coal mines.

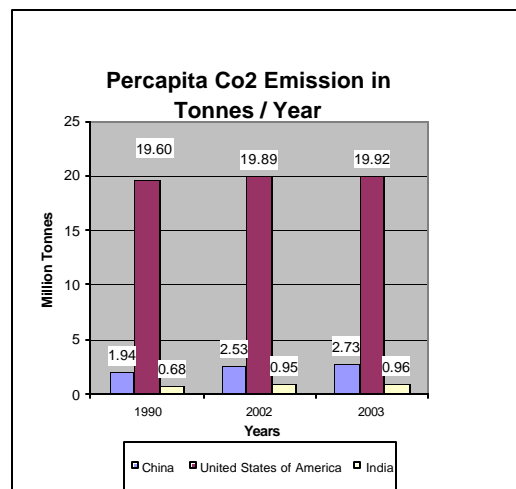
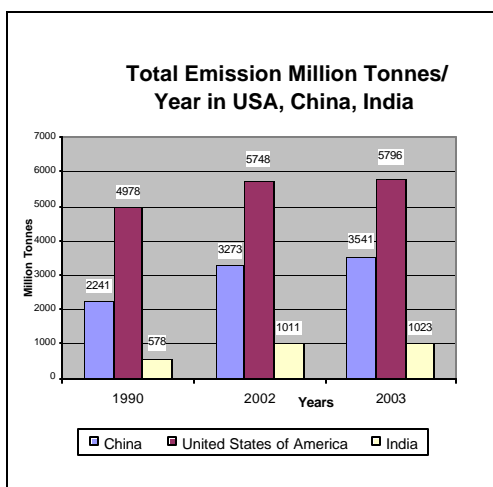
Use of byproducts and residues of thermoelectric plants – ash, cogeneration steam, fertilizer, gypsum etc. would contribute towards environmental preservation and improve competitiveness of such coals with other primary sources of energy. In Brazil ash is being used as raw material for construction materials (cement, tiles and as an element in highway construction, etc.). Gypsum is produced for removing sulphur from combustion gases using limestone as reagent and fertiliser is produced if the reagent used is ammonia.

Source: Gathered by S.K. Mahajan from Internet

1.44 There is a view among environmentalists that India's coal production is environmentally damaging and the plans to increase the production and consumption of coal in India will be disastrous. The Committee does not agree with this view. Any carbon burning would lead to addition of the load of carbon dioxide on a global scale and would have some impact on climate change. But this issue of climate change and reduction of carbon dioxide emission has been the matter of agreements between countries on the basis of the Kyoto protocol and India is not among the countries which need to arrest the level of carbon emission to a specified rate. The total carbon emissions per year and the per capita, CO<sub>2</sub> emissions of the three large users of coal are listed below:

**Table 1.17: Carbon Dioxide Emission in USA, China and India**

Name of the Country	Total Emission in Million tonnes/Year			Per Capita Emission in tones/year		
	1990	2002	2005	1990	2002	2005
China	2241	3276	5323	1.95	2.63	4.07
United States of America	5001	5763	5967	20.00	20.03	20.14
India	575	1015	1163	0.69	0.98	1.07



1.45 As seen from this table, India's total carbon emission is not even 1/4<sup>th</sup> of China and 1/6<sup>th</sup> that of USA. In terms of per capita emission India is far below US. In the next 25 years, even if India's population grows to be around 1.6 billions and coal consumption is about 2 billion tonnes, as discussed in the sections on Coal demand discussed above, India's contribution in terms of total CO<sub>2</sub> emissions and per capita emission would be far below the current levels observed in US and in China. The Committee, however, would like India to assume their role of a responsible user of coal making every effort to reduce the emission level or to eliminate it by developing and adopting clean coal technologies at the stage of production of coal as well as its consumption. If the environmental issues are adequately addressed, India can use more coal as projected and can also become an exporter and importer of coal like China and USA and play a significant role in the world market in coal trading.

## Summing Up

1.46 The Committee would like to urge that it is no longer a question whether there is coal or whether we could increase the coal production in the country at about 6.5% per year. It is now for the Government, the private and public sector coal

industry and the coal users to coordinate their efforts and plan for the development of coal resources to the extent needed and to use the coal with the highest possible levels of efficiency and the minimum possible levels of adverse environmental impact.

## ALLOCATION OF CAPTIVE COAL MINE BLOCKS– PROCEDURES OF SELECTION ON “NELP” BASIS

In Part I of the Report, the Committee suggested that an NELP type of procedure should be adopted in future for allocating coal blocks even in the categories which are not classified as “proved”. The Committee suggested that Government should decide on the procedures for such allocations. An attempt is made here to draw an outline of the structure that could be followed. In the case of hydrocarbons, the blocks are allocated on the basis of very preliminary surveys, which suggest that oil or gas may be available. The quantity, quality and depths at which oil or gas could be taken up for commercial operations are uncertain. In view of this, under the NELP procedures, the applicants are required to give a broad outline of their proposed drilling programme and the minimum expenditure that they are prepared to incur in exploration. Once the oil/gas is struck in the block, the procedures require the allottee to make out detailed plans with cost estimates of developing the discovery for Commercial Operations. In case the exploration effort does not yield a find, the exploration expenses are allowed as a tax write off. In case of a find, the allottee would indicate estimated quantity of hydrocarbons that will be produced under the proposed development plans and the profit share of the Government based on contractor’s net cash income achieving a certain multiple of the capital expenditure in exploration and development. As the multiple increases Government’s share also increases. The level of profit share for the Government is a key biddable parameter. In the case of coal industry, we could mimic the NELP procedures by adopting them to the nature of the coal mining industry and the related lower level of uncertainties at the time of making available a block of coal to the prospective applicants.

### **A. PROCEDURES FOR A COAL BLOCK WITH “PROVEN” RESERVES**

Once a coal block is brought under the proved category, the extent of coal likely to be available in the block, likely quality of coal and the approximate depth at which it is available are known. But the geological setting of the ore body makes a large difference to the Capital cost of the project, gestation and profitability, the last also influenced by quality of coal available in the block. There are open cast mines where the strip ratio is so favourable that coal could be brought out at the cost of around Rs.300/tonne. At the other extreme are cases where the over burden is so large that the average cost of mining could be as high as Rs.1000/tonne and even more if the deposit is amenable to underground mining. A just and equitable procedure for selection of a particular

candidate for allocation should attempt to moderate these variations and help the Government to reap a fair share of the “Rent”. All applicants for a particular block would know with a reasonable degree of certainty the cost at which they could mine coal in that block and the price at which the coal to be produced could be sold. Thus there is minimal exploration and development risk. However, there is an added complication namely that coal can only be used for captive consumption and cannot be sold in the market. The bid criteria and the selection should be based on the following parameters:

1. The committed time from zero date (being the date on which the mine plan approval, environmental approval and forest land clearance are all in place) by which coal would be available subject to a cap of 36 months from a zero date.
2. The targeted amounts of coal that they commit to mine from a given block in say a 25-year period. This commitment will be backed by a specified failure penalty/tonne duly secured by a bank guarantee. Failure penalty to be encashed pro-rata to the annual shortfall over committed targets.
3. The amount of coal that the contractor would share with the Government of India or its nominee on an annualized basis over the life of the concession.

The Government can rank the bidders in terms of the highest NPV from its share at a given price for the coal from a specific block depending upon its quality.

## **B. PROCEDURES FOR ALLOCATING UNEXPLORED BLOCKS**

For auctioning blocks with data only from Regional Surveys, the applications could be called for Exploration-cum-Mining. The time required for exploration and drilling would depend on the geological setting of the area, namely extent of outcrops occurring in the area and geological complexity of the area as well as the extent of exploration activity already carried out and documented besides the accessibility of the area. So the time required for conducting exploration and type of exploration activity to be carried out may be kept flexible with a threshold of two years and a maximum of 4 years. The outcome of the exploration and detailed drilling would be a document equivalent to the G.R, produced by CMPDI. The applicants would indicate the amounts they would spend on drilling and exploration (geological and/or geophysical) annually under their proposal. These expenses would have to be secured by a bank guarantee that is encashed in the event of a failure to perform.

The rest of the bid criteria would remain the same as for the explored blocks. While evaluating the bids, the Government can simply add the NPV of the exploration and drilling expenses committed to its take in ranking the proposals. In the event that a contractor finds no commercially exploitable reserves even after spending the committed amount in exploration and drilling, the certified expenses in this regard may be allowed as a tax deduction. To make this tax deduction valuable even to a new company (that has no income) it could be made tradable like depreciation benefit in the case of renewable energy.

### **C. JUSTIFICATION**

It is our belief that the above process would result in the most optimal, efficient and timely development of India's proved, indicated and inferred resources. Since coal is being mined only for captive use, the above process of allocation will not raise prices as bidders would want to ensure that the effective price of captive coal does not go beyond the price at which the national coal companies would supply coal any way.



COAL REPORT – PART II  
CHAPTER II

IMPROVING THE PROCEDURES FOR APPROVAL OF COAL MINES

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2.1 The Committee is deeply concerned at the long delays at different stages and in different departments of the Government at the Central and State level for giving the necessary approvals for setting up a coal mine. In Part I of the Report, the Committee had stated that this issue would be studied in greater detail and some specific recommendations made in Part II. The Committee have now examined the current procedures and are shocked that the total time taken in getting all approvals, from the time decision is made in principle to set up a coal mine, commonly exceeds 4 years which is rather a very long period of time compared to international practice. The total time has extended to over 7 years in several cases thereby delaying implementation of the project by several years. The Committee is also concerned that the contributions to delays are made not only by other departments but also by the Coal Ministry, coal companies and the related agencies. However, the major delays are traced to the environmental and forest department approval of use of forestland for non-forest use.

### **The Current Procedures**

2.2 The rules and procedures for taking up Coal mining now in force require:

1. Administrative approvals from the Boards of Management of the subsidiaries/CIL and the Government;
2. Clearance from environment angle which involves approval of the Environmental Impact Analysis (EIA) and the Environment Management Plan (EMP); and
3. The Forestry Clearance, if any forest land needs to be acquired to set up the proposed mine.

The current procedures in respect of these three clearances, the contributory causes and remedial actions to cut down the delays are discussed below.

#### ***(1) Administrative Approvals***

2.3 In Government, it is unavoidable that any proposal for approval of an investment plan by a Government agency has to go through several stages before it comes to Government where the administrative Ministry would process the case in consultation with several other Ministries. But the limits of authority for approval of projects have been enhanced from time to time in different Ministries keeping in view inflation and the move towards increasingly larger projects. In respect of coal

this has not happened to the required level. The limits of authority to the subsidiaries are only Rs.20 crores and that for the CIL Board is Rs.100 crores and all projects above Rs.100 crores have to get an approval from the Government. This has led to a situation where almost all projects have to get administrative approval at Government level. *The Committee recommends that the limits of authority must be enhanced to Rs.500 crores for subsidiaries of CIL, SCCL and NLC. CIL must be authorized to approve projects upto Rs.1000 crores. This would be appropriately changed when these companies get their Navaratna status, which is recommended by the Committee (See Chapter III, paras 3.29 & 3.30)*

- 2.4 The role of the MoC and Planning Commission should be limited in tune with the liberalization in other sectors. The Planning Commission could assess the coal requirement of the nation and advice MoC which in turn would give the necessary directions to the PSUs in coal sector. The PSUs namely, CIL, SCCL and NLC would discuss with MoC and settle the Annual and Five Year Plan targets. **As there is very little budgetary support to the PSUs they should be given full flexibility in selecting specific mines and planning the relative priority and allocation of funds for expenditure.** At the Annual Plan stage, the role of MoC/Planning Commission should be to determine the total production targets for **CIL and SCCL** and they **should be held fully accountable to fulfill the targets in general and meeting the loading point wise target in terms of the long term FSTAs they had entered into with consumers (Information regarding mines and production plans of the companies should be posted on Ministry's website).** For this to materialize, several of the uncertainties should be removed by planning sufficiently in advance. The Committee would like to suggest that projects to be implemented in a particular Plan Period should be given the necessary administrative approvals before the last year of the previous plan period at the latest, so that the PSU's will have six years to get the other approvals and implement the project. The PSUs would then be in a position to fulfill the targets set for the plan period. **Ministry of Coal should authorize CIL subsidiaries and SCCL to produce if possible more coal than targets set for them subject to commercial and environmental considerations. To help such efforts Environmental Clearance and other approvals should be obtained for 20% over and above the normal production capacity of each mine. They should be allowed to offer the extra production through e-auction or alternative methods of placing coal in a transparent market.**

2.5 The Committee considers that the current procedures for the project preparation with the necessary mining plan now adopted for getting approvals needs to be changed so as to bring it in line with the current practices in more advanced countries. **The project planning procedure should explore the total potential for mining in the specific area not only in horizontal but in vertical terms also, the availability of coal resources at different depths in the same mine should be carefully explained and justification given how the proposed mining methods would not lead to any abandonment/sterilization of resources but would lead to the exploitation of the total resources optimally in phased manner.** If there are alternative possibilities which may lead to less of surface disturbance and expedition of mine construction, these should be detailed and arguments set out for adopting the proposed procedure and technology. **The mine plans and proposals for large mines of 5 million tonnes and above should also be examined and evaluated by a group of experts constituted specifically for each mine proposal but with the direction that the report be completed within 4 months. The cost estimates should be made on the basis of comparison with the current cost of equipment in the international market.**

## 2) Environmental and Forestry Clearances

2.6 In addition to the administrative approvals, environmental and forestry clearances for a project have to be obtained separately from the Ministry of Environment and Forests (MOEF).

- Environmental clearance presently under EIA Notification 2006 is needed for a mining project (=5 Ha) and forestry clearance under Forest (Conservation) Act 1980 for any forestland within the identified leasehold which is required for diversion of forest land to non forest use.
- The procedures for both environmental and forestry clearances can be undertaken separately and simultaneously and grant of these is independent of each other.
- The nature of issues dealt with in the two i.e. environmental and forestry clearances are different.
- Environmental clearance deals with the entire gamut of environment related impact issues on land/water/Biota/Air, Aesthetics, socio economic aspect, energy conservation and generation of Environment Management Plan including appropriate Closure Plan, etc. The procedure takes on board public consultation – through public hearing/written submission, etc.
- Forestry clearance deals only with the forestry related elements like legal status of forest/forest density/species – enumeration of trees/vulnerability of

forest to erosion/ whether part of National Park/Wildlife Sanctuary, biosphere reserve and rare/ endangered/unique species of flora and fauna/SC/ST families etc within the forest land.

2.7 In the environmental clearance, the procedure requires reference to the State Level Expert Appraisal Committee for mining projects and measuring < 50 Ha to  $\geq$  5 Ha of leasehold land. In addition to this, the case is sent to the State Pollution Control Board for its opinion and for conducting the Public Hearing. **Recent amendments to the procedure have fixed time schedules (namely 60 days) for finalization of TOR and 45 days for holding and sending of its proceedings of Public Hearing (PH) or 45 days for holding of alternate PH in the event of State Pollution Control Board (SPCB) not holding PH in the prescribed time have provided teeth to the present environmental clearance procedure.** The long time delay, which used to occur, has been overcome to a great extent.

2.8 In the forestry clearance procedure Form-A (for fresh proposals) and Form-B (for lease renewal proposals) is submitted to the Nodal Officer of the concerned State. Much of the delay in forestry clearance takes place at the State level. The forestry clearance proposal received at the MOEF New Delhi is submitted to Forest Advisory Committee within a month of receipt for appropriate decision by it.

### 3) Environmental Clearance

2.9. The EIA 2006 comprises of the following four stages with the attached time schedule as under:

- a. **Stage I – Screening for Mining projects** with lease hold area of < 50 Ha to  $\geq$  5 Ha to be taken up on submission of Form-1 at State level for categorization into B-1, (requiring EIA, Public Hearing) and B-2 (not requiring EIA, Public Hearing). This is a one-time procedure for categorization of the Projects at State level.
- b. **Stage II – Scoping** is a requisite for category A (encompassing Area > 50 Ha) and B-1 Projects and involves submission of Form-1/Pre-feasibility Report/Draft TOR by Proponent to the State/Central Appraisal Committee for finalization of TOR (time schedule – 60 days).
- c. **Stage III – Public Consultation** to be taken up by State Pollution Control Board with intervention of MOEF if not held within time limits (Time schedule – 45 days).
- d. **Stage IV – Appraisal** consists of final application (EIA, PH, Feasibility Report and final layout plan), presentation by Proponent and appraisal in 60 days with acceptance of recommendation by the concerned Regulatory Authority for grant of environmental clearance in 45 days.

2.10. It is understood by the Committee that Public consultation for environmental clearance is to protect the stakes of local people on environmental aspects. However, public consultation degenerates into Resettlement and Rehabilitation/ Land compensation/job related issues. In spite of repeated reiteration that R & R issues have to be decided on the basis of a national policy (unfortunately not settled yet), due to the “tolerant” attitude of State officials, the PH gets entangled in this and other local/State National political issues. **Central Government should issue specific national R&R policy for coal mining and State Governments should issue strict instructions that the Public Hearing (PH) should focus on relevant environmental related issues and the entire proceedings video-graphed and preserved for future reference**

#### **4) Forestry Clearance – Rules and Procedures**

2.11 The Forestry Clearance procedures are recognized as very complicated and long drawn. But nothing has been done so far to improve this. Under the existing rules covering forestry clearance approvals, the State Government has to process and forward it to the Central Government in cases which require the Central Government approval within 210 days. The Nodal Officer of the State Government after satisfying himself shall send the report to the Divisional Forest Officer. The Divisional Forest Officer/Conservator of Forest has to examine the factual details, carry out site inspection and enumeration of the forest trees and shall forward its findings to the Nodal Officer of the State in about 90 days. The Nodal Officer will send up the proposal to Government of India. The State Government will forward the complete report to the Regional Office of MOEF. There should be very strong incentives and penalties for observance and non-observance of the stipulated times in which the different steps have to be completed. There is an inordinate delay/submission of additional proposals for forest land diversion on account of identification of forest lands. This also leads to undue harassment to the proponent. The directive of the Hon'ble Supreme Court for disposing of such cases within two weeks by State Government and 6 weeks by Central Government is totally ignored with impunity. This has added to the time taken to obtaining clearance with added confusion and attached violations, etc.

2.12 In such cases it is suggested that the proposal for forestry clearance may be considered as received on the status of information then available regarding forestland identified. Additional proposal could be processed later after appropriate identification and communication being received than the proposal

being delayed for want of NOC from the District Collector. The entire process should be restricted to the State Forest Department. Appropriate condition could be attached while providing such forestry clearance indicating the status of identification and the on going process of obtaining the necessary information from the revenue authorities of the revenue classification and identification.

- 2.13 **The procedures are governed by the Forest (Conservation) Act 1980 and the Forest (Conservation) Rules 2003. The Committee appreciates the need for preserving our forest wealth and ensuring that the forest resources are not denuded by developmental efforts in coal or any other sector. The attempts to ensure compensatory afforestation and collection of Net Present Value (NPV) of the forest yields are steps in the right direction but the rational utilization of funds should be monitored by the Coal Regulator or any other designated agency.**
- 2.14 **Issues related to Forest (Conservation) Act 1980 on various accounts are pending with the Supreme Court. It would be worth while to revisit the Forest (Conservation) Act 1980 and preferably re-engineer it taking on board stakeholders' views and the impact that the Scheduled Tribes (Regulation of Forest Rights) Bill would have on the process of diversion of forest land for non forest purposes.**
- 2.15 The constitution of Forest Advisory Committee (FAC) for the purpose to advise on the proposal received by the Central Government was stayed by the Supreme Court, as it was not constituted under the Forest (Conservation) Rules 2003. In the Supreme Court order dated 27.4.2007, the FAC, as it stood on that day, has been asked to take up proposals for forestry clearance which would have to be placed before the Supreme Court for approval with the response of Central Empowered Committee (CEC) being made available in each case. Simultaneously post 15.9.2006, the Supreme Court vide order dated 27.4.2007 provides for procedure via CEC for forestry clearance. These directions are likely to settle cases, which have accumulated due to the earlier orders. The FAC as it stands today will give priority to Projects, which need immediate clearances. Fresh cases may be cleared Project wise by the FAC and thereafter such clearances shall be placed before the Court for approval. Pending the decision of the larger question, all clearances by the FAC of fresh cases shall be subject to approval by the Supreme Court.

2.16 The Committee feels that the spirit of the action rules governing protection of forests and the development of more areas under the Forest could be better served, if the Department of Forest in Government of India and the State Governments could change their approach towards legitimate, economically and socially beneficial application of forest land for non-forest uses. They have to consider such applicants as partners for forest development and not undesirable encroachers of the forests, who are attempting to encroach and destroy the forests. There is enormous scope and need for improving forest growth in depleted forests and in wastelands. Anyone whose genuine need requires access to forests and temporary or long term use of forest land should be held responsible to create more forest area than taken away from the forest department and restore the land to become a well managed forest after the utilization of the area for any mining, whether open cast or underground. The applicants who have to establish their production units in forest areas should consider the creation of compensatory forest and rehabilitation of displaced persons as an inherent part of the mine development plan and the total cost should be taken into account while taking up a project in this area.

2.17 *The Committee feels that all the government agencies in charge of forests should look upon forest as a national resource like any other resource and could be used for other purposes provided the use is regulated in such a manner that it ultimately leads to the long term preservation of forest wealth and enlarged energy security. Towards this end the following measures should be taken:*

- *The forest area should be totally surveyed and digitized forest maps should be created for the whole country at the earliest possible time. Priority for such mapping and digitalization should be given to areas with mineral wealth like Bihar, Orissa, Chattisgarh, MP, Jharkhand, and Andhra Pradesh.*
- *The forest may be classified into three categories:*

**Category A: Totally prohibited areas** – *These will be genuinely selected after due process and public notice of areas where there is valuable bio-diversity or having flora or fauna of great value which have to be protected. In the assessment of coal resources of the country the resources found in such Category A forests may be removed and shown in a separate foot-note.*

**Category B: Forest Areas** which are **having reasonable forest growth** and needs to be preserved but which could be released for non-forest uses, if legitimate users could establish that the economic value added by such use would exceed the value received by retaining it as forest land; the release of the land would be subject to the creation of a compensatory forest area and payment of the prescribed compensation.

**Category C: Forest areas** where the forests have been **depleted** and are available for allocation for non-forest purposes on payment of compensation and can

*be allocated towards compensatory forest to be created by users who are given approval for conversion of forest land to non forest use s.*

- 2.18 **The Committee recommends the acceptance of the above suggestions and placing the information regarding such classifications in the public domain and should be used by those individuals or agencies who seek permission for forest clearance. Needless to say, in the case of an application for Category A, it will be returned with a rejection note explaining the cause. Applications in respect of category B lands, should take some time to assess the value of the tree growth and fix the compensation, etc. Applications in respect of Category C lands should be given automatic approval on payment of the necessary fees and compensation amount.**
- 2.19 The committee considered some of the suggestions made in the Report of the Working Group of Coal and Lignite on forestry clearance and would support the following recommendations:
- a. The Nodal Officer of the State Government should be empowered to forward proposal related to forest diversion directly to MoEF after receipt of finding from Divisional Forest Officer.
  - b. Once the completeness of proposal has been examined and the same has been accepted, no fresh queries should be raised further.
  - c. The movement status of proposals for forest diversion should be posted on website to provide information and transparency to the project proponent.
  - d. Tripartite Committee (comprising of user agency, concerned State Forest Department & monitoring cell of MoEF) may be constituted to resolve the reasons for delay as and when requested by coal companies.
  - e. In case where appropriate records in respect of forest land, jungle jhari etc., are not available, proposal for forestry clearance may be considered based on the information available. The NOC from District Collector should not be stressed upon.

## **5) Issues/Current Problems associated with Forestry Clearance**

- 2.20 The following issues/problems are encountered by project proponents specifically related to forestry clearance:
- a. Coal Production exceeding approved capacity/Level of production
  - b. Permission for conducting coal exploration in forest areas
  - c. Mine closure and restoration of mined-out areas
  - d. Compensation for forest land used for coal mining
  - e. Rationalization of levies.



**a) Exceeding the approved Level of Production**

2.21 Mining companies seek approval of mine plan based on average rate at which coal is likely to be produced during the entire planned life of the mine based on volume of coal and waste rocks (overburden) anticipated to be produced yearwise. When coal is actually mined there can be significant variation in coal output from planned levels depending upon actual volumes of coal and waste rock that has to be extracted on the ground in a particular year depending upon quality of coal available (having bearing on specific gravity of coal) in that year and geomining conditions actually encountered at that time. The problem is more acute in open cast mines where the relative proportion of coal and overburden volumes to be extracted could change significantly from year to year. While coal production may thus exceed approved levels at certain times and dip below approved levels at other times by a significant margin. Market demand and supply scenario may also force mining companies to regulate production to meet the current demand. Mismatch between actual and planned levels of production is thus inevitable in coal mining at certain times.

2.22 Supreme Court took a serious view of coal mines which produced coal in excess of approved quantity and issued orders for their closure as polluting units. The Committee notes with satisfaction that all 58 units identified under the Supreme Court order have later obtained environmental clearance wherever applicable. Nevertheless, the issue of violation of the Environment (Protection) Act 1986 associated with coal production beyond the approved capacity remains unresolved. Alternatives like provision of inbuilt 15% increase in production beyond approved capacity not attracting violation under EPA 1986 have been discussed between MOC and MOEF but have not yielded any break through. Another route to tide over the violation was the process of Temporary Working Permission (TWP) related to environment (The Gazette of India, Extraordinary Part II, Section 3, sub-section ii dated July 4, 2005). This has also not seen any implementation. Under the above circumstances it is suggested that the provisions of TWP related to environment may be re-looked into such that:

- i Increase in production beyond the approved capacity for a definite period as to obtain Environmental Clearance, and
- ii A 15% increase above the approved capacity could be addressed in a manner that they should not attract the provisions of violation of EPA.

2.23 Those projects which would involve higher increase in production, i.e. >15% of the approved capacity, could be provided with TVVP for processing for the final (increased) capacity that the Project could attain. MOEF maintains various environment related parameters all over India. It is understood that differentiation in the contribution from more than one polluting industry within an environmental set up need to be provided for a better understanding of the issues involved as well as the needs of additional input to mitigate a situation. **The issue of excess production should be overcome in one way by Coal companies while taking and seeking such permissions, ask for a production limit of say 20-25% above the planned capacity. Alternately, temporary work permits may be freely issued for capacity to exceed upto 20-25% above the original sanctions in some years, if the MoC recommends such proposals.**

**b) Problem of conducting Coal Exploration in Forest Areas**

2.24 **The exploration for coal by public agencies could be done by taking up drilling and even now it does not attract the full provisions of the Forest Conservation Act, if drilling is done for 10 boreholes of maximum 4 inch diameter per 100 sq. kilometers. Coal companies point out that such drilling will be inadequate to validate the data. The committee recommends that this provision may be modified to drilling of 50 boreholes per 100 sq. kilometer area with maximum 6 inch diameter in order to carry out coal exploration in forest areas in a meaningful and scientific manner.**

**c) Mine Closure and the Restoration of Mined-out Areas**

2.25 One of the issues which have not received adequate attention is the question of restoring lands in which coalmines have been worked, after the mining operations are completed. The conditions of the mining lease clearly spell out that the lessee after completing the mining operations in the area as per the proposed plan should restore the ground surface to its "original conditions". So far, the coal industry, CIL and SCCL have not declared any of the mining areas leased out to them as areas where the mining operations are completed. The questions which have remained unanswered are the following:

1. What does restoration to the original conditions mean?
2. What is the mechanism for evaluating this and approval of the work done by the mine owner?
3. If he has not done it, what penalty should be paid?
4. To whom does the land revert to when once the mining operations are completed?

The Committee would like that answers should be settled in advance with a view to attract private sector to coal mining.

- 2.26 *To ensure proper mine closure and restoration of mined out areas.*
- a. *Each mining lease should include a good description of the land used, whether there are large grown up trees, shrubs or no-vegetation. The conditions to which the lessee should restore the mines should be spelt out in detail.*
  - b. *The methods of calculating the net present value of income foregone should be rational and based on actual figures of income.*

*In all mining cases including underground mining, there is some degree of restoration, which goes hand in hand with coalmine production. The Coal Regulatory Authority should be given the responsibility to monitor the restoration work going along side with the mine development. The Regulatory agency should also certify that the mine has been fully worked out by taking out all possible coal resources from the area and should be treated as completed. The restoration must be done by the lessee and only if it is approved the lessee will be permitted to hand over the land and close the mine*

- 2.27 *A fee of Rs. 10 per tonne of coal mined as Mine-restoration levy and this should be collected annually and remitted into a fund managed by the Regulator. The Regulator would release as grants or soft loans, funds which are requested by the state government or forest department to improve the conditions of the completed mines in order to bring the area to fruitful uses such as agricultural or horticultural use or as real-estate uses or for recreational uses including creating water-bodies.*

- 2.28 The surface rights of lands given to coal mining purposes are obtained in three different ways. If the mine area is privately owned land, the prospective mine applicant would purchase the surface rights by private negotiations. If the private negotiations fail, the government on the request of the mining applicant would acquire the land under the Land Acquisition Act and give the lease only for the mining and not the surface rights. The ownership of the land would vest with the government. The Land Acquisition can be done either under the Land Acquisition Act or the Coal Bearing Areas (Acquisition & Development) Act. In both cases, the state government would retain the surface rights but give only the right for mining the coal. If the land is a forestland, the forest department agencies of the central and state governments have to give an approval for the transfer of the land from forest use to non-forest use. The mining area, however, remains the property of the Forest Department.

In the first case, when once the whole area is mined out, the mine owner would become the landowner and have the right to do what he wants with the land subject to such directions, which the environmental agencies may impose. In the case of lands acquired under any of the Acts (LAA or CABAADA) the land (surface rights) will revert to the State Government. In such cases, the mine owner, during the mining operations, has to pay a rent towards the use of surface rights and a royalty for the coal, which is produced. In these cases, the mining lessee has to restore the land to the level it was there prior to the mining operations. But, it still may not be a useable piece of land. Therefore, there must be some agency to monitor the conditions up to which the lessee restores the land and should have some method of having funds to invest on the land to make it useable and put it for any purpose such as housing, commercial buildings or agricultural land or plantation such as energy plantations. In the case of forestlands, the mine owner, during the course of mining, pays only the royalty. The mine-owner should restore the land to a state where good forest growth is possible.

**d) Compensation for Forest Land used for Coal Mining**

2.29 **As per the present rules, in respect of any forest land to be released for coal mining two monetary compensations are to be paid by the proponent: NPV and compensatory afforestation cost. Net Present value (NPV) for forestlands is paid to the governments – State and Centre, which own the forestlands from which they derive a certain income to be compensated for the loss of their revenue. It should vary with the extent of income that is actually received by the State and Central Government. The NPV has been fixed under the directions of the Court at values ranging from Rs.5.8 to Rs.9.20 lacs per hectare, depending on the crop density of forests. There is no third party assessment of the loss.** It has also been given retrospective effect. There is a clear case for a review. It is understood that in compliance to the Supreme Court an Expert Committee under an economist has been appointed. The Committee has recommended collection of rationally calculated NPV i.e., discounted net present value of the income stream foregone by the transfer of the land to mining use and an additional land rent, sometimes called Quit rent. This recommendation should be accepted without further delay.

2.30 Even allowing for the low quality of coal, the coal prices of Indian coal are an advantage to India and it should not be lost for the sake of collecting more revenue for certain departments. The Committee would like to recommend that

the entire issue of compensation for forest lands on which coal mining is permitted should be reviewed by a Committee of senior experts and early decisions taken. Such a Committee can also examine further the issue of returning the compensatory afforestation levy if the Coal mine company maintains a portion or the whole of the area leased with good tree plantations which are not inferior to the areas where afforestation has been done by the Government. The whole question of collecting both the NPV and afforestation costs for areas where underground mining is taken and the surface conditions are not disturbed should also be reviewed. The Committee would urge that the Coal Mining Industry should also have an environmental monitoring cell where the conditions of maintenance of the surface area in coal mines should be kept under review by a group of experts and periodic reports submitted for information of the public.

- 2.31 **In addition to NPV, there is a Compensatory Afforestation levy, which is prescribed at Rs.1, 25, 000/- per hectare with 25% solatium in the case of irrigated forestry land. In the case of non-irrigated forestry land, the compensatory afforestation levy has been fixed at Rs.25, 000/- per hectare plus 25% solatium. Such ad hoc large payments levied on forest lands which are to be used for coal mining is increasing the mining costs of coal where as of now India has an advantage over other countries.**

**e) Rationalisation of Levies**

- 2.32 *Main levies which are directly related for purposes of coal mining should be limited to:*

- a. *Payment of discounted cash flow of the income foregone from the land taken away either from the private landholder or state government or the forest department. This amount will go to the respective agencies, which lost income stream.*
- b. *A quit rent or land rent for the use of the surface rights of the total area leased out for the mining purpose. This fund will also go to the agency to which the ownership belongs which is the State government in the case of acquired land or revenue land and forest department in case of forestlands. This will be a stream of annual payment.*
- c. *A levy of Rs.10 per tonne of coal mined, which should be collected and remitted into the fund administered by the Regulator. This fund would be kept in reserve and along with the accumulated interest used for giving back to the State government or forest department on a case by case basis for the restoration of the mined out land area to more useful public purposes.*

- 2.33 There will be a series of levies not connected directly with coal mining such as miners' safety fund, etc.

## **5) Green Credit System**

- 2.34 **The present system of mining companies applying for opening new mines having to show equivalent land for compensatory afforestation leads to a lot of delay. Since the coal mining agencies are aware of their likely requirements in the next five years and even in the period thereafter, they can be encouraged to take up afforestation in advance and given “green credits” for specific acres of new forest created. These could be used in lieu of compensatory of afforestation when new applications are made. The State Governments and the forest departments can notify areas where the creation of forests and maintaining the trees for a period of five years would entitle the parties for “green credits”. In fact a market may be created for “green credits” which will bring in institutions knowledgeable in afforestation to take this up as a useful venture.**
- 2.35 The importance of avoiding delays at every level and expediting the issue of all approvals and clearances for taking up coal mining operations should be considered as a pre-condition to ensure the achievement of the desired targets. Action needs to be initiated to change and simplify the procedures as discussed in this chapter.

### **Summing Up**

- 2.36 The targets for coal production now fixed for the 11th and 12th Plans call for taking up new coal mines, both in the public and private sector on rates which have never been attempted earlier. There is need to expedite all approvals necessary for taking up coal mining. The recommendations made in this chapter are not new, but have never been given serious consideration. The time has come when decisions on these cannot be postponed except at the cost of losing energy security. The Committee would urge that these recommendations should be processed and decisions taken before the commencement of the 11th Plan Period. Furthermore, it is necessary that the delays at different stages should be placed in the public domain so that it acts as a deterrent for not delaying any approval, if such delay could be avoided. The Committee would suggest that the information regarding the progress of an application for obtaining the approvals for mine planning should be published in a concise form in a website by the approval monitoring cell which has been suggested earlier. As per suggestions from Ms. Kanchan Chopra Committee Report, the payment towards diversion of forest land

for non forest use would involve payment of NPV and ground rent only. While making recommendations, the Committee took on board the suggestions of variety of stakeholders including CIL.

COAL REPORT: PART –II  
Chapter-III

TOWARDS MAKING CIL A WORLD CLASS COMPANY

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- 3.1 In the terms of reference for the Expert Committee there are two items which relate to restructuring of CIL. These have been spelt out as follows:
- How to convert CMPDIL into a center of Excellence for Planning and Research in Coal Sector.
  - Restructuring of CIL to make it a World Class Company
- 3.2 The Committee felt that these two items should be considered together in this chapter. This would need consideration of the following:
- a. Required size of the organization to be a world-class coal company
  - b. Structure of the organization
  - c. Limits of authority prescribed for the organization
  - d. Systems of working within the organization and
  - e. Financial and administrative controls exercised by MoC and redefining the interface between CIL and the Ministry
  - f. Steps towards rapid technology upgradation in CIL and
  - g. Measures to upgrade the human resource base especially at the executive level and “professionalize” the coal industry on modern lines.
- 3.3 In this chapter the Committee would examine the issues (a) to (e) and deal with technology upgradation and human resource development issues in separate chapters later.

***a) Optimal Size for a World Class Coal Company***

- 3.4. CIL is a holding company with seven coal producing subsidiaries and a subsidiary company dedicated to mine planning and development. Profile of these companies is as follows:



**TABLE 3.1: Profile of CIL Subsidiaries**

Sl.No	Name of the Company	Production Target for 2006-07 in million tones	No. of mines	Number of		Turnover in 2005-06 in Rs. Crores
				Executives	Non Executives	
1	Eastern Coalfields Ltd. (ECL)	31.00 (33.00)	113	2383	99091	4376.02
2	Bharat Coking Coal Ltd (BCCL)	33.00 (24.20)	85	2407	84739	3467.04
3	Central Coalfields Ltd. (CCL)	43.30 (42.00)	59	2549	61651	4512.91
4	Western Coalfields Ltd. (WCL)	37.50 (42.00)	83	2345	65033	4986.32
5	Northern Coalfields Ltd. (NCL)	52.00 (52.00)	8	1382	15532	5315.09
6	South Eastern Coalfields Ltd. (SECL)	84.55 (88.50)	90	2801	83717	7127.19
7	Mahanadi Coalfields Ltd. (MCL)	68.00 (80.50)	22	1246	19630	3945.13
8	Central Mine Planning & Design Institute Ltd. (CMPDIL)	A Research, Mine Planning & Design Company		807	2427	145.79
9	CIL (HQ) * - NEC Division  - Coal Videsh Division	0.65 (1.60)	5	324 99	832 3292	268.41
	Total CIL	350.00 (363.80)	465	16343	435944	34143.90

Figures in brackets relate to anticipated production in 2006-07

**Note:** The production targets for 2006-07 are as set in X Plan document. Actual production has increased and production of most companies/Division under CIL in 2006-07 is likely to be more except for BCCL and CCL.

\* A separate Coal Videsh Division has recently been set up with a mandate to scout for acquisition of stake in overseas coal mines.

3.5. The issue of size of the company to become a world class entity raises the question whether we consider the production of different companies separately or take the production of all subsidiaries as CIL production, as is done in all official documents. The production of CIL as a whole is likely to be nearly 365 million tonnes in 2006-07. This makes it bigger than any private sector world class company. The largest private sector coal company in USA has a production of

about 200 millions tonnes. Other private sector coal companies have production below 100 million tonnes. Only a public sector coal company in China like Pingsuo Coal Industry Corporation has production above 200 million tonnes. On this basis we can conclude that **if CIL is treated as one company with all its subsidiaries, it has an effective size adequate to be a world class company.**

#### **BOX No 6: Profile of Some World class Companies**

BHP Billiton is the world's largest mining company. It has hundred operations spread over 25 countries and involved in mining of coal, uranium, copper, gold and several other minerals. On the whole it has only about 70000 workers as much of the work is outsourced. It is second largest exporter of coal in the world.

It is a dual linked company comprising BHP Billiton at Melbourne Australia along with corporate office and the BHP Billiton PLC located at London. Both the companies have identical Boards of Directors. In the last 3 years it has produced 108 million tonnes of metallurgical coal and 257 million tonnes of thermal coal and exported most of its production.

### ***b) Restructuring CIL***

- 3.6. The Committee examined whether CIL could be considered as functioning as one company or several companies linked only by ownership. The subsidiaries are incorporated as individual companies with a governance structure, where the Chairman and Managing Director and the Directors are appointed by the Government directly and one or two Directors on the Board are nominated as representative of the Corporate Office of CIL. The subsidiary companies pay corporate taxes on the basis of financial results of the individual subsidiary companies. The subsidiaries get the production targets settled at the ministry level, though CIL actively participates and plays a significant role.
- 3.7. There are advantages of the largeness of the size of a company. It helps in building and nurturing a Brand and a corporate culture. Large size helps to recruit and retain the best technical and management personnel. It helps in import and export negotiations and in building and managing potential coal mines abroad. Large size of a company helps in managing its training activities economically and efficiently. Size plays an important role in managing efficiently the procurement and maintenance of new and costly mining equipment and new technology. The

Committee on a careful evaluation found that the present structure does not fulfill these roles adequately and there is need to restructure the corporation.

- 3.8. The issue of restructuring the CIL has been examined on several occasions in the past. There have been a few experiments in Board level adjustments also in earlier years. Most of the earlier examinations resulted in two alternative options which are diametrically opposed to each other.
- 3.9. The most significant suggestions have come from the Chairman's observations in the Report of the Committee on Integrated Coal Policy (1996) (Chari Committee) and the Report of KPMG. Shri K S Chary had expressed the view that in the long run interest, each of the present subsidiary companies of CIL should become an independent company and gradually CIL should wither away. He felt that this alone will make them independent, competent and commercial units. This would also prepare these companies for adjusting themselves to the liberalized new economic policy which might lead to opening the Coal Sector to private players. KPMG had made elaborate study of the various alternatives from the financial and taxation point of view and operational efficiency. The KPMG report concluded that from tax and financial point of view complete merger of CIL and subsidiaries into a unitary company on the pattern of NTPC would be advantageous whereas operational efficiency would considerably improve if there is total desegregation of the subsidiaries into autonomous companies. After examining this, they suggested that CIL should seriously initiate a detailed exercise to study the merger of CIL with its subsidiaries, to identify implementation issues and evolve appropriate strategies.
- 3.10. **This Expert Committee examined the issue de-novo and had wide consultation with the management and workers of all Coal entities including CIL, CMPDIL, operating subsidiary companies of CIL, SCCL and NLC. Taking all the suggestions and fears and threats as perceived by the Coal Industry executives and workers, the Committee felt that while entrusting a very onerous responsibility to increase Coal India's coal production from the current level of about 360 million tonne to nearly 670 million tonnes in the next ten years, it would not be appropriate to make major changes in the structure of CIL.** At the moment, such restructuring would give rise to a number of issues relating to relative seniority of the personnel and their positioning of staff. The Committee also found that there is an all pervading fear regarding any change in the organisation and a faith that any performance needed for accelerating coal production can be achieved with "no change" in the current

structure. **The Committee, therefore, recommends that the issue of major restructuring of CIL should be considered during the 12th Plan Period.**

3.11. However, the **Committee felt that the current structure of CIL and the role and responsibility given to the CIL as the Corporate Company and the subsidiaries would require some changes at the corporate level only** for the following reasons:

- a) The current structure of Coal India Limited creates substantive imbalances between authority and accountability. While CIL is accountable to meet the targets of production and off-take of coal, achieve desired growth rate in coal production, all these tasks are being carried out by Subsidiary Coal Companies which are run by separate Board of Directors headed by a CMD and supported by number of Functional Directors. Formal participation of CIL in the decision making process of the Subsidiaries is through the presence of its nominee in the Subsidiary Board. The fact that the nominee is not the Chairman of the Board dilutes CIL's control on the decision making process in the subsidiary.
- b) As pointed out by various agencies, the present structure is highly tax inefficient. The huge business losses incurred by ECL and BCCL in the past are not available for set off against profits of other subsidiaries leading to large out-goes of Corporate Taxes. More than 53% of CIL's pre-tax profits were paid out by way of taxes and dividends to the Government in 2005-06.
- c) CIL runs 284 exclusively underground mines employing over 2.53 lakh persons, producing 45.82 million tonnes of coal at a loss of Rs.2558 crores (2005-06). In order to improve its competitiveness, CIL will need to revitalize underground mines and make this segment viable. This will call for amalgamation of smaller mines with larger mines wherever possible, phasing out all such mines where the number of persons exposed to mining risk is incommensurately high as compared to the low volume of production achieved. This approach may call for rational redeployment of underground manpower across mines throughout CIL. In the current system, redeployment is possible only within the boundary of the subsidiary coal company.
- d) CIL, to achieve the increased production targets set for it, will have to focus on procuring large sized mining equipment with long term 12 year Maintenance and Repair Contract (MARC) and/or secure global response for implementation of large coal projects through the outsourcing mode. This will call for improved efficiency in tendering, tender evaluation, contract formulation and contract management. It may not be possible to develop such expertise in a dispersed manner at the Subsidiary Level. In the interest of enforcing a uniform transparent approach, it would be appropriate to carry out such activities in a centralized manner. Effective centralization of such activities will call for more strengthening of CIL than at present.

3.12. Keeping all this in view, the Committee felt that in order to ensure that CIL which has under its control potentially the best coal blocks and the experience necessary to accelerate coal mining activities should be given the direct responsibility to deliver the total targets set for CIL in the 11th and 12th Plans. Chairman, CIL should be provided a clear and unambiguous line of command

which will enable him to monitor and mentor the subsidiaries to fulfill their share of responsibilities.

- 3.13. The Committee felt that this could be achieved by restructuring at the Board level without changing the legal status. **The Committee, therefore, recommends that Chairman CIL should be made Chairman of all subsidiary companies. As he may not be able to attend all the meetings, he should have the facility and power to send an alternative to the Boards of the subsidiaries or for each of the companies there could be a chairman and another representative of CIL on its Board. The current CMD of the subsidiaries can be re-designated, as Vice Chairman and Managing Director (VC and MD). The Chairman, CIL should be given the authority to transfer functional directors of the subsidiaries from one company to the other. CIL should be given the authority to encourage and approve the subsidiary companies taking up coal mining activities in the geographical command area of the other subsidiaries.** The current system of earmarking specific areas as the geographical command area of each subsidiary does not help competition and also does not permit the transfer of technical capabilities from companies which are facing exhaustion of economic, viable coal reserves in their area. In short, Chairman CIL who is given the mandate to deliver coal to the extent anticipated in the XI and XII Plan Periods should have the authority to deploy all resources of men, material and machinery to different subsidiaries as per the requirements. Needless to say, for specific services rendered by one company to the other, the receiving company will make a payment to the providing company. The blocks transferred to a coal company in an area beyond its command area will naturally form part of the subsidiary who takes up such mining activities.
- 3.14. The steep increase in coal production anticipated from CIL would call for contracting for heavy earth moving equipment, large size equipment for underground mining and should be able to obtain equipment on an maintenance and repair contract (MARC) on long term basis. In order to do so, it should strengthen the divisions dealing with technology assessment and acquisition. Heavy machinery would need to be ordered by pooling the requirements of all subsidiaries and negotiating long term MARC contracts. The manpower resource available for undertaking this heavy responsibility appears to be inadequate and this should be remedied as early as possible.

- 3.15. The interface between CIL and the subsidiaries should be properly streamlined so that MoC gets involved only in setting annual targets on physical and financial parameters. This should be done in consultation with CIL, which in turn will have detailed discussions with the subsidiaries. CIL and its subsidiaries should be left free to attend to the operational issues. The MoC would do the financial allocations to the subsidiaries. However, adequate flexibility should be given to CIL Chairman to make adjustments in the financial allocations between companies as per the actual needs. **The cadre of executives from level M1 i.e., executive engineers should be maintained centrally to avoid promotional discrepancy at the subsidiary level. This becomes necessary as CIL might have to take up coal mining activity in different regions on the basis of readily available resources and the growth rates of the companies would tend to be different over time.**
- 3.16. Ministry of Coal should quickly examine the Articles of Association of CIL and subsidiaries and introduce these changes so that ordering of equipment and owning responsibility for fulfilling the coal production targets set for CIL could start with the 11th Plan beginning. As recommended in the chapter on Human Resource Development (Chapter VII) of the Report, **the entire training function above the level of executive engineers and the recruitment and training of all executive level posts would be done by CIL's Corporate Office.**
- 3.17. This requirement of integration between the corporate office and the subsidiaries is necessary for improving the operational efficiency to quickly step up the rate of coal production in CIL. Issues relating to CMPDIL, SCCL and NLC are discussed below.

### ***c) Central Mine Planning and Design Institute Limited (CMPDIL)***

- 3.18. CMPDIL was established in 1975 as a wholly owned subsidiary to provide in house consulting services to CIL. It has now diversified its activities in several areas. The CMPDIL functions through a Board of Directors constituted by Government of India. A full time CMD is supported by four Functional Technical Directors and 4 Part Time (non executive) Directors. Its Corporate headquarters is at Ranchi and it has seven regional institutes.
- 3.19. It renders services to CIL and subsidiaries, directly to MoC and also takes up specific jobs for companies other than CIL as consultancy services. The services rendered by CMPDI to different clients are listed below:

### ***For CIL***

- Exploration including drilling and preparation of geological reports.
- Preparation of pre-feasibility reports, advance action proposals, feasibility/project reports, revised cost estimates for new and reconstruction projects.
- Annual operational plans for large open cast mines.
- Preparation of project reports and working drawings for coal washeries, coal handling plants and various infrastructure facilities.
- Preparation of EMPs and EIAs.
- Bid documents for CHPs, workshops, sub-stations and other infrastructural facilities.
- Annual assessment of mine capacity and HEMM/equipment performance for all mines of CIL.
- Technical services related to blasting, ventilation, support design, non-destructive testing, etc.
- Laboratory testing services for coal characterization, washability, air/water quality, physical-mechanical properties of rocks, etc. (such activities are also undertaken by Central Fuel Research Institute – CFRI, Dhanbad – In fact much of lab testing in the coal sector is done by CFRI both commercially as well as for scientific research)
- Management services for ISO certification.
- Energy audit/conservation studies
- Mining electronics and repair/testing of electronic components of equipment.
- Third party inspection of quality checking of materials and random testing of explosives procured by subsidiaries.
- CMM related services.
- Special reports
- Nodal agency for CIL, R & D projects

### ***For MoC***

- Promotional exploration and detailed drilling for non-CIL blocks
- Nodal agency for other Central Sector schemes, viz research projects under S & T schemes and EMSC projects
- Identification and evaluation of captive mining blocks
- Technical services including preparation of special reports.
- Preparation of Inventory of coal reserves in collaboration with GSI on annual basis. It has undertaken a project in 10th Plan regarding Integrated Coal Resource Information System for developing coal resource database as per UN International Framework Classification Guidelines

### ***For Outside Clients***

- The above listed services are being provided to companies outside CIL also depending upon specific job orders and based on open market bidding or specific requisition for such services.

3.20. The Committee had detailed discussions with CMPDI executives at Ranchi and felt that though it has functions which are close to any consulting agency dealing with coal, it had the advantage of working on all projects in which CIL was involved and as CIL was the dominating (almost like a monopoly) coal company, the CMPDI had the benefit of access to technological, coal field wise and mine

wise data. It has taken up the project “Integrated Coal Resource Information System (ICRIS)” to create coal resource database as per UN International Framework Classification Guidelines. The Committee felt that over the years CMPDIL, attending to this work, had internalized the talents relating to mine planning, exploration assessment, and other activities. In the context of permitting other public sector companies including state government mining companies and private major bulk users of coal for captive use, there is need to provide competitive service to these companies in detailed exploration and mine planning in areas allotted to them. **The knowledge and database, which is available within CMPDI, should be made available nationally by making it an independent company which is outside the control of CIL.** The links between CIL and CMPDIL should be detached. **The Committee felt that conferring total autonomy to CMPDIL would also enable it to retain its expert staff and augmenting their available talents by offering them better emoluments in keeping with compensation levels in consultancy companies of similar nature. With its very large size and diversified activities, it should enter into collaboration with Mine Planning and Development companies abroad which have long experience in mechanized underground and open cast mining.** It would also enable CMPDIL to give very objective advice, both to CIL and other coal companies in the private and public sector. The large task entrusted to CIL to step up coal production substantially may make it necessary for CIL to procure services for mine planning, exploration and machinery acquisition activities from companies other than CMPDIL also. In order to make such procurement of services by CIL there should be level playing field between CMPDIL and other consulting firms. The Committee found overwhelming considerations to recommend the de-linking of CMPDIL from CIL and making it a totally autonomous company in the public sector working for CIL and other coal companies.

- 3.21. However, during discussions, when this conclusion was put before the officials of CMPDIL, the **CMD, Directors and Executive Staff and workers unanimously took the opposite view that they should be allowed to remain as part of CIL under the current structure.** They perceive that CIL being a very large organization, the linkage with CIL would enhance the prestige of CMPDIL and would provide better future in both professional and personal matters. They also argued that only by being a part of CIL they can provide objective advice fearlessly and if they do not have the link, CIL and other Coal companies will give their business to consultants who will give advice to suit the clients. The



Committee feels that the views of CMPDIL employees are coloured by their experience in the days when coal was not in the competitive market. The Committee feels that the great strength of CMPDIL and the role it can play in future in the development of Coal industry in the public and private sector within the country and utilizing their expertise to develop an international market for the talent has not been appreciated, by the officials of the public sector coal agency.

- 3.22. **The Committee in deference to the views expressed by a majority of executives and employees of CIL and CMPDIL and not to impair in any way the efforts for accelerating coal production already initiated by CIL has decided to recommend that CMPDIL structure and the interface with CIL may be retained as it is today. In view of this recommendation, there is need to make some changes in the functions of CMPDI by separating all functions of CMPDI in advising Govt in respect of approval of mine plans of companies other than CIL. This is to avoid any conflict of interest.**
- 3.23. **A serious crisis is looming for CMPDIL in the immediate future which could jeopardize its becoming a centre of excellence unless remedial measures are immediately not initiated. This is in regard to shortage of qualified, trained and experienced professionals (surveyors, geologists, geophysicists, remote sensing experts, drilling personnel or mine planners) because recruitment of such qualified professionals has not taken place for the last more than 10 years. The average age of such staff is more than 50 years and many experienced professionals are on the verge of superannuation. The crisis is likely to deepen further with the likely exodus of qualified and experienced professionals from CMPDIL to private and public sector captive coal producing organizations. Further, some experienced professionals may have to be posted with the proposed CGRA when it is set up. The Committee would, therefore, recommend that action may be immediately initiated for large scale recruitment of such qualified professionals keeping in view the current shortage of such staff, likely exodus to other organizations, rate at which such professionals would be retiring every year over the next 5 to 10 years etc. so that these newly recruited professionals could be adequately trained by experienced professionals before they retire in the next few years.**
- 3.24. The Committee however strongly feels that the increased coal production in the public and private sectors during the Eleventh and Twelfth Plan periods cannot be

achieved if you have to rely on a single mine planning organization, namely: CMPDIL. **There is urgent need to have other organizations with adequate capability especially in planning and executing underground mines. There is already an organisation for mine planning namely the Mine Planning Division in Singareni Collieries which can be strengthened either with their own funds or with additional support from Ministry of Coal. An amount of Rs.500 crores has been indicated as the fund requirements for this purpose during the Eleventh Plan period.**

- 3.25. The Committee also feels that even 2 organizations will not be sufficient but there should be several more Mine Planning organizations to help in the Coal industry development. **All the organizations engaged in Coal mine planning and development should be provided level playing field to encourage healthy competition among them. All the data collected relating to coal and kept in the CMPDIL till now should be retained by them only to the extent necessary for the work of CIL. All other data should be kept in the public domain preferably in the resources management and statistics divisions of the proposed Coal Governance and Regulation Authority (CGRA).** In respect of technical matters all these organizations should be provided facility and encouragement to seek the knowledge and experience of coal mining, especially underground coal mining through appropriate collaboration agreements.

#### ***d) SCCL***

- 3.26 Historically, SCCL has been a separate company and even at the time of nationalization and formation of CIL, the question of integrating SCCL with CIL was considered. For various reasons it was decided to keep it as a separate company. The Company has done well and fulfilled its obligations from the date of the Coal Nationalisation. **The Committee recommends that the current structure and arrangement may be continued in respect of SCCL.**
- 3.27 **The Committee would suggest that CIL and SCCL arrange for greater co-operation and coordination in respect of recruitment, training, mine planning and heavy machinery acquisition.**

## **e) NLC**

3.28 This company though wholly owned by GoI, has remained separate from CIL as it is devoted to the mining of lignite only. Lignite is different from coal in several significant parameters and calls for mining by technology, which is different from that of coal mining. Moreover, NLC is also engaged in power generation based on captive lignite production. It is also a composite industry producing lignite and converting it to electricity, fertilizer and domestic fuel. The company systems and procedures are different from CIL. The performance of NLC has resulted in its getting Mini-Ratna Status. **The Committee recommends that in respect of NLC also the current structure of the company may be continued without change.**

## **f) Limits of Authority & Interface with Government**

3.29 A recurring theme that came up in the discussion with all companies was the need to expedite decisions at all levels of Government and all levels within the companies. Detailed suggestions were also submitted in most cases to the committee. The committee does not consider it appropriate to adjudicate in respect of the details. **The Committee, however, would like to point out that the limits of Authority fixed with respect to CIL and the subsidiaries is very out of date and needs to be redefined. The Committee considers it absolutely essential that CIL should be given the status of a “Navratna” company and its Board empowered to take all decisions in respect of investments when once the Government gives in principle approval to the investment. There should be only one Director from the Government on its Board. The Board may have, besides the Chairman up to five full time directors and three part time directors including the Govt. nominee. Besides these, there should be at least two Independent Directors.**

3.30. **The operating subsidiaries of CIL, CMPDIL, and SCCL should be given the Mini-Ratna status. The boards of management can be patterned on lines similar to CIL.**

3.31. The Committee understands that as per the present principles and guidelines these companies are eligible to get the recommended Ratna status but the procedures are time-consuming. The committee recommends that pending formal conferment of the Status, MOC should give them powers equivalent to the recommended status. These arrangements should be put in place as early as possible.

### ***g) Systems, Internal Procedures and Morale***

3.32. Needless to say, the organization cannot become world class merely by tinkering at the top. **The whole organization should adopt a new spirit of élan as contributing to India's energy security and accept changes in procedures and work-systems so that it could be benchmarked against the best coal companies of the world. The HR issues should be given highest priority. These are discussed in a separate chapter later in this report.**

COAL REPORT PART II  
Chapter IV

**REGULATION & GOVERNANCE IN THE COAL SECTOR**

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- 4.1. The Issue of the need or otherwise of setting up an office of coal regulator has not been included as a specific term of reference to the Expert Committee. However, the need and urgency for an appropriate independent regulatory mechanism for coal industry has been highlighted in the IEP Report and also in Part I of this Report. Many persons in private sector who presented their views to this committee also emphasized the need for a Regulator for Coal sector especially in the context of inducting new coal producers from among the major coal users as captive coal miners and state level public sector mining companies. The Committee, therefore, took up an examination of this issue under Term (vi) of the TOR, which reads “other matters that the committee may consider important for the general improvement in the functioning of the coal sector”. This examination had to be widened to a study of the whole structure of governance of the coal industry.
- 4.2. The Indian coal industry is poised for high production growth and major structural changes. The nationalisation of the coal industry in the seventies brought the entire coal industry under government ownership barring a few minor exceptions. The two major public sector coal companies, namely, CIL and SCCL dominated the production to meet the demand for coal, as per targets set by the Government. The coal industry has slowly increased its production from around 70 million tonnes at the time of nationalisation to 460 million tonnes in 2006-07. But if the coal demand in the next ten years has to be substantially met from indigenous production of coal, the industry has to increase production at a faster pace and reach a level 1100 million tonnes by the end of the 12th Plan i.e., 2016-17. In order to ensure this growth, Government have revised the rules to permit coal mining by major users by way of captive coal mining and further liberalized the rules regarding mining and trade by public sector companies such as mining corporations under State Government control. This has led to a number of companies undertaking coal mining in a systematic manner to over 30. These companies have taken up coal mining by getting coal blocks allotted to them by the Ministry of Coal under the liberalized rules. While each of the mines are subjected to approval by different agencies as discussed in Chapter II of this Report, there is no comprehensive law regarding licensing, setting up and operating a coal mining company or a coal trading company. The issue of having a regulatory mechanism for coal has been examined on several occasions in the past in the narrow context of determining coal price.

- 4.3 This Committee analysed the current governance structure in Coal sector and found that various aspects of governance are dealt with in different agencies functioning under diverse Ministries without any co-ordination. **The Committee, however, felt that** coal industry, which is becoming the main pillar of our national energy security, needs a new and comprehensive governance structure which could **lead to optimal and appropriate resource management including a regulatory mechanism** to attend to all issues relevant for development of coal resources, regulation of coal price, wherever necessary, and nurturing level playing field between the influential large public sector coal companies and the emerging small coal companies in the State public sector and the captive mining sector. **The Committee has, therefore, analyzed *ab initio* all the issues of governance and regulation in coal sector.**
- 4.4 Coal industry is today governed by a large number of Acts and Rules, which are administered by diverse agencies. Most importantly the industry has to plan its growth on the basis of sound reliable data. Competitiveness of the industry can be ensured only if such data is available on a neutral basis to all existing and prospective players in the industry. In chapter III we have discussed the need to have CMPDIL as an independent company to make the data availability neutral to all coal companies. In this Report some suggestions have been made regarding accelerating the pace of acquisition of information and data on coal resources and making the information available on neutral basis to all players.

### BOX No. 7: China – Governance of Coal Sector

#### **China Coal Law 1996**

Coal sector in China is governed by this law. The important provisions are set out below:

- The Law is formulated for the purposes of rationally exploiting, utilizing and protecting coal resources, standardizing coal production and management activities and promoting and guaranteeing the development of coal industry.
- Coal resources shall be owned by the state.
- Exploitation and utilization of coal resources shall abide by laws and regulations concerning environmental protection, prevention and control of environmental pollution and protection of the ecological environment.
- The department of coal administration under the **State Council** shall be responsible for the supervision and control of nationwide coal industry.
- The department of coal administration and other relevant departments under the **local people's governments** shall be responsible for the supervision and control of coal industry within their respective regions.

- **For establishing a coal mining enterprise**, the following requirements shall be satisfied.
  - a. Have a feasibility study report or mining plan for the coalmine construction project;
  - b. Have definite scope of the mine and mining area, and a resources comprehensive utilization plan
  - c. Have a geological, surveying and hydrological data and other relevant data needed for mining.
  - d. Have a mine design conformable with the requirements for safety in production and environmental protection of coalmine;
  - e. Have a rational production scale of coal mine and funds, equipment and technical personnel suited to the production scale; and
  - f. Other requirements specified by laws or regulations applicable to the area.
- The use of land for the construction of coalmines shall be handled in accordance with relevant laws and regulations.
- In construction of coalmines, coal exploitation shall be conducted in step with the protection and control of the environment.

**For applying for a coal production license**, the following requirements shall be satisfied:

- a. Have a mining license obtained in accordance with the law;
- b. The production system of the mine shaft is conformable with the safety rules;
- c. The mine director should have received proper training in accordance with the law;
- d. The workers engaged in special operation have received proper training;
- e. Have field surveying up – against down -pit engineering drawings.
  - The construction of coal mines shall adhere to the principle of protection of cultivated land and rational utilization of land
  - The state shall develop and promote coal-cleaning technology.
  - The recovery rates shall be determined by the department of coal administration in the light of different resources and mining conditions.

Source: Extracts from Coal Law of China 1996

### **Indian Legal requirements for Coal mining**

- 4.5. On the basis of information available if a Company plans to expand its current coal mining activity or to set up a new coal mine, it has to obtain several permissions and approvals before the company takes up coal mining. These can be grouped as under:
- Surface rights
  - Mineral rights
  - Prospecting license
  - Mining license

- Environment Management Plan's approval.

4.6. After commencing the mining operations, the company comes under different agencies which control:

- Machinery and Equipment Approval
- Labor and Employees Management
- Marketing and Distribution
- Export and Import

Each of these issues also has several sub-issues such as “mining” encompassing safety and health of workers and people living in surroundings areas and also includes issues of local environmental impact and global environmental impact. All these are dealt with by different agencies.

4.7. The surface rights refer to the physical possession of the land where mine is to be located. The procedures for obtaining surface rights depend on the category of the land in which the mine is proposed to be located, whether the land is private owned land or Government owned revenue land or forest land. Private lands have to be acquired through negotiation with the owners of the land or acquired under the Land Acquisition Act 1894. The surface rights can also be obtained under Coal Bearing Areas (Acquisition & Development) Act 1957 (CBAADA) by public sector Coal companies. The Surface Rights in forest land are governed further by Forest Conservation Act 1980. These legal provisions are administered by different agencies. While Land Acquisition Act is administered by the State Governments, CBAADA is administered by the Central Government. Both central and state Governments have roles to play under the Forest Conservation Act. Mineral rights issues are dealt with under Mines and Minerals (Development and Regulation) Act 1957 (MMDRA). Under this Act Coal has been assigned exclusively to Central Government. Prospecting Licensing procedures are very vague and conflicting views were expressed on whether private agencies can undertake prospecting under the current legal provisions. Mining Lease is issued by a State Government on the recommendation of Ministry of Coal.

4.8. **The Committee finds that the agencies for governance and regulation in the coal sector are many and these operate with reference to the specific legal enactment (Act) with which they are concerned and are only driven by the requirements of their particular Department. There is inadequate appreciation in these agencies of the important role they play in accelerating Coal production and ensuring energy security.** If these deficiencies are not remedied, they would critically affect the coal production plans. **The Committee**



**appreciates the fact that rights and duties assigned to different agencies cannot be transferred to single agency immediately. The Committee, therefore, would like to recommend the setting up of a central coordinating agency and gradually strengthening it.**

4.9. For the sake of ensuring greater coordination, the Committee sees great merit in de-linking these existing regulatory agencies, which deal fragmentarily with some specific parts of overall governance in the coal sector, and bringing them together under a Single agency of the Government.

4.10. The Committee examined if such an agency could be given certain regulatory powers towards determining the price of coal till well-developed market is created for the Coal Industry. The Committee discussed the issue of price and the price regulation in coal industry with the different stakeholders individually and in groups. **All stakeholders other than coal producers are in favour of a neutral body to determine the coal prices in a transparent manner. The Coal producers point out that the industry has been empowered a few years back to set and regulate the price of coal and CIL as the largest producer of Coal has emerged as the Price leader.** CIL has maintained the prices at very reasonable levels and has resorted to increase only to compensate for the inflation. In fact, the increase in coal prices in the last five years has been at rates lower than the rate of inflation. However, the common perception of the consumer is that CIL has arbitrarily increased prices and has made high profits. The Committee is of the view that the negative response of the consumers is due to their non-participation in the price determination process. **This Committee has recommended in Part-I of the Report that a different pricing mechanism be applied to Coal users in strategic industries like Power, whose prices are controlled and who require regular supply of very large quantities of Coal every year, which has to be arranged with the cooperation of the providers of infrastructure for the transport of such Coal. The Committee has recommended that the price for such Coal should be negotiated on a long-term basis with a formula for revision of the price periodically.** The long-term price could be settled between the buyer and seller by negotiations but at rates, which shall not exceed a maximum to be prescribed by the regulating agency. Whenever negotiated price does not emerge the matter will be referred to the regulating agency for determining the fair price. (See Coal Report Part I – Chapter 5, paras 5.16 to 5.21). **The Committee has further suggested that the major coal consumers under this category should also involve the Railways in**

**such transactions and enter into a Fuel Supply and Transport (FST) Agreement.**

- 4.11 At the time when the Committee made the recommendation (December 2005), and even now the coal producers maintain the view that the coal industry after prices were de-regulated in 1997 has done a good job of self-regulation and self-restraint. Since the major contribution (of over 80%) of the additional production required in the next two plan periods are expected to be delivered by the public sector coal companies, they should be allowed to continue under the present system of self regulation in respect of prices. **The Committee however feels that till the Coal supply and demand comes to an equilibrium state there would be need for an agency to regulate the price, in respect of the major bulk consumers of Coal, especially the consumers whose output prices are strictly controlled as in the Power Sector. This will be only in cases where the parties are not able to settle the price among themselves through bipartite or tripartite negotiations. The rest of the coal users could obtain coal to meet their requirements from e-auction market or the alternate to e-auction which is likely to be recommended by a special Committee appointed for this purpose.**
- 4.12. A special Committee was appointed after a Judicial Court had held that e-auction is not a legally permissible procedure. The GOI set up the special Committee to propose alternative methods of allocating limited quantity of coal available to users other than strategic industries of Power, Steel and Fertilizers. The committee would like to reiterate that the e-auction price of Coal would reflect the real price of coal in a free market if the proposal of the Committee to increase the quantity offered through e-auction is increased to about 30% of total production and conducted in a planned and transparent manner annually. However, the Committee is confident that the special committee set up for the purpose will make very useful and practical proposals. This Committee concluded that the need for some intermediation in price determination and dispute resolution is unavoidable under the present condition of supply and demand in Coal. The Committee has made the suggestions towards such a mechanism to fulfill this need.
- 4.13 It is to be noted that **the three parties to a long term Coal supply contract would first negotiate a settlement for an FSTA. If the tripartite negotiations fail, the Regulator, on their request, or suo-moto can take up the issue and resolve the differences.** The decisions of the regulator should be in the form of

speaking orders and should be placed in the public domain. These orders would provide guidance in the negotiations for coal supply in similar cases later. **In the case of other industries the Regulator has to play a lead role in the evolution of a competitive market in coal, as per the recommendations of the Special Committee. There would be in the early years of regulation several occasions when the Regulator would have to resolve disputes between buyers and sellers. The regulator would also issue clear direction regarding the procedures to be adopted for negotiations as well as competitive bidding.**

**4.14 Taking all these facts and the experience in other countries into account the Committee is of the view that the various agencies which are currently governing and regulating the Coal sector on issues such as systematic assessment of all coal resources, collating the information in a digital form, and regulation of coal mine safety and working conditions of miners, regulating prices, ensuring the restoration of open cast mine areas after completion of the mine operations and providing adequate safety in exhausted underground mines and to resolve disputes between any stakeholders in the Coal industry should be brought together under a single agency. The Committee therefore recommends the setting up a *Coal Governance and Regulation Authority (CGRA)*. It should not be a mere regulating organisation, but a development and regulation organisation as in the case of redesigned UK Institutions for gas and electricity.**

**4.15 The suggestion is not to duplicate the agencies or increase the number of executives and operatives currently attending to these items of work under the control of diverse departments/ministries, but to move these functionaries from their respective organisations to work under one umbrella called CGRA. The persons who are brought into CGRA would continue to be on the rolls of the respective departments but would be placed with CGRA only to deal with Coal industry issues under the overall guidance of the Authority. This is not a novel arrangement, but very similar to the arrangements which have been in existence for a number of years now in the different ministries of GOI. The Financial Advisors to the departments/ministries are selected and appointed by the Ministry of Finance but placed under the Administrative Ministry for advising the concerned Secretary and his Officers on financial matters. These Financial Advisors are under dual control of the Finance Ministry and the Administrative Ministry.**

4.16 **The Committee recommends that in order to effectively deal with all issues connected with governance of coal sector and its development, the Officers of the different departments very closely connected with the regulation and governance of the Coal industry should be brought under one Authority.** The Authority will have five Directorates. These are:

- Directorate of Coal Resources Management
- Directorate of Mines Safety & Workers' Health & Employment
- Directorate of Prices and Taxes
- Directorate of Environment Management.
- Directorate of Public Relations, Legal and Dispute Resolution & Statistics

Authority should consist of minimum of three members representing technical, legal and finance expertise. These members would guide and monitor the work of the five directorates under it, which should operate with a high degree of autonomy but under the overall directions and control of the members.

The issues to be dealt with under the directorates could be:

- **Coal Resources Management** – This would involve keeping together under its control all information relating to coal as well as lignite blocks in the country, the allocation of these blocks and the issue of licensing for prospecting for coal and lignite resources, issue of Mining Lease, approval of mine plan of prospective block allottee, assessment and auditing of reserves, ensuring conservation of coal lignite resources, permitting the closure of coal and lignite mines, special issues like Coal fires and issues of abandoned mines, the Jharia and Raniganj Coal Mines Reclamation, etc. This directorate would be responsible for systematic assessment and classification of coal and lignite resources as per international standards and defining the boundaries of coal mines and would assist the government in drawing up principles and procedures for allocating coal blocks to all companies, both private and public and adjudicating disputes arising in the allocation process.
- **Safety, Health and Employment** - This is now under separate Organisation called Directorate of Mines Safety. The scope of this should be widened to include the safety and health of workers in open cast and underground mines and the regulation of employment, especially the labour employed by the outsourcing agencies undertaking OB removal and coal extraction and transportation activities in these mines.
- **Prices, Taxes and Royalty etc.** – This involves a number of Acts which govern many commodities other than coal also and many Acts which are under the Central Government purview. These are closely linked issues but they are dealt with by different agencies with divergent objectives. Needless to say, that this Directorate would have to deal with all issues of Coal and Lignite pricing including resolution of price disputes and regulating the sale of coal through e-auction.
- **Environment Management** - This includes coordinating with the environmental agencies in fixing pollution standards, enforcing the observance of standards and encouraging and providing incentives to the coal industry for taking up Clean Coal

technologies. It would also deal with the formulation of policies and procedures of introducing Carbon Capture and Storage technology based projects.

- **Policy – Legal, Public Relations, Statistics and Dispute Resolution** – This will include all items of work other than those set out above. Each of these group subjects listed above merit the presence of appropriate talent to effectively deal with the issues and should be headed by a very senior official, say of the rank of a Director in the other regulatory agencies.
- 4.17. **Private sector participation in all activities in the coal supply chain from exploration, mine identification and setting up and operating of efficient coal and lignite mines and coal washeries/coal preparation plants is recommended by this Committee. If these recommendations are to materialize all the information and data relating to Coal and Lignite resources, coal and lignite blocks in possession of different agencies, Coal and Lignite mines in operation, the details of their production etc., should be available to all the players in the coal sector in the same manner.** In India these details are collected under different laws and regulations by different agencies. The major chunk of responsibility has been entrusted under the provisions of the Collection of Statistics (CoS) Act 1953 to the Coal Controller. There are serious questions now about the need to continue this organization. **The Committee is of the view that the scope of data to be collected under the CoS Act be widened to include ALL data relating to coal sector and the responsibility entrusted to the Coal Regulator. The data collection functions of CMPDIL for coal and NLC for lignite should be transferred to the Regulator.** All data should be available to all players under the same conditions. This is an important element in our providing level-playing field to all players, including the prospective players in coal sector.
- 4.18. **The Committee has recommended that in areas not covered by Proven Reserves with GRs (Geological Reports) private sector may be invited to take up exploration and mine development at their risk partly shared with the Government on the lines of the New Exploration Licensing Policy (NELP) followed in the oil sector. The role of the Director General Hydrocarbons (DGH) would have to be played by the Regulator in the Coal Sector.**
- 4.19. The procedures of approval of proposed operational mine plans and the principles followed currently need to be streamlined. The principles and procedure should be made transparent and should be uniformly applied to private and public sector. **The Regulator should, after open hearing of the different stake-holder interests, formulate the principles and procedures and also act as the**

**appellate authority in cases where the mine-owners are aggrieved by the decisions of the mine approving agency.**

4.20. There are a number of funds and cess collections made in the coal sector and these are administered by diverse agencies without co-ordination. CGRA would be the appropriate authority to coordinate and monitor the collection and utilization of these funds. An illustrative list of such funds is given below:

<b>S.No.</b>	<b>Funds/Cess</b>	<b>Rate/Amount</b>
I-	Coal Royalty as per revised rates w.e.f. 16.8.2002	Varying from Rs.65/tonne to Rs.250/tonne depending upon the grade of coal
II-	Excise duty under CCDA Act	Rs.10/tonne.
IIIa-	Cesses by WB Government:	
	i. WB Rural Employment & Production Cess	@ 20%
	ii. WB Primary Education Cess	@ 5%
	iii. Public Works and Road Cess	Rs.1.00/tonne.
	iv. Asansol Mines Board of Health Cess	Rs.0.40/tonne.
IIIb-	Andhra Pradesh Mineral Land Bearing Cess	Rs.20/tonne
IIIc-	Assam Land Tax	Rs.50/tonne
IIId-	Cesses by Chhattisgarh Government:	
	i. Vikas Upkar Tax	Rs.5/tonne
	ii. Paryavaran Upkar Tax	Rs.5/tonne
	iii. Entry Tax for some selected mines	@ 1 to 2.5 %
	iv. Terminal Tax for some selected mines	@ 1 % to Rs.2.50 to 20.00 per tonne
IIIe-	Cesses by MP Government:	
	i. Gramin Adosancharan & Sadak Upkar Tax	Rs.5/tonne
	ii. Forest Tax in some mines	Rs.7/tonne
	iii. Entry Tax for some selected mines	@ 2.5 %
	iv. Terminal Tax for some selected mines	Varying
IIIf-	UP Govt: Shaktinagar Special Area Development Authority Tax	Rs.5/tonne

4.21. The utilization of these funds is under diverse agencies and the efficiency of utilization has been often criticized. **The oversight by CGRA would remedy the shortcomings in the present system.**

4.22. Taking all this into consideration, the Committee recommends setting up an **Coal Governance and Regulation Authority (CGRA)** which would be entrusted with

the overall resource management and mobilization of public and private efforts to fulfill the very large expectation from the coal industry.

4.23. **The Government will have full rights to give any direction to the CGRA but all such directions should be in writing and should be placed in public domain and later placed in the Parliament.**

4.24. The Regulator would submit to the Parliament and the People an Annual Report on the Status of the coal sector.

#### **NATIONAL COAL COUNCIL OF INDIA**

4.25. **CGRA as well as Ministry of Coal should get advice from an Advisory Board which may be called the National Coal Council of India (NCCI) in which all stakeholders are duly represented. The experience of USA which has a similar arrangement could provide some pointers of how this could be structured.**

### **Box No. 8: US National Coal Council**

#### **The National Coal Council USA**

The National Coal Council USA is a federal advisory body in which all stakeholders in the Coal industry including workers and coal mine machinery manufacturers are represented. The Charter of the National Council is extracted below:

The NCC provides advice and guidance on a continuing basis as requested by the Secretary of Energy on the general policy matters relating to coal, including:

- Review of federal policies which affect directly or indirectly the production, marketing and use of coal.
- Advice on plans, priorities and strategies to address more effectively the technological, regulatory and social impact issues relating to coal production and use.
- Advice on appropriate balance between various elements of federal coal-related programmes.
- Advice on scientific and engineering aspects of coal technologies including emerging coal conversion, utilization or environmental control concepts.
- Advice on the progress of coal research and development pursuant to the Office of Coal Research Act.

*Source: The Website of National Coal Council, USA*

4.26. The members of the National Coal Council of India (NCCI) could be headed by the Minister in charge of the Ministry of Coal who could be assisted by an Executive Vice-chairman (a wise old man accepted by all stakeholders to be fair and objective) and could have as members the Secretaries of the ministries of Coal, Power, Steel, Heavy industry, Railway Ministry and Environment ministry,

Planning Commission, chairmen of selected large coal companies and representatives of small companies, representatives of the coal mining Machinery manufacturers and selected representatives of the workers and executives and selected eminent scholars and scientists who are engaged in the study of economics, technology and social aspects of coal production and usage. All coal production industries and coal related industries and all institutions and individuals interested in coal industry can voluntarily seek membership of the NCCI and all others will have a right to attend the Annual General Meeting once in a year when there will be a review of the status of the Industry, emerging national and international trends and policies required to ensure sustained production of coal and the well-being of all the entities connected with it. The Executive Committee will consist of about 25 persons; part of them will be nominated representatives of the connected Ministries but the rest elected from different interests from among the registered members of the NCCI. The Executive Committee will meet once in three months and review the status and give their objective comprehensive assessment of the progress and problems. The purpose of the NCCI is to enable the Government to get a considered objective view on coal industry which is free from sectional bias. The Executive Committee may commission special studies on issues of current relevance and importance.

### **Summing Up**

4.27. The Committee recommends that all issues connected with the governance of coal sector and its development to serve the energy security interests of the country should be brought together under an umbrella organisation called the Coal Governance and Regulation Authority (CGRA). This would, with five directorates under the organization, be dealing with the subjects as set out below:

1. Coal Resources Management
2. Safety, Health and Employment
3. Prices, Taxes and Royalty etc.
4. Environment Management
5. Policy – Legal, Public Relations, Statistics & Dispute Resolution

This Body will have legal powers derived from some existing Acts and new Acts which might be enacted. It will be governed by the rules framed for its functioning by the Government and it can formulate regulations regarding the principles and procedures that would be adopted by the CGRA. Government can give any direction on policy issues to CGRA but the copy of the direction should be



reported to the Parliament immediately or at the earliest thereafter. CGRA is also to submit an Annual Report to the Parliament.

- 4.28. The Committee has also recommended the setting up of the National Coal Council of India (NCCI) as an Advisory Body in which all stakeholders could participate and help the Government to understand the state of the coal industry periodically.

## **ROLE AND RESPONSIBILITY OF THE MINISTRY OF COAL**

- 4.29 The Ministry of Coal in consultation with other ministries and Planning Commission would determine the coal production targets and coal import/export levels. It would set the specific responsibility to the different agencies of the government including public sector undertakings. It will decide on the extent to which the coal block should be kept in the public sector and the extent to which the coal blocks may be released for captive coal mining and public sector coal mining. It will approve proposals for investments by any agency in coal mines abroad. It should coordinate the efforts in the other relevant Ministries for the timely development of infrastructure facilities like roads, railway lines and ports for the accelerated production, import and export of coal. It will develop appropriate incentive policies for the washing of coal and for industry to undertake clean coal technologies. It would coordinate all research efforts by private and public sector agencies relating to coal. Needless to say the Ministry of Coal will have powers to issue directions on policy matters to any agency including CGRA.

- 4.30 **These two new institutions proposed namely, CGRA and NCCI would greatly help the Ministry of Coal to achieve the accelerated growth of coal industry with a sense of commitment and inclusiveness by all parties.** The mere creation of a regulatory agency with limited powers of fixing prices for certain consumers might not serve the needs of the current situation.

COAL REPORT – PART II  
CHAPTER V  
PRODUCTIVITY IMPROVEMENT AND TECHNOLOGY  
UPGRADATION

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- 5.1 Among the terms of reference for this Expert Committee, the Government had included one item, which is of great importance. It has been set out as: How to improve the productivity of man and machinery in Indian Coal Sector, particularly in Coal India. The issues of productivity increase and cost cutting in the coal sector are discussed below:

**Productivity increase over time**

- 5.2 The productivity of Coal Mines is measured in terms of tonnes of Output-per-Man-Shift (OMS) in India and Output per Man-Hour in USA and other developed countries. The overall productivity of coal industry in India has been increasing gradually but is still abysmally low when compared to productivity in other countries. The overall productivity has increased in CIL from a level of 2.00 tonnes/man shift at the beginning of IX Plan (1997-98) to around 2.67 tonnes/man shift, at the beginning of X Plan (2002-03) and from 1.31 to 1.89 tonnes per man-shift in SCCL during the same period. But these figures are deceptive as they are the result of increasing the percentage of open cast (OC) mines in the total coal mined from OC and underground (UG) mines (see Table 5.1 below). The productivity of OC mines in CIL in 2004-05 was over 7.18 tonnes/man shift while in SCCL it was 8.83 tonnes/man shift in that year. The world over, the OC mines have a higher productivity than UG mines but the difference is not as much as it is in India. This is due to the adoption of the very low and old technologies used in underground mines and also in open cast mines. The XI Plan Working Group has proposed a plan for productivity improvement in the public sector coal companies to be followed in the next five years.

**Table 5.1: Production & Productivity in OC and UG mines (1974-2005)**

Item	OC Production Mt	OC Productivity t/manshift	UG Production Mt	UG Productivity t/manshift	Overall Production Mt	Overall Productivity t/manshift	%of OC production
CIL 1974-75	20.77	0.76	58.22	0.54	78.99	0.58 (0.60)	26.3
CIL 1979-80	32.31	1.26	59.13	0.55	91.44	0.68 (0.80)	35.3
CIL 1984-85	70.31	2.07	60.50	0.52	130.81	0.87 (1.35)	53.7
CIL 1989-90	119.88	3.08	58.71	0.55	178.60	1.21 (2.25)	67.1
CIL-1994-95	167.46	4.35	55.60	0.56	223.06	1.63 (3.41)	75.1
CIL 1997-98	207.02	5.07	53.99	0.59	261.01	2.00 (4.14)	79.3
CIL-1999-00	208.26	5.46	52.32	0.61	260.58	2.11 (4.49)	79.9
CIL 2001-02	230.43	6.08	49.22	0.64	279.65	2.45 (5.16)	82.4
CIL 2002-03	242.27	6.30	48.42	0.69	290.69	2.67 (5.37)	83.3
CIL 2004-05	276.53	7.18	47.04	0.69	323.57	3.05 (6.24)	85.5
SCCL 1974-75	0.00	0.00	6.18	0.81	6.18	0.81	0.0
SCCL 1979-80	0.20	5.63	9.20	0.84	9.40	0.85 (0.94)	2.1
SCCL 1984-85	1.78	3.50	10.55	0.77	12.33	0.88 (1.16)	14.4
SCCL 1989-90	5.77	3.81	12.03	0.71	17.80	0.96 (1.76)	32.4
SCCL 1994-95	11.89	3.63	13.76	0.69	25.65	1.08 (2.05)	46.4
SCCL 1997-98	15.34	3.50	13.60	0.76	28.94	1.31 (2.21)	53.0
SCCL 1999-00	16.77	4.42	12.79	0.75	29.56	1.42 (2.93)	56.7
SCCL 2001-02	17.06	6.74	13.75	0.85	30.81	1.67 (4.11)	55.4
SCCL 2002-03	20.43	7.67	12.81	0.86	33.23	1.89 (5.05)	61.5
SCCL 2004-05	22.33	8.83	12.97	0.85	35.30	1.99 (8.27)	63.3

Figures in brackets represent weighted average of OC and UG productivities.

5.3 Technological advances in UG and OC mining such as mecahnisation of UG mines and the deployment of larger size earth moving equipment in OC mines makes it possible to achieve higher OMS in future. With the adoption of appropriate technology and equipment the productivity can be enhanced significantly In India in most coal mines. This is demonstrated by the relatively higher OMS in some of the coal mines. While the over all underground mine productivity is less than one tonne/man shift, in some subsidiaries of CIL even from underground mines, productivity is nearly 3-4 tonnes/man shift. **The high coal production targets proposed in the next two plan periods and further in the period upto 2031 -32 can be achieved only by focusing on improving the technology and productivity in both underground and open cast mines.**

**Measures should therefore be designed and implemented effectively to increase the level of mechanization, introducing the state-of-the-art machines in the mines and ensuring better utilization of machine capacity which should be upto international standards.**

- 5.4 Equipment utilization both in CIL and SCCL has been far below the world standards. However, it is generally accepted that average cost of production of coal in India is low compared to USA. But the best mines in USA both underground and open cast at favorable locations at the mine mouth have production costs closer to costs in India. This has been achieved by adopting appropriate configuration of equipment and using them more effectively. **Coal companies have been slow in adoption of emerging new techniques and increasing the size of equipment. Often the geological/geomining characteristics of OC and UG mines in India are cited as reasons for not shifting to more modern equipment. The Committee finds that even under our conditions it is possible to use more modern and larger machines. The Committee would strongly urge the acceleration of the shift to more modern equipment of higher productivity.**
- 5.5 The equipment used in India now are smaller in size than used in USA and Australia. The type of equipment used and the achieved percentage utilization of heavy earth moving machines (HEMM) during X plan period and the target for XI plan period are set out in the table below:

**Table 5.2: Equipment Utilization in CIL & SCCL**

Sl. No	Equipment	CIL			Projected end 11 <sup>th</sup> Plan	SCCL	
		End 10 <sup>th</sup> plan				End 10 <sup>th</sup> plan	Projected end 11 <sup>th</sup> Plan
		CMPDI Norm (%)	Percentage of CMPDI Norm achieved	Percent Utilisation		Percent Utilization	Percent Utilization
1	Rope Shovels	60	84	50.4 (4415)	Not Projected	41 (3592)	45 (3942)
2	Hydraulic Shovels					49 (4292)	52 (4555)
3	Rear Dupers 35-85 T 120-170 T	50	74	37.0 (3241)		46 (4030)	46 (4030)
4	Draglines	73	109	79.6 (6973)		70 (6132)	70 (6132)
5	Dozers	45	63	28.4 (2488)		34 (2978)	34 (2978)
6	Drills	40	76	30.4 (2663)		NA	NA

Figures in brackets represent number of hours equipment is utilized in a year (out of 8760 hours)

**The Committee recommends that the process and procedure of the equipment selection at the stage of Mineplanning and approval and monitoring the**

**performance of Heavy Earth Moving Machinery (HEMM) needs revision to help the acceleration of the pace of shift to more efficient equipment .**

**(1) OPEN CAST MINING IN INDIA.**

5.6 The prevailing mining technologies deployed in the mechanized OC mines are basically various combination of Heavy Earth Moving Machinery (HEMM). More modern technology for opencast mining can be the following combinations of HEMM:

- Shovel dumper combination
- Shovel dumper/dragline combination
- Dragline dozer combination
- Surface loader dumper combination
  - with creeper dumper haulers
  - with high angle conveyors/inclined skips
- Shovel dumper/in-pit crusher/conveyor combination
  - with creeper dumper haulers
  - with high angle conveyors/inclined skips
- Shovel-dumper/surface miner/rock breaker/tipper combination
- High wall mining

5.7 Shovel-dumper system is the most flexible system. In-pit crushing-conveying system may be combined with shovel-dumper. High wall mining may find its applicability depending upon the seam parameters and geo-mining conditions.

Dragline and shovel-dumper operations are the most common technology adopted in open cast coalmines. Sizes of these units are gradually being upgraded for better control and increased productivity of the opencast mines. At the time of nationalisation, surface mining equipment in use was 4.6 cum shovels, 25/35 T Rear Dumpers, 100/160 mm Drills, 180/250 HP Dozers and assorted sizes of draglines.

Coal India has at present 41 draglines including 16 nos. of higher capacity draglines (24 cubic meters (cum) & above), 126 electric rope shovels of the size of 10 cum and above, a large number of Hydraulic shovels in the size range of 2.7–4.2 cum and some higher size d hydraulic shovels upto 11.8 cum bucket capacity. 120T and 170T rear dumpers have been introduced mostly from the year 1990; at present there are 307 such pieces of equipment.

Equipment like 42 cum electric rope shovels, 250 T Rear Dumpers, 850 HP Dozers and 360T–400T rear dumpers and hydraulic shovels upto 35 cum bucket capacity are likely to be inducted in the opencast mines in the near future.

- 5.8 Mobile in-pit crushing and conveying technology for coal is in operation at the Piparwar opencast mine of CCL and shift-able in-pit crushing and conveying of overburden is in operation at the Ramagundam II mine of SCCL. These technologies have, however, been associated with extremely high capital cost.

Surface miner has found its application in mining industry for cutting rocks like limestone, lignite, clay, loams, coal, etc, having low compressive strength. Drilling and blasting operation can be avoided for extraction of these categories of rocks with the application of surface miner. It also cuts the rocks to a size under 200 mm, thereby eliminating the requirement of primary crushing. This machine, if judiciously applied, can facilitate selective mining of coal seam having thin bands.

- 5.9 Opencast mining operations are capital intensive and huge initial investments are required to open up a mine. The success of the mine would depend on configuring the most appropriate equipment for the specific mine and determining the optimal operational plan and finally, utilization of all resources in terms of equipment, materials and manpower to their maximum potential. A major share of this investment is on HEMM and thus the cost of owning and operating these machines have a strong effect on the profitability of mining ventures. With the increase in the size of operations and a consequent increase in fleet size, real time control is needed to ensure optimum performance of equipment fleet. **Effective and efficient usage of HEMM and elimination of idle time is to be ensured for maximizing productivity. Objective should be to monitor and identify bottlenecks/areas of improvement and exercise greater control over equipment and operations in real time. Online information provided by the modern equipment is a fundamental and strategic step towards changing the nature of technical and operational decision making at mining operations. Advanced satellite technology, e.g. global positioning systems (GPS) based mine management along with Truck Dispatch System (TDS) is a common facility in many large opencast mines in Australia, South Africa and USA. Indian coal industry has just started looking towards these technologies.** The Committee is happy to note the efforts made to upgrade the technology but is unhappy that the arrangements made to absorb and adopt quickly the technology and to extract the highest possible utilization from the equipment have not been satisfactory and such high cost equipment are mostly delivering low availability and output. **The time taken in most cases for ordering new hitherto untried equipment has been very long. The specter of vigilance enquiry is often cited as the cause for such long delays. There is need to**

**have permanent cell for technology evaluation and monitoring and improving the systematic operating procedures forequipment procurement.**

## **(2) UNDERGROUND MINING TECHNOLOGY**

5.10 Underground mining technology has made rapid strides in technology upgradation in the world though it has been relatively stagnant in India. The technologies presently in vogue in the underground mines are as follows:

1. Conventional Bord and Pillar system
2. Semi-mechanised Bord and Pillar system with Side Discharge Loaders (SDLs)/Load Haul Dumpers (LHDs)/Universal Drilling Machines (UDMs)
3. Mechanised Bord & Pillar/Room & Pilar system with Continuous Miners (CMs)
4. Mechanised Longwall(PSLW) mining system
5. Special methods (i.e. site specific methods) like Blasting Gallery (BG) method; Cable bolting method, wide and stall method, steep mining methods, etc.

Alternative technologies for extraction of resources by underground mining in geologically disturbed areas and deep seated coal resources will depend primarily on the intensity of geological disturbances and depth of occurrence. The prevailing technologies will also find their applicability in most cases with or without modifications. Some of the alternative mining technologies can be:

1. B & P with SDL/LHD/UDM (Universal drilling machine)
2. PSLW/Longwall Mining
3. CM Technology – Wongawilli method
4. Shortwall Mining
5. Special Methods
  - a. Blasting Gallery (BG) method
  - b. Cable bolting method
  - c. High Pressure water jet mining (Hydro -mining)
  - d. Integrated sub-level caving
  - e. Sub-level caving with High Pressure Air Breaking System
  - f. Short longwall method for extraction of standing pillars
  - g. Longwall Top Coal Caving (LTCC) technique for mining thick seams
  - h. Jankowice Method (for Steeply dipping seams)
6. Stowing technology in conjunction with mining:
  - a. Stowing with sand or alternative stowing materials
  - b. High Conc. Fly-ash stowing (Paste-fill) technology
7. Underground Coal Gasification (UCG) for coal/lignite deposits can be undertaken in very deep mines which are not workable by conventional methods. (This will be dealt with in the chapter on “Cutting Edge Technologies”).

5.11 At present in the UG mines of CIL there is a mix of manual, semi-mechanized and mechanized mines. This needs to be changed more speedily towards 100% mechanized mines. The presently available methods, namely, Long-wall and Bord

& Pillar (B&P) methods will continue to be used dominantly with the limited application of other methods like Blasting Gallery, etc. **The thrust area for UG mining may be the replacement of the B&P methods with higher degree of mechanization like, Continuous Miner (CM) technology. However, the use of Longwall technology, wherever geo-mining conditions permit, will be continued as a mass production technology, particularly for deep-seated reserves. So we will have a judicious mix of B & P with CM, B&P with SDL/LHD combination, mechanized Longwall and other special mining methods.**

**In the area of underground mining, new technologies will have to be introduced in mine development to reduce the gestation period of underground mines, introduce better mine support through appropriate strata control investigations, development of suitable methods for induced caving such as hydro-fracturing for hard roof management for shallow and medium depth of cover and also in the other areas like drilling and blasting, transportation, etc.**

In brief we have lagged behind other countries in adopting new technologies and in updating the old ones. The Committee, therefore, recommends the adoption of the following method to incentivise the adoption of the state-of-art technologies for UG mining.

### **(3) ULTRA-MEGA UG MINES.**

5.12 There is a perception even among those closely connected with coal industry that large scale mining of coal using modern underground technologies will have to face many unknown risks. **There is need to provide special incentives to stimulate interest in a large-scale underground coal mining in India. The procedures followed in the power industry to mobilize investment for ultra mega power projects provides a model which could be adopted in coal industry.**

5.13 Towards this end it should be possible to identify coal blocks which are amenable for exploitation as large size mechanized UG mines and could support 5 -10 million tonnes of production per year. For these blocks, CIL or CMPDI may be directed to promote a shell company as SPV and take up all pre -production work of obtaining the required legal and administrative clearances, including environmental approval and forestland use conversion approval. MOC should set up a High Level



Empowered committee to call for bids on international competitive bidding basis from Indian companies permitted to take up coal and captive coal mining to bid along with a well established foreign coal company with experience in modern mechanized UG mining operation. The criteria for selection should be the cost at which about 5 million tonnes of coal could be delivered at the mine mouth in say 4-5 years. All prospective bidders could be allowed adequate time to do adequate due diligence before filing the bids. The cap price for the bid could be the price of imported coal of equivalent quality at the location of the mine. This coal could be offered on linkage basis to large users. If the lowest bid is higher than the prevailing price of coal at that location Government could provide a subsidy. The Committee feels that such a contingency might not arise and the price of coal produced by this method is likely to be competitive. The design of this proposal can benefit from the experience of the Ultra-Mega Power projects selection and approval recently completed. The Committee recommends that **at least two ultra mega UG mines may be taken up for allotment on this basis in the XI plan period and on the basis of experience of its operation could be continued in the subsequent periods.**

- 5.14 The Committee feels that unless special attention is paid to UG mining by introduction of modern methods of mining already adopted in other countries which help to increase OMS in such mines and reduce the costs of mining in UG mines, there will be neglect of high valued deep-seated coal resources which could be mined only by such methods whereby these precious coal resources of India would be lost. **The Committee, therefore, recommends the launching of a specially designed “UG COAL INITIATIVE” to increase the share of UG mine production gradually from the current less than 15% to 25 % in the next fifteen years. The Initiative suggested should examine comprehensively the suggestions discussed above and training of large number of engineers within the country and abroad in mechanized state-of-the-art UG mining for various thickness ranges – thin seam, normal thickness seam and thick seam, especially in multi-seam environment.**

#### **(4) Administrative Hurdles for Introduction of New Technology**

- 5.15 The discussions with the officials and machinery suppliers by the Committee revealed that there is a great degree of inertia which prompts the officials to place repeat orders for the same kind of equipment that has been procured in earlier years and have performed satisfactorily. Ordering the requisite number of the

same type of equipment is easy and is reported to be safe from the point of view of vigilance. Even for ordering equipment of the same kind but of a bigger size, there are endless enquiries and negotiations regarding price, delivery, etc. It is also learnt that each of the equipment has to get a certification from the DGMS, even in respect of equipment which is used routinely in other countries. Needless to say, whenever large size equipment for the known technologies like shovels and dumpers are to be ordered the proposals are subjected to several queries at various stages. The terms of contracting for purchase are also not modeled on the new types of contracts for which the machinery suppliers are agreeable which ensures the sharing of risks of guaranteed performance. Some coal mining organizations like Tatas purchase equipment, along with a 12 year maintenance and repair contract (MARC). Machinery suppliers urge that public sector companies should also enter into such MARC contracts. The machinery suppliers also guarantee the performance upto a particular level and the percentage availability of the machines. The Committee found that some of the senior officials of CIL are keen to introduce such contracts, but are constrained by the procedural problems. The Committee recommends that **MoC in consultation with CIL and SCCL and DGMS should immediately evolve a clear contracting system and an evaluation system of equipment of different kinds for a specific use and most of the equipment in use in other countries should be evaluated in advance.**

- 5.16 A system of equipment deployment with the equipment manufacturers/mine operators on risk gain sharing basis, is being contemplated now a days and are in operation at few mines in CIL. By this mode of operation a manufacturer of equipment/mine operator is expected to provide and maintain the equipment during contractual period for which CIL will pay the operator on cost per tonne basis for coal produced. This arrangement has been found to be very successful in operating Continuous Miner packages at 2 mines in CIL. Similar packages are being processed for other 3 underground mines in ECL and more such projects are expected to come in various coal producing subsidiaries of CIL. A similar arrangement is also being contemplated with large equipment configuration in HEMM for Rajmahal mine of ECL. This arrangement has the advantage as procuring company need not pay out much capital towards purchase of very expensive large size HEMM and the payment would be made from the production made available through the use of the equipment. The Committee recommends that **in all cases efforts should be made first to procure high cost equipment on the performance based payment basis. Furthermore, the staff posted to**

**operate the new HEMM should be given adequate training, orientation and should be rewarded for performance, if they maintain or exceed the production fixed as per the norm.**

- 5.17 **An alternative approach to sourcing of reliable and highly productive equipment is for CIL to enter into Joint Ventures with equipment manufacturers of repute for OC and UG mining equipment for which there is huge demand to ensure secured supplies of equipment and spares at reasonable prices and to diversify the sources of supply. This option is now feasible since CIL is anticipated to be flush with surplus internal resources which can be gainfully employed instead of keeping them in bank deposits or to invest them in mutual funds which have recently been allowed by the Government.**

## **(5) Cost Reduction through Coal Washing and Transportation**

- 5.18 Optimizing the cost of coal at the mining stage alone will not serve the interests of coal users especially those who are located at long distance from the mines. It is well recognized that the two outstanding features of the Indian coal resources are the high ash content often exceeding 40% in most cases and the skewed distribution of the resources by which coal is available in nine States only and consumed in over 20 States. The use of coal in States like Gujarat and Kerala involves transporting coal over 1500 kms. In such cases, coal washing reduces the cost of transporting coal for a given requirement with less of “coal” after washing than before washing. The high railway tariff of coal transportation makes the cost of coal in far away states prohibitive. Washing coal also reduces the mineral content in the coal and thus improves thermal efficiency. Most of the Indian coals have high gritty material which damages the power plant equipment. Using washed coal in power plants improves life of the plant and its availability factor thereby reducing its capital cost requirement. Further, the Ministry of Environment and Forest (MoEF) has issued orders that power houses situated beyond 1000 kms from linked pit head coal mines or situated in critically polluted areas or sensitive areas or urban areas irrespective of distances from the pit head mines must use power coal having ash content below 34%. Till recently, India had installed capacity of 31 MT (million tonnes) a year for coking coal washeries and only 20 MT for non-coking coal. With the introduction of the third party investment in coal washing on “build-own-operate” (BOO) basis there have been additions to non coking coal washeries and the current capacity exceeds 100 MT. There are some lacunae in the scheme and some misuse of coal is also reported. The

Committee recommends that **MoC should review coal washing on BOO basis and introduce incentives for producers like CIL or other users of coal to set up washeries. It is estimated that out of the demand of 540 MT of coal for power sector at the end of XI plan 150 MT would be required for use in power stations beyond 1000 kms. CIL should be persuaded to wash the coal for these destinations before dispatch. MOEF directive on moving only beneficiated coal beyond 1000 Kms should be tightened gradually during XII Plan.**

- 5.19 **Since the characteristics of Indian coals are by and large similar to South African coals (poor quality with high ash content upto 45% or more but low sulphur content), comparison of South African coal preparation industry with its Indian counterpart would be in order. South African coal preparation industry is far advanced as it is able to produce export quality washed coal (<14% ash) from ROM coals containing ash as high as 40% with yield levels higher than 75% in the case of easy to wash coal seams and yield levels lower than 40% for difficult to wash coals since export quality washed coals (CV of 27.5 MJ/Kg or 6573 Kcal/Kg) fetch a price 3 times higher in the export market compared to that of lower quality washed coals (CV of 23 MJ/Kg or 5497 Kcal/kg) sold in the domestic market. In sharp contrast Indian UHV based pricing system with very wide bands does not offer a significantly higher price for washed coals. A study done by an U.K. consulting firm, DARGO Associates Ltd. has shown that it is feasible to profitably produce clean coal with 28% ash by washing 42% ash ROM coal in a 500t/hr capacity washer plant in conjunction with 150 MW capacity Fluidised Bed Power plant. Similar results were obtained in BHEL-CMPDI study. Coal pricing reform (fully variable GCV based pricing of Indian thermal coal) would alone give a boost to Indian Coal Preparation Industry**

## BOX No. 9: South African Coal Preparation Industry

### Jigging the South African Coals – A New Challenge

South African (SA) Coal seams generally produce low grade coals with high ash content and varying washability characteristics depending upon the amount of Near Gravity Material (NGM) present in the coal. Some seams are characterized by easy to wash coals while other seams contain difficult to wash coals.

Jigging technology of coal washing is a gravity separation method widely used world wide using only water as a medium and using only intermittently applied water current or a pulsating current. Jigging is widely used in washing easy to wash coals because of low operational cost (due to low overall installed power in a jig circuit, use of only electricity and air as “consumables” besides low maintenance cost) and many other advantages in operation.

Because of exhaustion of SA coal reserves of easy to wash coal seams coal jigging plants closed down in South Africa to be replaced by DMS (Dense Media Separation)/ HMS (Heavy Media Separation) plants in the last several decades because of better efficiencies and higher yield of DMS plants although operational costs are high. The last coal jig disappeared from the SA scene in May 2000. It is well known that gravity separation in jig offers lower recoveries than with DMS for obtaining a similar grade product at cut densities between 1.3 and 1.8 due to very nature of jigging and the interactions between the physical forces taking place in the process.

Modern (mobile as well as fixed plants) air pulsed Apic jig fitted with Jig Scan and other advanced mechanical features and control systems is making a comeback in SA for washing more difficult to wash coals because of improved technology. The air jig can model the wave pattern to match a given feed and because of higher levels of control can overcome some of the conventional defaults of mechanical jigs of the past. Mobile Apic jigs permit easy and fast travel from one site to another and at-the-pit-installation is easy making it possible to access difficult zones/remote areas and can be used for on site pilot scale testing and overall Capex is less compared to fixed plants. The jigging module can be added to an existing coal preparation plant for rewashing the rejects or destoning the feed.

SA coal preparation industry has been able to obtain 14% ash clean coal (typical export quality) from easy to wash ROM coal (SA 5 seam) having 29% ash and low NGM (less than 10%) getting attainable yields of nearly 74.9% with Air jig whereas using DMS technology the yield will be marginally higher at 75.3% making the jig plant preferable to DMS plant as the observed yield difference is much less than 3.6% maximum yield loss acceptable for jigging plant under current market conditions. In the case of SA 4 seam ROM coals with 38.5% ash (reportedly one of the most difficult to wash coals in SA with high NGM – more than 30-35% and low yields at low cut densities) jig yield of 32% is much less than 42% achievable in DMS plant in which case DMS plant will be the preferable option. However, in such cases application of jigs would make it feasible to remove high density and expensive to transport discard material (rejects) upstream of DMS coal preparation plant easily achieving a mass reduction of 15% depending on pilot plant test results. Air pulsed jigs can handle coarser 150 mm lumps without any difficulty making them suitable for destoning. They can work equally comfortably at high density cuts, are less sensitive to slime/fines content in the feed and can accept high proportion of sinks material (ash). As such they are amply suitable for rewashing the tailings of CPP.

Source: Gathered by S.K. Mahajan from Internet

5.20 As already indicated, the railway tariff is very high for coal transport as it includes a very large element of subsidy which is used by the Railways to subsidize the passenger transport. While, passenger transport should get all necessary assistance, it is necessary in the interest of national development to keep the cost of an essential commodity like coal low and free from the heavy subsidy element. This Committee recommends that **the railway tariff should be subjected to a review at least in respect of coal. The other ways of bringing down the cost of coal transport by having special railway corridors have been thought of. The implementation of these good proposals for coal should be expedited and enlarged in scope to cover the transport from all coalmines in the east to consuming centers in western and southern destinations. Furthermore, a well thought out railway-cum-sea route to southern and western ports should be given consideration in the 11th and 12th Plans.**

The coal slurry pipeline transport has been discussed in India several times, but availability of water and high cost of pipeline have proved the proposition as unviable. No study has been made to update the earlier studies after 1992. There may be a case for reviewing the earlier studies on coal slurry movement in the light of current international experience.

#### **(6) COST CUTTING THROUGH OUT-SOURCING.**

5.21 The chain of activities starting from exploration of coal resources to planning of mines and extraction of coal after shaft sinking or removal of overburden (OB) and coal washing, preparation and transport involves several separate disciplines and calls for different types of skills. Modern management practice suggests that in such cases each individual activity should be entrusted to a separate company who have specialized knowledge and skill in that part of the production chain. The workers and executives of the specialist companies are also paid appropriate market wages and compensation and are subjected to the same labor laws. This happens in all industries. Out sourcing of services has made significant contribution to the high productivity in many industries. In coal industry, based on some historical perception out sourcing has been very strictly regulated as per some archaic norms. The Committee appreciates the efforts made and legal protection given to workers against exploitative low wage employment. The committee would urge that employing legally recognized specialist agency firms which observe all the rules and procedures relating to labor to undertake certain

parts of the production chain like overburden removal should be allowed. The spirit of the labour laws is to protect the workers from exploitation and if this aspect is guaranteed the different forms of employment contracts should be allowed. The productivity and wages of individual workers in the specialist firms could be regulated with reference to the norms of the category of industry to which they belong.

- 5.22 **Out sourcing should be differentiated from contract labour employment. It is not a method to extract more work and pay less to unskilled and semi skilled labour. In fact it becomes relevant and inevitable in tasks which call for specialized skills.** This should be adopted in different areas such as manpower selection and training, equipment repair and maintenance, accounting and pension administration, project construction monitoring etc.

It is recognized that in coal industry nearly a half of the cost of production of a tonne of coal is accounted for by wages, salaries and pension, which are not controllable. The other half of the production cost has potential for cost cutting. If Indian coal is to maintain in the long run its advantage as a preferred fuel for the power industry **there is need to maintain strict vigilance through Cost control and Monitoring committees involving all stakeholders in all public sector coal companies.**

## **(7) Avoiding delays at all stages**

- 5.23 As indicated in the earlier chapters one of the characteristics of the coal industry is the long delay at most of the stages in the coal production stage. We have dealt in the earlier chapters with the delays caused by the external agencies in the approval of mines, in avoiding clearances by environment and forest departments both at the state and central levels. There are avoidable delays within in the Coal Companies and the Coal Ministry in dealing with this sanctioning of mines, in procuring of equipment and in mobilizing manpower and training them for the specific operations of the new equipment. **The committee would like to emphasize that the achievement of the production targets set for coal industry would be possible only if there is a conscious all out effort made to eliminate delays in every stage of the coal production chain.**

COAL REPORT – PART II  
CHAPTER VI  
CUTTING EDGE TECHNOLOGIES AND R&D

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6.1 One of the terms of reference assigned to the Committee is: Introduction of cutting edge technology in coal sector. The Committee examined the issues relating to developing technologies which though currently in wide use in other parts of the world, are not in use in INDIA. These technologies have the potential for ensuring the energy security based on the primary use of coal. The Committee has examined relative level of (R&D) in coal sector in India and the attention now paid to cutting edge technologies which are emerging in coal sector in the world. The Committee has identified the following for detailed consideration:

- 1 .R&D in Coal sector-The approach and expenditure.
- 2 In-situ Gasification (Underground Coal Gasification).
- 3 Coal Bed Methanation (CBM)
- 4 Clean Coal Technologies – Carbon sequestration and storage
- 5 Coal to Oil Technologies (CTL)
- 6 Coal to Gas Technologies (CTG)

### **1. R&D in Coal Sector in India –Approach & Expenditure**

6.2 In India, it has long been accepted that Coal is the primary source of supply of commercial fuels and will continue to be so for several decades. It is also well-known that Coal resources of India are not of high quality. It has very high ash content and has low calorific value, almost half of the good quality coal in the international market. However, it has low sulfur content and is valuable for power generation. There are a large number of issues regarding the best ways of using this coal which need to be researched. The overall turnover of the coal industry in 2006-07 is likely to be Rs.50,000 crores and one would expect the R&D expenditure to be about 1% or around Rs.500 crores per year. But the actual expenditure is reported to be only one tenth of this. See table 6.1 below:



**Table-6.1: Status of R&D Projects taken up during IX & X Plans**

Particulars	Plan		
	IX	Xth	
		Upto 31.3.06	Anticipated
Projects completed	48	41	51
BE (in Rs. crores)	88.73	80	100
RE (in Rs crores)	40.60	46.81	61.81
Total fund utilized (Rs. In crores)	24.97	43.33	58.33
* Mid T erm Appraisal of Xth Plan: Rs.72.93 crores			

6.3 In the five year plan exercises, attempts are made to identify the areas for launching R&D efforts and each plan document sets out very impressive organizational arrangements to pursue these. The results are pathetic as can be seen from the summation of X Plan R&D efforts made in the Report of the XI Plan Working Group on Coal and Lignite:

“The three pronged approach for Research and Development in coal viz coal S&T Programme under the Standing Scientific Research Committee (SSRC), in-house Research and Development programmes of Coal Companies and Inter-Sectoral Research Technology Advisory Committee (IS-STAC) has been adopted during the X Five Year Plan. R&D in coal is carried out under four broad areas namely production, productivity and safety; coal beneficiation; coal utilisation; and environment and ecology. The major thrust areas identified for R&D in the X Plan have been coal gasification, coal washing, beneficiation of low volatile medium coking coals, coal liquefaction, fluidized bed combustion, sequestration of carbon dioxide etc. Despite the thrust laid on coal S&T the progress has not been satisfactory both in taking up new projects or in utilising the outlays provided to various projects. Some of the high value projects like pilot project for washing low volatile medium coking coal, demonstration project for coal bed methane exploitation and utilisation assisted by UNDP/GEF have not been progressing satisfactorily. “

6.4 The Committee has also considered the list of R&D projects identified for the XI Plan and find the list needs to assign relative priorities as soon as possible and focus attention on those which are currently relevant and urgent. The long list as set out in the Working Group Report is presented below:

The following areas have been identified for research activities:

*Underground Mines:*

- Mapping of UG old unapproachable abandoned mine workings
- Hard roof management by induced caving
- Development of mining method for thick, flat & inclined seams
- Support system for weak/clay roof strata
- Method of mining for deep seated seams under built up areas
- High capacity pre-tensioned roof bolts to create artificial breaker line during multi seam working by continuous miners
- Method of mining for multi seam workings

- Method of mining with fly ash stowing under built up areas

*Coal Preparation:*

- Application of multi gravity separator
- Development of simulation software for control of jigs to achieve optimum yield at desired ash level
- Development of zero emission coal combustion technology

*Environment:*

- Methodology for prediction of mine water quality
- Base line measurement of GHG emission in mine fire areas
- Use of tissue culture for conservation of plant species
- Software development for air quality prediction

*Opencast:*

- Studies on dump and high wall stabilities in opencast mines
- High Wall Mining

*Safety:*

- Communication system in case of miners trapped in underground mines
- Development of predictive models to determine the progress of fire in mine fire areas
- Establishment of integrated survey systems for UG and OC workings and OB dumps

*New emerging areas:*

- In situ coal gasification
- Liquefaction of coal
- Carbon sequestration
- Underground gasification of coal after coal bed methane recovery from deep seated seams
- Coal Bed Methane reserves estimation

6.5. New emerging areas deserve a special kind of treatment, which would be discussed separately in this chapter later. In respect of the other issues, *the Committee considers it imperative that the simpler ones are separated and leadership entrusted to one of the coal companies for each item. The expertise and knowledge available in the coal companies could be supplemented by various research institutions and universities which should be co-opted in the R&D efforts. The more fundamental and complicated issues should be separately listed. Then each proposal should be delineated clearly setting out the expected outcomes and the datelines to be adhered to. First it should be put out for National competitive bidding and if the response is not adequate International competitive bidding should be invited. All public sector organizations including CMPDIL should be eligible to participate in the bids.*

6.6 *The Committee recommends that a Coal R&D fund should be created whereby half of one percent of the turnover of all coal industries in the public and private*

sectors is deposited. The companies paying the levy should be encouraged to set out their perceived research & development priorities and get such projects included in the list and bid for taking up the projects when the bids are invited. CGRA would manage the funds.

## **2. Underground Coal Gasification (UCG)**

- 6.7 The Underground Coal Gasification is a process by which coal is converted in-situ to a combustible gas that can be used as a fuel or chemical feedstock in manufacture of methanol/fertilizer. The produced gas is a Syn-gas, which is a mixture of Hydrogen, Carbon Monoxide, Methane, Carbon Dioxide, higher hydrocarbons, etc. This recovered gas may have calorific value ranging from 850 to 1100 Kcal/M<sup>3</sup> with air injection. UCG offers a potential economic means of extracting energy from deep seated deposits, which are not amenable to conventional physical extraction economically.
- 6.8 This is not a new technology. It is in use already globally. Majuba mine of Eskoms, South Africa plans to exploit 106 million tonnes of geologically disturbed coal reserves by UCG. Total energy expected to be produced from this project is 350 GW. A UCG plant in Angren, Uzbekistan is in operation since 1955. For each mine the design and environmental protection aspects would be location specific.
- 6.9 In India, large amount of coal resources exist beyond present techno-economically viable mining depth. Such coal resources have immense potential to yield energy through UCG. Besides, within mineable depth also, there are many small isolated patches of coal occurrence, which are presently not viable for mining and the same can be considered for UCG. Additionally, there is a huge occurrence of lignite in India, which has not even been brought into lignite resource inventory, but otherwise known in course of oil and gas exploration in the country. These lignite fields need proper exploration and may be taken up for UCG, in addition to known lignite deposits.
- 6.10 Earlier attempts to develop the in-situ gasification technology based on coal and lignite seams, which were taken up as a science and technology projects, were abandoned in view of the dangers foreseen of the likely contamination of aquifers lying above and below the coal/lignite seams. Of late, the interest has been revived and an MoU has been signed between CIL and ONGC for a pilot project study on underground gasification. ONGC as the implementing agency has

engaged Skochinsky Institute of Russia as Consultants. CMPDI has prepared data packages for five prospective UCG sites, out of which two have been selected for further investigations regarding the suitability. CMPDI is heading a multi organisation group for formulation of a regulatory framework for development of UCG in the country. *The Committee feels that the action on identifying the possibilities and appropriate technology for UCG is of great urgency and importance.* The IEP Report 2006 has specially emphasized this viewpoint. The Committee recommends that *the work of developing UCG technology suitable for India should be taken up on a Technology Mission Mode and given a time line of three years to achieve certain milestones.*

### **3. Coal Bed Methane (CBM)**

6.11 CBM is emerging as an environment friendly alternate energy source in different countries. It is known that CBM availability in India is significant. CBM resources are prognosticated as of now to be 3381 BCM extended over an area of 35,326 sq.km.

It is to be noted that potential coal bearing area is estimated at 17300 sq. km considering depth extension of coal seams as 900 meters or 22000 sq. km. if depth extension is assumed 1200 meters. Out of this total potential coal bearing area only 12000 sq. km has been regionally explored wherein proved, indicated and inferred coal resources have been estimated. Potential lignite bearing area is not indicated anywhere. Since established lignite resources are much smaller and depth to which these deposits have been explored is marginally beyond 300 meters, its areal extent cannot be very large. As such *the reliability of estimated CBM resources that have been prognosticated over an area of 35,326 sq. km needs to be established.*

6.12 In 1997, CBM policy was framed by which Ministry of Petroleum and Natural Gas (MoP&G) has been made the administrative ministry. Under this, prospective blocks are delineated in consultation with the MoC and global tenders are invited as in the oil and natural gas blocks. For the exploitation of CBM from the deep seated coal deposits, 16 blocks have so far been allotted to interested parties through two rounds of global bidding and additional 10 blocks are to be allotted in third bidding. A total of 50 core wells and 20 test/pilot wells have been drilled so far and have yielded encouraging results. ONGC is in advanced stage of implementation of a VCBM (Virgin CBM) Pilot Project in Jharia Block.

- 6.13 A consortium of CIL and ONGC has been awarded two blocks in Jharia and Ranigunj coalfields. 16 deep seated borewells have been drilled. As the recovery of methane is a high priority area in the field of coal mine related CBM recovery, an aided demonstration project with assistance from GEF–UNDP has been taken up in Moonidih and Sudamdih mines of BCCL. Attempts are being made by some private sector allottees to develop CBM on a commercial basis in the near future.
- 6.14 *A number of constraints limit the fast development of CBM technology. These are:*
- a) The data base is inadequate.*
  - b) Availability of Infrastructure: Service providers within the country are few and the gas distribution net works have to be developed over extended coverage. As such, there should be a national policy in place to connect the CBM blocks to national pipeline grid, as is the practice in USA. This will facilitate the CBM producers to have a net-work for marketing.*
  - c) The boundaries of some of the CBM blocks overlap to some extent with the boundaries of coal mining blocks resulting in jurisdictional problems as to who can undertake mining first – the CBM operator or the coal mining block allottee.*
- 6.15 US is the leader in CMM production. As per EPA estimates US mines captured about 40 billion cubic feet (Bcf) of CMM in 2001. Emission of methane from China's coal mines is 8-10 Bcf annually.
- 6.16 In India some beginning has been made. As per the MoU signed between Ministry of Coal and Ministry of Petroleum and Natural Gas, the coal producing companies will have the right of CBM exploitation in their working mines including pre and post mining operations. Accordingly, steps were initiated by CMPDI on behalf of CIL towards the development of CMM.
- 6.17 With a view to develop indigenous capacity in the field of CMM recovery, a GEF/UNDP aided demonstration project has been undertaken by Gol on CBM recovery & utilization at 2 mines of BCCL.
- 6.18. **A proposal for an Indian Coal Bed Methane Clearing House has been mooted** - The objective of the clearing house would be to act as a technical and policy consultant to the industry and to the other stakeholders in recovery of CMM/CBM and to give impetus to production and utilization of CBM/CMM in India. It will also be helpful in creating network for information exchange and project development and connect potential developers with these contacts. A proposal

for establishment of Coal Bed Methane clearing house in association with US EPA is under consideration of Govt. of India.

#### **4. Carbon Sequestration and Storage (CSS)**

- 6.19 The R&D efforts so far discussed relate to production of coal in solid or gaseous form. There are serious issues raised on a country using ever increasing quantities of coal as it adds to green house gas (GHG) emissions

The global climate change, as a result of environmental pollution, has been a major concern worldwide. The options for mitigating the risk of global climate change have so far focused on reducing emissions of carbon dioxide and other green house gases (GHGs).

- 6.20 The Earth's atmosphere contains carbon-dioxide (CO<sub>2</sub>) and other green house gases (GHGs) that act as heat insulating layer, causing the planet to be warmer than it would otherwise be. If the level of CO<sub>2</sub> rises, mean global temperature is also expected to rise as increasing amounts of solar radiation are trapped inside the "greenhouse." The level of CO<sub>2</sub> in the atmosphere is determined by a continuous flow among the stores of carbon in the atmosphere, the oceans, the earth's biological system and its geological materials. As long as the amount of carbon flowing into the atmosphere (as CO<sub>2</sub>) and out (in the form of plant material and dissolved carbon) are in balance, the level of carbon in the atmosphere remains constant.

- 6.21 The primary source of the slow but steady increase in atmospheric carbon are the fossil fuel combustion, which contributes approximately 5.5 gigatonnes (billion metric tonnes) of carbon per year, and land use changes, which account for another 1.1 gigatonnes of carbon per year. In contrast, the oceans absorb from the atmosphere approximately 2 gigatonnes of carbon more than they release, and the earth's eco-systems appear to be accumulating another 1.2 gigatonnes annually. Overall, the atmosphere is annually absorbing approximately 3.4 gigatonnes of carbon more than it is releasing.

- 6.22 While the annual net increase in atmospheric carbon may not sound large compared with the total amount of carbon stored in the atmosphere *i.e.* 750 gigatonnes - it adds up over time. It is estimated that if the current rate of carbon accumulation were to remain constant, there would be gain in atmospheric carbon

of 25% over the next 50 years. In fact, the rate at which human activity contributes to increase in atmospheric carbon is accelerating. Emission from land use change has been growing at the global level, though not nearly as rapidly as emissions from fossil fuel combustion.

- 6.23 Till recently the efforts have been to increase the rate at which ecosystems remove CO<sub>2</sub> from the atmosphere and store the carbon in plant material, decomposing detritus, and organic soil. In essence, forests and other highly productive ecosystems can become biological scrubbers by removing (sequestering) CO<sub>2</sub> from the atmosphere. In recent years the world is seeking ways for storing (or “sequestering”) significant amount of carbon not only in forests but in other eco-systems like appropriate geological formations.
- 6.24 The cost of carbon sequestration is typically expressed in terms of monetary amounts (dollars) per tonne of carbon sequestered i.e. as the ratio of economic inputs to carbon mitigation outputs for a specific programme. The denominator, the carbon sequestered, in case of forest based programme, is determined by forest management practices, tree species, geographic location and characteristics, and disposition of forests *etc.* A number of projects on carbon sequestration have been taken up in Australia, USA, Canada and China in recent times for the development & commercialization of technologies to separate CO<sub>2</sub> produced during coal or wood burning and storing the carbon-dioxide in a safe place is receiving attention as geological sequestration and mineral sequestration

### **Geological Sequestration of Carbon:**

- 6.25 Injection of CO<sub>2</sub> into the earth's subsurface offers potential for the permanent storage of very large quantities of CO<sub>2</sub> and is the most comprehensively studied storage option. The CO<sub>2</sub> is compressed to a dense state, before being piped deep underground into natural geological reservoirs. An obvious site for geological sequestration is depleted oil & gas reservoir.

Storing large amount of CO<sub>2</sub> in deep saline water saturated reservoir rocks also offers great potential. One major project is already being conducted by the Norwegian company Statoil. This is at the Sleipner field in the Norwegian section of North Sea where about 1 million tonnes a year of CO<sub>2</sub> are being injected at a depth of about 800-1000 m below sea floor.

## **Mineral Sequestration of Carbon**

- 6.26 It is a process whereby CO<sub>2</sub> is reacted with naturally occurring substances to create a product chemically equivalent to naturally occurring carbonate minerals. The weathering of alkaline rocks is a natural form of CO<sub>2</sub> storage which normally occurs over long periods of time. With this natural process, mineral storage speeds up the reactions and turns CO<sub>2</sub> into a solid, environmentally benign mineral. This process is still at the stage of laboratory development.
- 6.27 **There are also ways in which the CO<sub>2</sub> separated could be used as a valuable resource.** CO<sub>2</sub> is widely used in the oil industry to increase oil production – the CO<sub>2</sub> helps pump oil out of the underground strata, thereby increasing the level of recovery from the field. Without such methods of enhanced production, many oil fields can only produce half or less of the original resource. There is a potential opportunity for storing CO<sub>2</sub> in unmineable coal seams and obtaining improved production of coal bed methane as a valuable by-product.

## **India's efforts in Carbon Sequestration**

- 6.28 The issue of carbon sequestration in our country has not received the required level of attention. World over, research is ongoing for reducing the CO<sub>2</sub> emission to separate carbon and store it in geological formations. Advanced countries like USA, Canada, Japan, Australia and European Union, have coordinated ongoing programmes on CO<sub>2</sub> sequestration and the long term Technology Road Maps have been developed. India along with several other countries has joined Carbon Sequestration Leadership Forum (CSLF) at the invitation of USA and Ministry of Power as the nodal agency. The Secretary, Department of Science & Technology represents India on the Policy Group of the CSLF. The objective of the Indian participation is to develop cost-effective technologies by organizing collaboration in R & D on an International basis within the legal, financial and regulatory frameworks. It is now decided that evaluation of coal bearing sedimentary basins as a potential CO<sub>2</sub> sink can be assessed in a best possible manner by CMPDI who are custodian of coal exploration and mining data with an added agenda of gainful utilizations of CO<sub>2</sub> for enhanced coal bed methane recovery at an appropriate time.
- 6.29 NTPC has requested CMPDI to take a leadership role in this regard for which a suitable Approach Note for assessment of CO<sub>2</sub> sink capacity with a time bound action programme is required to be submitted.



- 6.30 The committee is concerned that India, which is the third largest producer and user of coal and proven technological capability in areas like Nuclear and Space research and technology has not taken a lead in organizing R&D efforts to be self-reliant in this technology in the long run. India has the capability to undertake adequate research on its own or in collaboration with internationally recognized institutions working in the area of carbon capture and storage. A number of major research organizations in the world are keen to work in India and develop appropriate technologies towards this end in India and China. China has recently agreed to collaborate with some European companies with European Union assistance to set up a 5 million tonne coal mine along with a coal preparation unit and a power plant to use all the coal. Under this proposal, China will only bear the costs which they would incur for a normal coal mine and power plant of this size. The foreign companies would bear the capital expenditure of adding equipment developed by them for carbon capture and storage and run the plant. It is designed to determine the real costs of introducing this technology. There are a number of companies that would like to set up plants of similar nature if NTPC or BHEL could collaborate with them. The Committee feels that *India has the capability to undertake such research and develop equipments which will suit Indian conditions. The Committee recommends that MoC should arrange to move as early as possible towards setting up a plant on the lines of clean coal technology plant in China.*
- 6.31. The Department of Science & Technology has sent a communication to the Committee indicating that it has taken up an **in-depth Study on Clean Coal Technology Initiative in 2006**. The study report has recommended among other things the thrust areas of R & D Technology Roadmap, likely investment required with possible mechanisms and suggested policy changes in the management of the coal industry. It also indicated that a National Programme on CO<sub>2</sub> Sequestration (NPCS) is being implemented by DST currently. There is also a task force on clean coal development and climate change under AP 6.
- 6.32 *The Committee appreciates that there are a number of initiatives taken by different departments towards reducing GHG emissions and Carbon sequestration. The Committee recommends that the ongoing efforts and studies for carbon storage should be well coordinated by a high power committee and results published in, say, five years. The steps leading to this end are:*
- *Constituting a National Level Task Force comprising members of Planning Commission, concerned ministries like Ministry of Coal, Ministry of Power,*

*Ministry of Environment & Forests, Geological Survey of India and concerned industries etc*

- *Identifying the areas for carbon sequestration and carry over the feasibility of the identified practices.*
- *Assignment of the activities to various stakeholders for the carbon sequestration*
- *Implementation*
- *Monitoring.*

## **5. Coal to oil conversion**

6.33 *Oil is a convenient form of fuel that is essential for transport sector. Transportation of oil and oil products is relatively the easiest among all sources of primary energy. The Coal To Liquids (CTL) technology was developed during World War II by Germany for producing essential petroleum products from its abundant coal resources. The technology was perfected in South Africa during the apartheid years. Given record prices for crude, several countries today are looking at the technology to address energy security concerns.*

6.34 In view of India's poor resources in terms of oil and the **perceived** abundance of coal, there has been a persistent demand to take up the conversion of coal into oil. Several expert committees were constituted in 70s and 80s to recommend measures towards this end. Most of the studies could not recommend the conversion purely on commercial grounds. However, the recent steep increase in oil prices has led to a renewal of interest on this subject.

6.35 There are several methods of converting coal to liquid fuel but the most advanced and well experimented methods are the following:

- Indirect Liquefaction by coal gasification and subsequent conversion of synthesis gas to liquid products through Fischer-Tropsch (FT) process.
- Direct Liquefaction of coal by catalytic hydrogenation of coal based on Bergius-Pier process.

Laboratory as well as pilot plant scale investigations have been carried out in different places in the world on the Direct Liquefaction process. However, SASOL in South Africa has been successfully using the indirect coal liquefaction technology on a commercial scale.

In India, it is generally considered that direct liquefaction technology is feasible only with high calorific value coals in Assam and in some mines of Orissa. Currently, Oil India is pursuing this process and is in contact with M/s HTI (Hydrocarbon Technologies Incorporated) in USA. The progress is very slow.

6.36 India conducted a Feasibility Study with UNDP assistance in 1985 to evaluate the CTL option. A Techno-Economic report was prepared by Fluor Engineers Inc., California under UNDP/UNIDO project for a plant size of 1 million tonne/year of liquid product based on indirect coal liquefaction technology.

6.37 Two coal sources from Raniganj and Singarauli were found to be suitable. The feed coal analysis indicated in the report is as follows:

Moisture: 6%, Ash: 25%; VM: 30%; FC: 39%; Hydrogen: 3.97%

As per this report, about 6.6 tonnes of coal would be required for production of 1.0 tonne of liquid fuel.

6.38 OIL INDIA Limited (OIL) has taken the lead in deploying the direct Process using high grade Assam Coal. In 1999 OIL commissioned a 25 kg/day processing capacity coal conversion pilot plant at Duliajan, Assam in collaboration with Axens NA of USA. As per the study carried out by Axens NA, about 4.5 tonnes of Assam coal shall be required to produce 1.0 tonne of liquid fuel.

Though results of the pilot plant studies with Axens NA's Technology have been found very promising, it is considered necessary to carry out studies with other contemporary technology that may yield better economics.

Accordingly, OIL is also considering taking up Techno-Economic Feasibility Studies for a commercial plant for converting Assam coal to liquid fuels based on technology of M/s HTI (Hydrocarbon Technologies Inc.) USA. For this purpose, desired coal quality is indicated as: Ash: 5-10%; VM: 40-45%; Moisture: 2-3%; Sulphur: 1.5-6%; FC: 47% (approx). Such type of coal generally contains Hydrogen in the range of 5.4-6.3%.

### ***Action Taken by CIL on Coal Liquefaction***

6.39 In order to explore the possibility of setting up Coal Liquefaction Plant in India, a global tender was floated in 2001 by CMPDI for setting up a coal liquefaction plant

in India based on high ash Indian coals for a nominal capacity of one million tonne of liquid and gaseous products per year. No response was received consequent to the global tender.

### **Techno-economics of CTL Project in Indian Context**

6.40 In January 2007, Tatas indicated that coal to oil will be a feasible proposition and an investment proposal should be invited for this purpose. *Tata-Sasol proposal for conversion of Coal to Liquids (CTL) was reviewed in the Planning Commission. Salient conclusions of this review are as follows:*

- 1. The essence of the Tata-Sasol proposal is that coal would be mined from a coal block allotted to the Group as per their choice and beneficiated. The washed coal would be gasified and the gas so produced would be converted to petroleum products, mainly diesel. The most fuel-efficient configuration involves taking 31 million tonnes of coal to produce 3.6 million tonnes of petroleum products and 1400 MW of electricity for sale.*
- 2. The proposed CTL route merely converted one form of primary energy (coal) into another form of primary energy (liquid fuels). And in doing so it loses 55% of the thermal energy input even under the most thermal efficient scenario of the proposal. Eighty percent of the coal produced in India is used for electricity generation. It would be instructive to compare the net energy balance in terms of how much electricity can be generated using coal directly and using the diesel, etc, produced by the CTL project. Even if one assumes that the liquid fuels generated by the proposed process would yield a high 50% conversion efficiency in electricity generation; the total electricity equivalent of the outputs of the proposed plant is only 67% of the electricity that can be produced by the 31 million tonnes of coal that the CTL plant requires as an input. This proportion falls to only 57% if one excludes the coal input for the 1400 MW of surplus power that is planned to be generated by the proposed CTL plant. In effect this additional quantity of coal utilized (over and above the process requirements) to produce surplus power partially masks the low overall thermal efficiency of CTL process proposed to be adopted in the project (the proportions stated above would get further reduced if it is considered that 31 mt of coal could be used in supercritical boilers for power generation). The overall thermal efficiency of the proposed project would get further lowered if the liquid fuels generated from the project are utilized for any other end use.*
- 3. The CTL project as proposed did not enhance India's energy security as claimed since India does not have surplus coal. India would in fact need to import significant quantities of thermal coal to even meet its power generation needs. As such it does not help India to divert local coal for conversion to liquids unless there is an overall gain in thermal efficiency while converting a scarce primary energy resource to a usable form of secondary energy.*
- 4. The viability of the proposed project was contingent upon specific incentives (tax holiday and exemption from MAT for 10 years and waiver of import duties) which are not available to coal mining projects and these incentives would also apply to the surplus power cycle that has nothing to do with CTL plant. There is no parallel between the proposed CTL project and the Ultra mega projects*

*for availing these incentives since the latter are competitively bid projects, which was not the case with the proposed CTL project.*

5. *Moreover, the risk sharing profile in the proposed project was not symmetric as besides the incentives sought for making the project financially viable, the proposal sought that GOI absorb the full market risk and capital cost overrun risk within a price band of \$40 to \$55 per barrel of crude. In fact the proposal sought a price guarantee of \$55 a barrel as long as oil prices remain in the \$40-55 price band. However, the benefits beyond a crude price of \$55 barrel were not to be shared evenly and any benefit that GOI got from the proposed agreement would lapse in 10 years.*
6. *Even if India sought greater liquid fuel security, it would make more sense for it to use domestic coal for power generation and import liquid fuel from a CTL plant to be located, say in South Africa, as opposed to importing coal from South Africa, Indonesia or Australia and diverting local coal for conversion to liquids.*
7. *The CTL technology has been around for years and does not offer any larger spin-off for India. This is borne out by the fact that despite being around for several decades, large scale application of the CTL technology has remained confined primarily to South Africa. Indeed what India really needs is in-situ coal gasification technology that could potentially expand its energy resource base by tapping deep-seated coal seams that cannot be mined by any conventional mining techniques.*

6.41 Gasification of coal and other solid and liquid forms of energy sources has been incentivized in the US under the New Energy bill of President Bush. Increasingly such projects aimed at producing synthetic gas are seen to be environmentally friendly as they provide the possibility of separating the pollutants. Separately, in August 2006 the US Government announced a 50 cents/gallon tax credit for diesel fuel produced from coal using the Fischer-Tropsch process. This CTL technology would get a boost also from the new law that allows only 10 ppm of sulphur in diesel starting 2006. Besides, *CTL fuels also produce significantly lower levels of carbon monoxide, nitrous oxide and particulate matter than even low sulphur diesel. However, production of CO<sub>2</sub> during conversion of coal to liquids is twice that produced during refining of petroleum to petro products. Moreover, the CTL technology involves very high capital and operating and maintenance costs and these will be significantly enhanced if attempt is made to reduce pollution load by capturing CO<sub>2</sub> and sequestering it.*

6.42 As a result of the various measures taken by US Government three or four large CTL projects are reportedly under development in the United States (in Wyoming, Illinois, Ohio and Mississippi). Proposals have also been mooted to produce synthetic fuels from waste coal using CTL technology. China reportedly plans to invest \$15 billion in CTL projects over the next several years. Royal Dutch/Shell

and SASOL are building 10 CTL projects in China. Additionally, China's largest State owned company is currently building a project in Inner Mongolia that is projected to convert one million tons of coal a year into synthetic fuel in 2007 with plans to increase output to 20 million tons a year by 2020. Once again, it is noted that China has surplus coal.

## **6. Coal to Gas Technologies (CTG) - Coal Gasification**

6.43 Coal gasification is the process of converting coal, a solid product into a gaseous product through reactions with gasifying media like air, oxygen or steam. Coal gas can be classified according to the energy content per volume as low or lean gas, or medium gas or high or rich gas, depending on the process and the composition of gas in terms of CO, H<sub>2</sub> or N<sub>2</sub> or CH<sub>4</sub> and CO<sub>2</sub>. Plants based on coal gasification technology were set up in India by Neyveli Lignite Corporation and Fertilizer Corporation of India. The NLC plant at Neyveli with 8.6 lakh cubic meters per day capacity was planned to produce gas which was an intermediate step towards fertilizer manufacture. It has been shut down as Naptha proved to be a better raw material for fertilizers. The two Fertilizer Corporation of India plants were located at Talcher in Orissa and at Ramagundam in A.P. Each plant had three gasifiers with a capacity of 40,000 cubic meters per hour. They were both shut down as they proved to be unviable. Currently interest in coal gasification has been revived due to growing relevance of introducing fuel efficient IGCC power generation.

6.44 In addition to IGCC, in situ gasification of coal is of interest to India in order to enhance its resource base and tap coal and lignite that would not be economical to mine otherwise.

### **SUMMING UP**

6.45 The Committee is surprised that even when the issue of Energy Security is being hotly debated and the need to produce and utilize wisely our relatively larger resources of coal is accepted as the major plank on which energy security is to be planned. The coal sector has paid so little attention to the R&D efforts for sustaining the growing level of production needed. R&D has been given little attention partly because of the precedence given to the pressing needs of enhancing coal production to levels higher than planned at the beginning of the plan period. At least in the XI plan period the Committee would like a well designed and efficiently implemented R&D plan for sustainable development of

coal industry. Towards this end the Committee would like to recommend a coordinating and monitoring mechanism for R&D in coal sector.

- 6.46 *The Committee would like to suggest the setting up of a high level Empowered Committee of concerned Secretaries to GOI and eminent scientists in the coal sector and entrust a fund of Rs. 1000 crores to the Empowered Committee to be spent as per their directives. The Empowered Committee would not need any approval or prior clearance for sanctioning Research and Development projects. It should prioritize the research projects and attempt to enlist all individuals and institutions in these activities. The best way appears to be to call for National Competitive Bidding (NCB) for these projects setting out clearly the outputs expected and the datelines to be met. If the NCB does not bring in the appropriate response, the project should be let out on International Competitive Bidding (ICB). At both stages the bidders can form a consortium with Indian or foreign institutions. The empowered Committee on R&D would be answerable to MOC only. It would give each year an Annual Plan of Action and with it "actuals" of achievement against the previous years. All the R&D committees referred to in this chapter earlier would become sub-committees of the Empowered C ommittee.*
- 6.47 *The Committee would like to reiterate the need for a time-bound programme of R&D in coal sector in India. This could be achieved only by following the route of the competitive bidding for issues to be researched or methods to be developed with certain expected deliverables. Seeking aid from foreign agencies, both government and non government, for R&D may not get us the best of the sources of technology already available and the best suppliers of machinery. The negotiations involving "aid" get mixed up with diplomatic considerations and lead to a lot of delay in the contract settlement. Such contracts and agreements deny us the right to seek the technology appropriate to our conditions and circumstances. The empowered committee may be authorized to seek the best possible solution to each research problem.*

7.1 The overall performance of CIL has been good in many aspects of management in the last decade. However, CIL has not been paying adequate attention to several dimensions of corporate management which could ensure continued good performance over a long period and help to make the company a world-class company. The weakest link in the chain of management functions of CIL has been its management of Human Resources. Existence of substantial unutilized and underutilized manpower coupled with heavy losses in subsidiaries like ECL, BCCL and CCL, having bulk of CIL's manpower, prompted CIL to put major thrust on reduction in manpower. Retirement schemes in different forms were introduced from time to time and targets of manpower reduction based on expectation of response from these schemes were set. With overwhelming concern to meet the target for manpower reduction, other aspects of human resource management did not receive proper attention.

The aspects which needed far more attention are:

- Manpower Planning and HRM strategies
- Recruitment
- Training and Development
- Motivation and Communication

### **(1) Manpower Planning and HRM Strategies**

7.2 The manpower strength of CIL in 2005-06 is about 4.5 lakh employees. Due to the diversity in technologies used in different mines and the variance in the share of UG mines in the total mines, there is no correlation between manpower and production in the subsidiaries of CIL. ECL is ranked the highest in employee strength with a workforce of 102,000 though its production is the lowest. Woman employment is low as in most mining industries. The women employees in the whole of CIL constitute about 6% of the total employee strength. These women are mostly engaged in jobs like nursing, office and secretarial assistance, wagon loading and shale picking assistance, etc. An examination of the employee strength at different levels shows that there is mismatch between executives and workers. The executives comprise only 3.5% of the total workforce.

7.3 Despite all the short-comings, the manpower reduction in CIL and SCCL has been impressive as seen from the following table–



**TABLE-7.1: Manpower Reduction in CIL & SCCL**

In numbers

	1997	1999	2001	2003	2005	2007 (anticipated)
ECL	158,251	142,746	127,452	114,582	105,692	97,459
BCCL	142,436	127,220	113,738	102,414	92,268	83,037
CCL	91,649	84,993	77,882	72,401	66,871	61,755
Other CIL	235,127	231,923	222,979	212,022	203,619	200,216
<b>Total CIL</b>	<b>627,463</b>	<b>586,882</b>	<b>542,051</b>	<b>501,419</b>	<b>468,450</b>	<b>442,467</b>
(Reduction)		(40581)	(44,831)	(40,632)	(32,969)	(25,983)
(Cumulative Reduction)		(40581)	(85412)	(126044)	(1590131)	(184996)
SCCL	114,486	109,419	105,626	97,053	91,970	82,200
(Reduction)		(5,067)	(3,793)	(8,573)	(5,083)	(9,770)
(Cumulative Reduction)		(5067)	(8860)	(17433)	(22516)	(32286)

- 7.4 Even though the programme for manpower reduction through the retirement schemes proceeded satisfactorily, the net reduction in workforce has, however, not been to the extent planned, mainly because of the fact that recruitments were made, mostly in the lowest category of employees, under various provisions in the Wage Agreement and also to provide employment to the land losers. In spite of the major reduction in manpower by 1,85,000 as shown in the table above, CIL has been able to increase its coal production by 113 million tonnes during IX and X Plans through better utilization of the remaining manpower and through technology upgradation.
- 7.5 *Such major reduction in manpower over a relatively short period of time coupled with absence of a long term manpower planning resulted in some mismatch between required skills and the available skills. While efforts were made to minimize the mismatch through regular training and retraining programmes, there are gaps between requirement of manpower in higher skills, arising from technology upgradation and intake of larger and more sophisticated equipment and availability of such manpower. Further, a fairly large number of employees in skilled and essential categories, including statutory categories, are retiring every year and absence of adequately experienced staff to replace them is being felt. There is also a manpower imbalance across executive levels, i.e. E1 to M3 in CIL. This is largely because of absence of any long term executive manpower plan spelling out requirements in different disciplines and at different levels keeping in view the pace with which the company has been growing.*

7.6 *The large scale regular recruitments have been given up for several years, and fresh induction of employees has been rare; as there has been no major fresh infusion of young persons in recent years. The average age of the employee in CIL is has been steadily increasing as can be seen from Table below:*

**Table 7.2: Average Age of Employees in CIL in different categories**

<b>Levels</b>	<b>Age</b>	<b>Percentage</b>
E1 to E5	40 plus	50%
M1 to M3	50 plus	60%
M1 to M3	56 plus	20%

*This policy has resulted in severe shortage of skilled and experienced professionals (surveyors, geologists, geophysicists, drilling and mining engineers) in CMPDIL (as already highlighted in Chapter I) which is likely to assume crisis proportions unless immediate remedial measures are not taken. Shortage of skilled manpower in various critical disciplines in different subsidiaries of CIL needs to be identified expeditiously and measures taken to correct this manpower imbalance.*

7.7 *Based on our discussions with the Officers and Workers Associations, the Committee has identified the following important measures as the urgent ones to be taken as the first steps towards CIL designing the HRM strategies for the future:*

- *The manpower planning process at CIL needs to be thoroughly reviewed and strengthened.*
- *CIL will have to undertake a scientific study to identify the manpower surplus based on potential job requirements during the next ten years. This will need to be harmonized with the future projections of the production targets, technology shifts and skill requirements to efficiently manage the new equipment that might be introduced.*
- *CIL has to revise its promotion policy and evolve incentives which do not lead to imbalances in the ratio of officials occupying different levels of hierarchy. This will be particularly relevant for the officers in mining engineering stream whose promotion to management cadre should be based on recognized basic engineering degree and/or post graduate engineering/management degree. It is learnt that in the present system diploma holders and field candidates (who do not hold any diploma or degree) manage to get promoted to management cadre only on the strength of First Class Mines Managers Certificate of*

*Competency (Coal) issued by DGMS which is not recognised by any professional body dealing with technical education in the country.*

- *CIL should devise a well thought out HRM plan that would gradually groom the employees to take up higher responsibilities by stepping up their limits of authority steadily as they move up the career ladder. The difference in power held and decision making responsibility between the top management and the second line of managerial staff is inordinately large and needs to be modified.*

## **(2) Recruitment**

7.8 Recruitment has been neglected in CIL as the thrust was on reducing the work force strength. The direct and indirect impacts of this on the organization have been discussed in this Report. This also has had significant adverse impact on the academic environment relating to coalmine engineering. The bright students in engineering institutions do not see any good career in mining industry in general and coal mining industry in particular. Increase in the number of seats for mining has not kept pace with the increases in other engineering disciplines. If CIL were to suddenly increase the recruitment to executive cadre from the colleges by campus recruitment it is not likely to get candidates of appropriate quality in the required numbers.

7.9 As in the last ten years there is no fresh recruitment in the executive cadres, the present image of coal sector among the young is that of a sluggish slow-growing sector, much inferior to other sectors. Due to this coal sector may not be able to attract good people and retain them to be able to effectively fulfill the national coal/energy requirement and contribute to the energy security to the country.

Further more, as the future of coal sector is dependent on the underground mining operations, coal sector would need high quality technocrats with multidisciplinary understanding. Such professionals are scarce and are becoming increasingly choosy about the organisations which they would like to join.

7.10 All these factors make it imperative that Coal industry in general, and CIL and SCCL in particular, take up immediately measures designed to improve the image of the industry and the companies and to recruit, train and retain on a massive scale technical staff of appropriate quality. Towards this end, the Committee recommends the following measures:

- 1) *CIL in collaboration with private Coal Companies should organize a programme of providing 100 new scholarships per year to students who opt for*

*coal geology/coal mining and/or coal exploration specialization. Of these students a small number, who show outstanding performance should be assured of executive posts in CIL and other participating coal companies.*

- 2) *The enthusiasm of young bright persons to opt for coal geology/coal mining and/or coal exploration as an avocation would require the creation of a regular annual opportunity for them to compete in a competitive examination and on the basis of merit enter CIL at the highest possible entry level. The Indian Administrative Service attracts a very large number of young people to compete for entrance because there is regular selection for a number of vacancies to the highest entry level into government service. The Committee recommends the creation of a SENIOR MANAGEMENT SERVICE for technical and administrative cadres in CIL and SCCL and the remuneration package and service prospects for persons in this service should not be less than any other government service and should be on par with those in the best private sector organizations. Based on the manpower studies referred to earlier CIL, which could coordinate these efforts, should announce that it will recruit, say, 50 persons to senior level and about 100 persons in the middle level through this process. Pending this, CIL should take up campus recruitment from the next academic year from all well run geology/geophysics and/or mining engineering institutions in the country.*
- 3) *There is need to give special attention to inducting mining engineers who have good experience abroad in underground mining adopting modern methods. CIL should undertake a talent search for senior level engineers, preferably of Indian origin, who could come to work in CIL on contract basis for 3 to 5 years to put the working systems in place in large size UG mines which are likely to be taken up in the XI plan period.*
- 4) *It will not be easy to recruit the required number of persons to the junior levels also through the practices and procedures now followed. CIL should set up a widely advertised and publicized system of recruiting each year a specified minimum number of persons from outside the organization to middle and junior level posts. With a view to get youth of good quality to these posts CIL should sponsor a large number of polytechnics and Industrial Training Institutes in all the districts where there are coal mines and make an assurance that the best performing 10 to 20 students in each institution will be getting employment.*
- 5) *The work force itself should have educational and aspiration levels much higher than what they were a few years earlier because they have to handle sophisticated technologies, which call for higher level of skills and responsibilities in the workers. CIL should work closely with Polytechnics and it is in their area of operation to modify and upgrade the contents of their courses.*
- 6) *The Management Training Scheme of CIL should be extended to all disciplines and sources of recruitment of such trainees should be widened.*
- 7) *Advertising for recruitment also provides opportunities to advertise the company and build its image. CIL should follow the most modern methods of recruitment and take up more sophisticated advertising regularly for recruitment and image building.*
- 8) *Retaining the persons recruited within the organization is not likely to be easy as the opening up the sector to private industry, though in a restricted manner, has created alternate career routes to mining engineers. The compensation package should be competitive; more importantly the non-finance incentives should be designed to create a feeling of pride and wellbeing in working in CIL. Incentives should also be introduced for loyalty to workers who complete 20 years, 25 years and 30 years service in the company. The recruitment and*

retention procedures now introduced should make CIL the most desired organization for engineers aspiring to join coal industry.

- 9) For the massive expansion and diversification programme now envisioned for coal sector there is need to have comprehensive system that would help attract, motivate, and retain talented people through a dynamic organizational climate. The challenge is to develop a culture within the Coal organisations conducive to the development of an individual and fulfillment of his aspirations through meaningful individual roles and team spirit.

### **(3) Training and Development**

7.11 The training and development function in CIL has been focused so far on up-gradation of the skills of manpower (unskilled, semi skilled, skilled and highly skilled) in the traditional fashion. CIL has 25 training centers in all the subsidiaries. These include management training centers, technical training centers, mining training centers, excavation training centers, and a central training center focusing on technology transfer. In addition, there are about 105 vocational training centers.

7.12 The Indian Institute of Coal Management (IICM) in Ranchi focuses on training senior managers and directors and in providing Training of Trainers programmes. This also provides the Induction training to Management Trainees. The Committee visited the Institute and is impressed by the well designed but modest infrastructure. The institute conducts a large number of programmes on a wide variety of subjects. *The Committee recommends that IICM should be given a greater role in functioning as a central apex training institution for coal industry and all facilities for training in Technical and Managerial aspects of the industry. For this it should design several new programmes and redesign several others in collaboration with the best institutions providing such programmes in the world. Steps should be initiated now itself to make IICM an university called UNIVERSITY OF COAL TECHNOLOGY AND MANAGEMENT (UCTM).*

The proposed University should develop an integrated MBA course which should not be confined to knowledge of different coal energy forms and their extraction or recovery technologies but should also include thorough knowledge about the other associated technologies, machineries, finance, and personnel management aspect of the Mines. This degree program should be developed in collaboration with the best of such institutions in the world.

- 7.13 *All other training institutions in CIL should be expanded as per a well designed programme. This could be done by a Committee with some outside experts to review and draw up plans keeping in view the national expectation of increasing coal production and consumption to 2000 million tonnes by the year 2030 and the new technologies that are likely to be introduced.*
- 7.14 There is also need to take up specialized education and training programmes in underground mining. There is need for providing not only incentives but stimulating interest in underground mining by giving preferential attention to the education, training and compensation aspects of underground mining. CIL should make use of existing technical institutions also by providing them with financial and technical assistance. *CIL should encourage prestigious technical institutions like Indian Institute of Science, IITs, IIMs to design programmes which could expose the senior level management to emerging ideas in technology and management and officers' cadre at the beginning of their career in the senior positions should be sent to these specially designed programmes. This should be modeled as a mini-MBA programme with special inclusion of subjects relevant to coal industry.*
- 7.15 An efficient programme of refresher courses to retrain employees at all levels in CIL and SCCL periodically should be introduced. Without exception workers and executives in all levels should undergo this programme at regular interval. *The non executive staff should undergo training courses of one week to 4 weeks duration which are to augment their skills or expose them to new technological developments related to their jobs/work or give them skills to prepare to take up higher responsibility.* Special emphasis should be given in these programmes to give them skills to operate newly introduced high cost machinery more productively. *The middle management levels should undergo every year a two week programme specially designed to improve their capacity to handle better their present jobs and to equip them to take higher responsibilities. The training programmes for the middle level should emphasize the importance of working as a team.*
- 7.16 More importantly, *the Public Sector Coal companies should take up a programme to upgrade the management capabilities of the senior level executives.* Organizing a regular training programme for them each year for about two weeks undergoing specialized management training within the country or abroad could do this. During these training programmes abroad, they should be provided an

opportunity to visit some of the coal mines of excellence in those countries. *To begin with from 2007-08 at least ten officers should be sent for Senior management programmes a year organized by prestigious academic institutions like Harvard, Stanford, London Business School and at least twenty should be sent to similar institutions in India. The senior management programmes have to provide the concerned officials of the various related sectors whose progress determines the potential for growth of coal sector.*

- 7.17 In brief, the Committee would like to recommend that under CIL leadership coal industry should thoroughly revise their total training programme and devise a comprehensive new programme covering all levels without exception, preferably with the assistance of an outside HR and Training expert organization which has good knowledge of mining industry. While designing such a programme the suggestions of this committee made above may be examined and incorporated suitably. All the training programmes should be properly coordinated and monitored by the Director, HRD in CIL.

#### **(4) MOTIVATION AND COMMUNICATION**

- 7.18 The Committee in their discussions with officials individually and collectively through the Unions and Associations found that, with a few exceptions, officials generally had a complacent attitude and did not feel excited about the emerging importance of coal and the role that they have to play. The adoption of the mission statement to become a world class organization CIL has not infused adequate enthusiasm to scan the international energy market to identify the new expanding market for coal due to steep increase in the price of alternative and competing fuels. While the oil and gas industries have consistently over estimated the demand and were seeking more funds and concessions, CIL has been accepting demand estimates derived from Planning Commission estimates. CIL has more data, information, technical competence and staff and still has accepted the position of a mere executing agency of the Government decisions and not the chief advisor to Government and the advocate for the coal industry. In spite of the restriction on transport of coal of high ash content CIL has made no attempt to take up coal washing on a large scale and insist on users taking the ROM coal only.

- 7.19 The corporate culture in the organization is hierarchical and does not nurture and reward employees on the basis of their performance. *The Committee strongly*

*recommends that internal corporate communication systems should be reorganized to bring the large number of executives and a huge work force spread around the whole country to come closer emotionally to exchange views and notes and develop a sense of pride in belonging to an industry which is playing an important role in the socio-economic development of the country. Each worker and each executive should become familiar with the acceleration in the pace of growth of their organisation and attempt to maximize their contribution to the achievement of the corporate goal.*



No. A-13011/1/2004-Admn.  
Government of India  
Ministry of Coal

...

New Delhi, the 20<sup>th</sup> December, 2004

**ORDER**

1. The Government has decided to constitute an Expert Committee comprising the following:

1. Shri T.L. Sankar, IAS (Retd)-Chairman of the Committee.
2. Dr.J.J.Irani, Director, TATA.
3. Shri P.K.Sen gupta – former CMD, Coal India Ltd.
4. Shri P.V. Sridharan, Sr. Visiting Fellow, TERI.
5. Shri S.K.Mahajan, former Joint Adviser (Coal & Mines), Planning Commission.
6. Shri S.P.Sethi, Adviser (Energy), Planning Commission.
7. Shri Pradeep Kumar, Additional Secretary-Member Secretary of the Committee.

2. The items of reference of the Committee are as follows:

- i Measures for meeting the demand-supply gap in Coal in the short, medium and long-term.
- ii How to improve productivity of man and machinery in Indian Coal Sector, particularly in Coal India.
- iii Introduction of cutting edge technology in Coal Sector.
- iv How to convert CMPDIL into a center of Excellence for Planning and Research in Coal Sector.
- v Restructuring of CIL to make it a World Class Company.
- vi Other matters that the committee may consider important for the general improvement in the functioning of the coal sector.
- vii Examining the merits of opening up trading in coal.
- viii Examining the current policy of providing captive coal mining, and considering recommendations which might reduce the demand – supply gap.

3. The Expert Committee should also examine major recommendations suggested by M/s KPMG Consulting Private Limited.

4. CIL will provide secretarial assistance to the committee.

5. The Committee will submit its report within a period of three months.

6. The non-official members of the Committee will be paid TA/DA at the rate applicable to officers of the highest grade in the Central Government for attending the meeting of the committee.
7. This issues with the concurrence of IF Division (DY: No. 863/IF/04 dated 20.12.2004.

**(Parkash Chand)**  
Deputy Secretary

To

1. Shri T.L.Sankar, IAS (Retd) - Chairman of the Committee.
2. Dr.J.J.Irani, Director, TATA.
3. Shri P.K.Sen gupta – former CMD, Coal India Ltd.
4. Shri P.V. Sridharan, Sr. Visiting Fellow, TERI.
5. Shri S.K.Mahajan, former Joint Adviser (Coal & Mines), Planning Commission.
6. Shri S.P.Sethi, Adviser (Energy), Planning Commission.
7. Shri Pradeep Kumar, Additional Secretary, Ministry of Coal.
8. Shri Shashi Kumar, CMD, CIL, Kolkata.

## Conclusions and Recommendations – Part I Report

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Committee felt that it would be desirable to submit Report in two parts with PART-I dealing with the short to medium term issues and PART-II dealing with the rest. For the purposes of this Report the Committee has decided to divide its recommendations for the short and medium term and long term into the two parts of the Report. The medium term covering upto 2011-12 i.e., the end of Eleventh Plan would be covered in Part One of the Report and anything beyond the end of Eleventh Plan would fall in the long term and would be covered in Part Two of the Report. (Para 1.5)

Part-I Report would mainly address the issues of increasing the availability of coal in the short to medium term and bridge the gap between demand and supply. For this, the projected requirement has been reassessed in detail and also the production plans and strategies on the ground given by the major producers have been assessed. It was felt that the role of captive coal producers would be quite important and captive mining could take root and contribute significantly in the short to medium term. The committee has also found that the procedures of getting the various approvals and permissions for the grant of a block or the commencement of mining operations in a block allotted to public or private sector are time-consuming and lead to avoidable delays in coal production. The committee has included a brief analysis of the environment related issues and has made some recommendations which would help to expedite the grant of environmental clearances without any deviation from the spirit of the law and policies for environmental protection. (Para 1.7)

That Coal shall remain India's primary source of commercial energy supply is equally relevant even today. A time-bound plan to cover the entire country by regional mapping in 15 years should be prepared by GSI, CMPDI and MoC. Funding for this should commence from the 2006-07 budget. The MoC must launch a program of detailed exploration and drilling, in the 11th Plan, aimed at increasing proved category reserves. CMPDI's current capacity of drilling 3 lakh meters per annum must be raised to at least 15 lakh meters per annum by involving all eminent agencies within the country and outside. The committee recommends the creation of a Revolving fund of Rs. 500 crores for this purpose. The fund would recover the outlays once the mining leases are granted on the reserves so proven. Such an enhancement in the capacity for detailed exploration could potentially add about 10 billion tonnes of coal to the proven category annually. (Para 2.38)

With the need to expedite project approvals, it is also necessary to improve project formulation to match international standards. Greater delegation of authority must accompany greater accountability and responsibility. CIL could be granted the status of a Navratna company in which case the company need not come to Government for approval of projects irrespective of the capital expenditure involved or else the subsidiaries of CIL could be granted the status of mini Ratna companies in which case only those proposals of such a subsidiary would need government approval wherein the capital expenditure exceeds Rs.500 crore. The boards of such companies should be restructured with the induction of independent non-government directors. (Para 3.21)

The environmental clearance for these projects is a cause of major concern. The environmental issues in respect of projects which are important to reach the Tenth and Eleventh Plan targets should be taken up on priority consideration by the MoEF and if necessary a Special Task Force with adequate powers may be set up for examining these on a priority basis. The Environmental clearances should be sought and also given for production levels which are at least 25 % above the initial required mine capacity so

that wherever possible and necessary, the production from certain mines could be enhanced. The MoEF could address rapid development of domestic energy resources by identifying critical areas that have Biodiversity and other special features in advance and notifying them as such. Other areas where the environmental impact could be mitigated by creating compensatory afforestation could be treated differently. In respect of the later the environmental clearance should be given within four months of filing of the application. (Para 3.22)

The State Government must be requested to give clearance within six months failing which it should be deemed to have been approved. The rationale for fixing a standard rate for loss of revenue from forestlands, which are acquired for coal mining besides insisting on compensatory afforestation, needs an objective review. (Para 3.23)

Next four years will be years of pronounced coal shortages in India. Shortages are likely to become acute in the first two years of the 11th Plan as the delayed 10th Plan power projects get commissioned alongside the 11th Plan projects already under construction. These shortages are likely to rise rapidly by the end of the 11th Plan unless Coal India's unprecedented capacity expansion plans materialize during the 11<sup>th</sup> Plan. CIL's Emergency Production Plan that is being processed, if delivered in addition to the large capacity expansion foreseen by CIL under the 11th Plan, offers the only hope of reigning in a widening demand-supply gap. While all efforts should be made to meet the immediate shortages it is equally important to examine and implement the recommendations made by the Committee which would lead to self sufficiency in coal in the long run. (Para 3.25)

Thermal coal import to the tune of about 30-40 million tonnes of high grade coal by 2011-12 is the principal short term measure recommended by the Committee to alleviate looming shortages. However, even this would require that the port capacity and the evacuation facilities be taken up for enhancement immediately. Considering the fact that India is the third largest producer and user of coal in the world, India should be an important player in the world coal market. The foregoing assumes that the infrastructure requirements for handling rising coking coal imports continue to expand, as required, in line with past trends. (Para 3.26)

To enhance domestic coal production capacity rapidly requires that the MoC sets up a permanent Special Task Force to monitor progress of clearances and project implementation of all projects required to be completed by the end of the 11th Plan to fully realize Coal India's production plans including the Emergency Production Plan. This Task Force must also monitor clearances and progress of approved Captive projects. The Task Force must include representatives of MoEF, Railways, MoST and MoP as well as the concerned State Governments. (Para 3.27)

The success of this short-term supply management would depend on the organization of suitable institutional arrangements for importing thermal coal and selling it in a transparent manner. Long term planned imports are possible at considerably lower prices compared to ad hoc imports that currently dominate thermal coal imports. Organizations that have long experience of importing coal must be co-opted in implementing the short-term supply management program. (Para 3.28)

Increasing proportion of all domestic coal (supported by imported coal where necessary) that is not earmarked for the Power Sector be brought into the E -auction market over the next 2 to 3 years. Willingness to meet the actual demand at a market driven price would go a long way in establishing transparent coal markets in India. There is need to replace the current system of loose linkages feeding the power sector with formal long term Fuel Supply and Transport Agreements that include the Railways. Again, this exercise should be completed within the next 2 to 3 years. (Para 3.29)

The current provisions for increasing the level of competition in coal mining through captive mining were adequate and reasonable. However, procedures and processes need to be improved to expedite the allotment of the captive coal blocks in a transparent and effective manner. These procedures/processes should address the legitimate concerns of various stake holders involved and incorporate necessary flexibility to achieve the end objective of raising the number of players engaged in coal mining with a view to increasing supply and competitive efficiency in the coal mining sector. Further, the established procedures/processes should be able to select serious allottees committed to developing and mining blocks allocated within a prescribed timeframe. Finally, the procedures/processes must include a set of punitive penalties for failure to do so.

(Para 4.9)

And such of these proven blocks that the two Government companies cannot bring into production even by 2026-27 must somehow be brought under the captive dispensation provided it leads to an earlier realization of the production potential offered by these proven coal reserves.

(Para 4.22)

The problems of delay in the pre mining stage of captive mine proposals should be carefully examined in consultation with the concerned Central and State authorities and measures designed to enable a sincere allottee to commence mine construction within three years of the date of allocation in the case of blocks allotted from Proved category.

(Para 4.24)

The Central Government (MoC) should take a proactive role in monitoring the approvals and clearances to be provided by the State authorities. The States can be requested to take advance action to earmark coal bearing areas for allocation to the allottees who obtain Central Government approvals. The State Government must be requested to give clearance within six months failing which it should be deemed to have been approved. In respect of land acquisition the State Government may be requested to keep a standing officer designated as the land acquisition officer to whom these cases could be referred to without waiting for the setting up of a special land acquisition court.

(Para 4.25 i)

The Government should set up an empowered High Power Committee of Secretaries who may consider the applications for Environmental clearance with the assistance of especially appointed/designated staff and give clearance within 4 -6 months. The same group can also review the rationale for fixing a standard rate for loss of revenue from forestlands, which are acquired for coal mining, besides insisting on compensatory afforestation.

(Para 4.25 ii)

All possible legal measures should be evolved to cancel the licenses issued earlier if the allottee has not taken adequate steps to bring the allotted mines to production or in setting up the end-use units.

(Para 4.25 iii)

There is urgency to give special attention to incentivising and expediting captive coal production in the period up to the end of the Eleventh Plan.

- d) Any coal block in the Proved reserve areas held by any company that cannot be put into production before 2026-27 should be deblocked and taken over by the Government of India. However, the current allottees including State and Central PSUs could form Joint Ventures to produce coal within the period specified from the blocks that they hold currently, Any Joint Venture so established as well as all current holders of coal blocks (except CIL & SCCL) must provide bank guarantees to back their production commitments as specified in (iii) below. In the case of CIL/SCCL, MOC could conduct biannual reviews of progress and periodically de-block coal blocks that are unlikely to go into production by 2026-27.

(Para 4.26 i)

- e) Proven coal reserves un-blocked as a result of the exercise under (i) above must be grouped into the following categories:
- a) All blocks with proven reserves that can support a production of 2.5 million tonnes per annum or more for 30 years should be earmarked for power production exclusively.
  - b) Within the blocks earmarked for power generation attempt should be made to identify a few blocks that could support an annual coal production of 10 million tonnes or more for 30 years.
  - c) Blocks that can support a production of 0.5 mt to 2.5 mt of coal annually for 30 years to be made available to any of the eligible end users.
  - d) Small and isolated blocks reserved for lessees producing for Coal India under sub-leases or for captive and group captive needs. (4.26 ii)
- iii. A transparent mechanism for allotting the coal blocks so identified should be put in place. The following alternatives are the criteria for selection of the preferred applicant among several for the same block: (4.26 iii)
- a) A minimum net worth of Rs.200 crore for being eligible for blocks in categories (ii) (a) above. The minimum net worth requirement to rise by Rs.100 crores for every whole multiple of the minimum mine capacity of 2.5 million tonnes proposed under these categories. A minimum net worth of Rs.50 crore for blocks in category (ii) (c) above rising in steps of Rs 25 crore for each whole multiple of the minimum production potential of 0.5 million tonnes. And finally, a minimum net worth of Rs5-20 crore, depending on the size of the deposit, for blocs in category (ii) (d) above. (4.26 iii)
  - b) An undertaking to produce a minimum of 2.5 million tonnes of coal by an agreed date before the end of the 11th Plan for blocks in category (ii) (a) above, 5.0 million tonnes of coal for block in category (ii) (b) above, and 0.5 to 1.0 million tonnes of coal for blocks in category (ii) (c) above (depending upon the size of the deposit). The minimum production target for the lessees for blocks in category (ii) (d) above to be specified individually. (4.26 iii)
  - c) Undertaking to set up the full capacity of the power plant by the end of 12th Plan for blocks under category (ii) (b) above. All other end use capacities to be realized in full by the end of the 11th Plan. (4.26 iii)
  - d) An unconditional bank guarantee at the rate of Rs.40 per tonne of coal to be mined per annum. The bank guarantee to be only Rs10 per tonne of coal to be mined for blocks in category (ii) (d) above. (4.26 iii)
  - e) One half of the bank guarantee to be encashed on a pro rata basis if production falls below the guaranteed production by the end of the 11th Plan. The remaining 50% of the bank guarantee to be encashed (on a pro rata basis) if the end use project not realized as proposed in the application. Bank guarantees to be released on a pro rata basis if the targets are met. In the event that the mine is never established, the full guarantee must be encashed and the assigned block must revert back to Government of India. (4.26 iii)
  - f) As a contingent measure, in case the end-use industry does not materialize for any reason the allottee should then convert his status to that of a lessee who produces on behalf of CIL/SCCL. In case the allottee is unable to produce coal, as per the plan, the bank guarantee would be encashed as laid out in (e) above. Further, the Bank Guarantee for not putting up the end use project would be encashed in full. (4.26 iii)

- g) In case of multiple applicants for the same block, the Screening Committee should base its decision on a point system based on net worth and technical expertise/experience. In case of a tie, the speed of bringing a mine into production should be considered. As a last resort the level of guarantee offered above the minimum required could be used for selection among competing applicants. (4.26 iii)
- h) Small and isolated deposits under category (ii) (d) above should now be opened up for exploitation by anyone who comes up with a proposal to supply the coal locally as a lessee of Coal India. Terms of such leases to be negotiated individually but the minimum criteria detailed above must be followed. These blocks can also be given for captive/group-captive use of small end users such as the brick and ceramic industry. If more than one application is filed, for the same block, preference could be given for those who are representatives of user associations like small-scale industry association, pottery manufacturing association or even brick kiln owners' association. (4.26 iii)
- i) Coal from blocks under (ii) (d) above need not be subject to any price controls and the administrative arrangements for allotting such coal blocks should be streamlined with powers delegated to a smaller subgroup of the Screening Committee. (4.26 iii)
- j) Group captive mines must be permitted for all categories of blocks identified in (ii) above. (4.26 iii)
- k) CMPDI must be made an autonomous body with powers to independently hire sub-contractors or bid out exploration work so as to enhance its drilling capacity from 3 lakh meters per annum to 10 lakh meters per annum by the end of the 11th Plan. A list of recognized domestic and foreign contractors can be developed to enhance the number of players in the field of detailed exploration in India. (4.26 iii)
- l) Incidental production from captive blocks during mine development or periodic surpluses during mine operation must be sold to CIL/SCCL at a negotiated price with a band of plus or minus 10% of the CIL price for the same quality of coal. Alternatively, Coal India could auction such coal from captive mines through its e-auction platform for a handling fee of 1% of the value realized. (4.26 iii)

The level of attention given and encouragement extended to captive coal mining will decide whether domestic coal will remain the primary source of energy supply in India. Developing domestic coal resources and successfully extracting this primary energy resource is critical to India's energy security and sustained growth. Hence, captive coal mining is of utmost importance. (4.27)

Coal prices would need to be regulated in light of the above market realities. Further, the regulation of coal price has to differentiate the pricing of coal for power generation since it consumes 80% of the domestic production and the quality of coal it consumes is not easily salable to the steel and cement sectors. Further, the power sector has to be serviced with long-term contracts and special investments in transport. There is need for long-term supply and price contracts between the power and coal industry that involve the critical third party namely the Railways. (5.9)

The recommendation of the Fuel policy Committee made in 1975 and accepted by the GOI is valid even today. FPC 1975 states "From the national point of view, the fuel prices should ensure that the pattern of use of fuels is in keeping with the optimal pattern of production determined with reference to the long-term availability of fuels and their costs." (5.15 i)

Import parity price could increase dependence on imported coal, as many Indian consumers may prefer imported coal. This may aggravate India's energy security concerns. (5.15 ii)

It is reasonable to have special price and supply arrangement for the power sector which will keep Indian industrial production globally competitive and provide electricity at affordable cost to the poor. For convenience the power sector may be called a Class 'A' consumer. All other consumers of coal may be called Class 'B' consumers. To begin with class 'A' consumers would include power utilities and captive power plants. (5.16)

The coal requirements of Class 'A' consumers should be supplied at prices determined strictly on a cost-to-produce basis subject to certain efficiency norms and allowing a rate of return in keeping with the other energy supply industries like electricity. Until the setting up of a Regulatory mechanism or other arrangements for coal price determination, the MOC on the basis of periodic price studies can fix this price. A tripartite agreement involving coal supplier, coal consumer and the transporter called the Fuel Supply & Transport Agreement. Every year on the basis of the production plans of public sector and private coal mines Government would decide the quantity of coal out of the total production which should be earmarked for supply to Class 'A' consumers. The remaining coal production in the country should be sold to Class 'B' consumers on the following basis: the larger coal consumers including associations of consumers with minimal demand of 1 lakh tonnes per year can be given 60% of their need under FSTA at a price indexed to e-auction price. The remaining quantity required by these consumers and all other smaller consumers could get their needs through traders/import or e-auction. For this method to succeed at least 10% of the total domestic production must be sold in the open market through e-auction in the first year. The amount of coal made available for e-auctions can rise to a minimum of 20% of the domestic production by the third year. Simultaneously, the power utility sector should be asked to set up coastal generating stations along the Western Coast of India and South Tamilnadu based on imported coal. This will lower the dependence of domestic power utilities on domestic coal, thereby making it possible, over time to raise the quantity of coal being sold in the open market through e-auctions to 25% and even 30%. If during the transition the requirements of the Class 'A' consumers as a group or as individual consumer within the group get an allocation which is below the projected demand for the year, the industry should, individually or collectively, arrange to import the extra requirements. (5.17)

The above gradual approach spread over three years to reach 20% of domestic production and possibly over 5-7 years to reach 30% of local production being sold through e-auctions recognizes that it is necessary that the distribution and pricing of coal should be gradually moved from the current practices to the desired final stage set out above. The procedures of auction and the quantities to be auctioned during the year with the monthly break up of the quantities and the possible locations from which the coal is likely to be offered should be published in advance of the year and revised once in three months.

(5.18)

If the recommendations towards liberalizing captive coal mine allocations, totally deregulating production from small mines, and imports by major users like NTPC are encouraged, the coal shortage could be completely remedied in 4-5 years. Further, in keeping with India's size of coal deposits and the level of production/consumption India's coal sector should integrate more closely with the world coal market for a competitive coal industry to develop. To keep the import option functioning efficiently as an essential supply option along with the regulation of price in the Indian coal industry which will ensure least cost supply of coal for power generation while allowing a competitive and transparent coal market to supply the needs of other consumers. These



recommendations are conceived as a package and they should all be implemented simultaneously starting with the year 2006-07. (5.19)

Three measures are urgently required concerned with Railways:

- a) The Railways, Coal and Power Ministry have to work together to drawup a well-conceived model of Fuel Supply and Transport Agreement(FSTA). GOI should ensure that all the concerned Ministries and agencies accept the FSTA and perform as per its provisions.
- b) The Railway tariff for coal should be subject to a detailed review by an independent agency, preferably headed by a High/Supreme Court Judge.
- c) The Railways should in consultation with Planning Commission and the ministries of coal and power determine the main corridors through which coal would move in very large quantities to power plants and examine the cost and feasibility of setting up dedicated trunk-routes for coal transport. The exercise can also consider the possibilities of using multimode of coal transport involving rail-cum-coastal shipping and the use of double decker freight trains. This exercise should be taken up immediately to enable a decision on this investment in the early years of the XI plan. (5.20)

The concern for Climate-change implications on account of increased coal use in India at the current stage is somewhat premature. Having said this, India must take up various measures of reducing the pollution impact of coal use by developing and adopting all appropriate emerging clean-coal technologies including carbon sequestration whenever found economically viable. (5.21)

