Final Report

Equitable sharing of benefits arising from coal mining and power generation among resource rich states

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Acronyms

AEQM	Area wide Environmental Quality Management
AMD	Acid Mine Drainage
BCCL	Bharat Coking Coal Limited
CAGR	Compounded Annual Growth Rate
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CCL	Central Coalfields Limited
CEA	Central Electrical Authority
CEPI	Comprehensive Environmental Pollution Index
CERC	Central Electricity Regulatory Commission
CIL	Coal India Limited
CMPDI	Central Mine Planning and Design Institute Ltd
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
CPSU	Central Public Sector Utilities
CSE	Centre for Science and Environment
DVC	Damodar Valley Corporation
ECL	Eastern Coalfields Limited
EMP	Environment Management Plan
FCA	Forest Conservation Act
FIMI	Federation of Indian Mineral Industries
GIS	Geographic Information System
IDCO	Infrastructure Development Corporation
IPP	Independent Power Project
JRDA	Jharia Rehabilitation and Development Authority
LAD	Local Area Development
LARR	Land Acquisition and Relief Rehabilitation
MCR	Mineral Concession Rules
MMDRA	Mines and Mineral Development and Regulation Act
MoC	Ministry of Coal
MoEF	Ministry of Environment and Forest
MoU	Memorandum of Understanding

NRRP	National Resettlement and Rehabilitation Policy
NTPC	National Thermal Power Corporation
PAF	Project Affected Families
PAP	Project Affected People/Population
PM	Particulate Matter
R&R	Resettlement and Rehabilitation
RoE	Return on Equity
RSPM	Respirable Suspended Particulate Matter
SECL	South Eastern Coalfield limited
SPM	Suspended Particulate Matter
TPP	Thermal Power Plant
UMPPs	Ultra Mega Power Projects
WACC	Weighted Average Cost of Capital
WTP	Willingness to Pay

Executive summary

Background and rationale

Coal is key to the energy security of the country and provides employment, income and revenues to coal rich states. Coal bearing states have repeatedly aired their concerns about the negative externalities they face in connection with coal mining and coal based power generation. The dissatisfaction with existing payments for impacts has led states to make demands for a greater compensation for the externalities they suffer in mining coal that is used in the production of power that benefits other states. Towards this end, coal bearing states have suggested various options to compensate for externalities including certain percentage of free power and a cess on power generated in host state and sold to other states.

The immediate rationale for this project emerges from these demands by coal bearing states, made at a meeting held on August 8, 2012, convened by the Planning Commission to discuss issues relating to a policy initiative for equitable sharing of benefits arising from coal mining and power generation activities among states.

Purpose of this study

This 6 months study examines the various issues involved in these demands of coal rich states and proposes recommendations for equitable sharing of benefits between resource rich host states and power consuming states. The specific study objectives are:

1. To arrive at a realistic assessment of the negative impact of coal mining on land acquisition, land re-use, rehabilitation & resettlement, environmental and ecological degradation, physical infrastructure in the resource rich host state. This assessment is based on established norms from previous research studies for some of these aspects.
2. To assess the expenditure on administrative machinery of the host state to process the approvals and address the negative impacts of coal mining as stated in point (1).
3. To study the impact of agreeing to the states proposal for either certain percentage of free power from the coal based power plant located in host state similar to the benefits given for hydro power plant or supply of certain percentage of electricity at variable cost.
4. To study the impact of agreeing to the states demand for first right of refusal for supply of certain percentage of electricity from such plants.
5. To examine the provisions in the present legal and regulatory framework for imposition of tax or duties for the electricity generated in host state primarily for export to consuming states and recommend suitable amendments, if such provisions are not there
6. To examine the provisions in the present legal and regulatory framework to impose tax or duties on mining activities beside royalty by the Central Government for mitigation measures to address the environmental degradation in the resource rich states.

7. To study mechanisms for sharing of such taxes and duties between Central Government, resources rich states and consuming states

Approach and methodology

Broadly, there are two sectors involved in this study – coal and electricity. The demand of coal-bearing states is that part of the revenues accruing from electricity consumed in other states should rightfully be theirs, since it is generated using their coal and imposes costs on their natural and human resources. Posed this way, the central issue is not about sharing of revenues from electricity consumed, but about being compensated for the impacts caused by coal production. The essential policy question here is this – how are coal-bearing states and their people compensated for the negative externalities they bear from coal mining and for those that arise from the production of electricity?

This study examined the environmental and social externalities and costs of coal mining and coal based thermal power generation using a life cycle approach in four major coal producing states – Odisha, Jharkhand, Chhattisgarh and Madhya Pradesh. This assessment is based on secondary literature, TERI's earlier work on the subject, field visits, and the data made available by states during the course of the field work (through EMPs, etc.) and stakeholder consultations in the concerned states. Drawing from previous studies on estimation of monetary costs of various externalities, this study identifies those costs which are left unaddressed by power and coal companies.

Through a regulatory and institutional analysis, it examined the approvals and agencies for coal mining and the various expenses that the state incurs to support coal mining, as well as the regulatory framework to address impacts. Through a legal analysis, it examined the possibilities available to address the inequities faced by coal rich states. An analysis is undertaken of the impacts on tariffs and state government revenues of the various demands made by the states for concessional/free power produced in their states.

Coal bearing states

The study states are Chhattisgarh, Jharkhand, Odisha and Madhya Pradesh. They account for about 21% of the total geographical area and 14% of the total population of India and around 31% of its forest cover. The states are rich in minerals, especially coal, which forms an important constituent of the economic activities in the study states with a substantial population of the state residing in coal mining districts. NTPC has substantial power generation capacity housed in the identified states and a number of UMPPs are coming up in these states.

Royalty payments are an important fiscal handle. Since 2006, the payments from royalty have been increasing at a CAGR of about 10-12% for most of the states with the increased mineral production rates. With a move to *ad valorem* rates since 2012, the fiscal position of the coal states should improve considerably. Though these states are resource rich, they lag behind the country on several key human development indicators. In 2009-10, 36 -48% of the population of these states was below the poverty line. They also do poorly in water and sanitation and in energy access. While a number of power plants are coming up in these

states, a large part of population in Odisha and Jharkhand still have no access to the electricity, are below the poverty line and lack basic amenities.

Assessments and analyses

Assessment of impacts and costs of coal mining and coal based power generation in this study followed a life cycle approach. This was done with a view to capture the different externalities that result at different stages of coal mining, coal transportation and power generation. Each of these stages is associated with some social, cultural, and environmental impacts.

Environment related

Forests and biodiversity

Forest loss is high.as 60% of the coal resources are located in the forest areas (MoC 2005). Out of the coal leases acquired by Coal India Limited (CIL) about 28% lie under forests (Greenpeace 2012). Forest land diversion for coal mining in the four states studied – Chhattisgarh, Jharkhand, Odisha and Madhya Pradesh - between 2005-2011 was about 7752 ha (Indiastats). The study found that while CAMPA funds are being collected for compensatory afforestation and to restore some of the lost ecosystem services, the utilization of these funds has been poor and the achievement of the objectives is questionable.

Air quality

Air pollution in the coal mining region is high. The Ministry of Environment and Forest) in 2010 declared the following coal mining districts of the country as critically polluted areas: Korba, Angul, Talcher, Hazaribagh-Chatra, Singrauli, Chandrapur, Raigarh and Jharsuguda. Discussions with respective state pollution control board brought out concerns regarding deteriorating air quality in the mining region in Jharkhand and increase in SPM and fugitive emissions in mining regions in Odisha. TERI estimated both fugitive emissions from coal transportation in the four study states and the emissions of air pollutants for coal mining in districts of Odisha.

Water quality

Coal mining activities have adversely affected water in the region but there was not enough data or credible data to make a strong comment. Studies suggest that mining has degraded the quality of water by not only lowering the pH of the surrounding water resources but also by increasing the level of suspended particulate solids, total dissolved solids and some heavy metals. Further, the overburden generated also contaminates the surrounding water bodies and increases the heavy metal concentration especially of Fe, Cu, Mn and Ni which reduces the utility of water for domestic purposes. In the data provided by CPCB 2011 for selected mines, most of the parameters are found within limits, but the cumulative effect is not known. These results also were at variance with what stakeholders reported in terms of water quality.

Land quality

Land degradation is a serious concern in the mining regions. The high overburden (OB) ratio in coal means that a high amount of OB waste is generated for every tonne of coal

produced, for which land is required for dumping. In addition, large tracts of land previously under mining are currently lying abandoned. India does not have a detailed inventory of abandoned mines. The CAG (2011-12) reports a backlog in backfilling and technical reclamation of 12,643 hectares of land in seven subsidiaries of CIL as on March 31, 2010.

Coal washing

Coal washing is found to be a major problem for host states although it has major benefits otherwise both on efficiency and environmental grounds. Large amount of rejects are generated during washing. These rejects pose serious environmental hazards as proper disposal ground for these rejects do not exist in coalfields. They are generally dumped on the ground and hence lead to degradation of fertile land. These rejects are also susceptible to spontaneous combustion leading to CO, CO_2, and particulate emissions.

Fly ash generated

Fly ash is one of the residues generated during the combustion of coal in thermal power plants. It leads to the problem of air, water and soil pollution, land degradation, disrupt ecological cycles and set off environmental hazards. Fly ash also poses radiation and arsenic concerns, which have not been sufficiently investigated in India. The disposal of fly-ash requires large quantities of land, water, and energy, and its fine particles, if not managed well, can become airborne. Currently, 131 million tonnes of fly-ash are generated every year (CEA 2011). Less than half of this is used in brick-making, cement making, land filling, embankment etc. Ash ponds are significant contributors towards the ambient concentration of Particulate Matter (PM) to the neighbouring regions.

Social externalities

Displacement

Displacement is a very serious issue both for coal mining and thermal power plants (TPPs).Between 1950 and 2000, according to conservative estimates, the coal mining sector is reported to have displaced between two and two and a half million people. As per the MoC (2005), a minimum of 1, 70, 000 families involving over 8, 50, 000 people are likely to be affected by future coal projects. Discussions with different experts and state officials highlighted the fact that managing displacement is one of the biggest challenges in the case of coal mining. The displaced people not only lose their natural livelihood options and safety nets, but they also suffer from significant health diseases due to air and water pollution. TERI attempted its own estimation of persons displaced in setting up of power projects. This rough estimate indicates that there are significant differences in the actual number of people displaced vis-à-vis numbers estimated by the project proponent.

Health impacts

Health impacts seem to be high and rising. During stakeholder consultations in Odisha and Jharkhand, adverse health impacts on the people living in the vicinity of mines were pointed out as a serious cause of concern. Studies do agree that there are many adverse health impacts of mining. However, there is insufficient empirical evidence of the number of people who have worked in coal mines and are affected by coal dust, and even less of those impacted who live in the neighbourhood or in transportation corridors.

Thermal power plants are associated with adverse health impacts including pre-mature deaths from lung cancer, respiratory illnesses, and heart diseases. The increased emissions of particulate matter and other pollutants have led to increased health problems. A study by Cropper et al (2012) estimated pre-mature deaths per tonne of particulate matter, SO_2 and NO_x for 89 thermal power plants in India for the year 2008. Their estimates suggest that SO_2 causes an average of 500 deaths per plant, NO_x roughly 120 and PM2.5 around 30.

Stress on natural resources

Besides coal, TPPs require heavy utilization of resources, primarily water and land. TPPs require a huge amount of water for coal washing, cooling and ash disposal. Various estimates are available for use of water in thermal power stations. Wise, 2013 estimates that upto 60-100 litres of water are needed per unit of electricity produced. The consumptive use of water on coal based TPP is about 3.92 million cubic metres per 100 MW per year. (Prayas, 2011). CEA, 2012 recognises that difficulties are already being faced in siting thermal power plants due to non-availability of water, particularly in coal bearing states like Odisha, Jharkhand and Chhattisgarh.

Current compensation regime in India

A compensation payments regime exists, but it is not clear how adequately and fairly issues are addressed. It does not address socio-cultural impacts sufficiently and does not create a gain/benefit for those who have contributed in terms of land and lost livelihoods to the coal project; it does not recognize the loss of opportunity by those who have lost land in benefiting from enhanced land values as a result of coal development. (TERI 2007)

As per our understanding, following are the externalities that are either only partially compensated or not compensated at all:

- Loss of prime forests, species diversity and vital ecosystem services that are permanently lost and may not be restored to original state after afforestation - Partially compensated
- Cumulative impacts of water pollution of major rivers and streams even though individual mine operators may be compliant to existing standards - Not compensated
- Degradation of water streams due to waste water from coal washeries - Not compensated
- Degraded water let into streams meant for agricultural use resulting in loss in productivity - Not compensated
- Cumulative impacts of air pollution from coal mining and power generation that result in health impacts - Not compensated
- Loss of agricultural productivity due to dust settlement in areas adjoining coal mines; emissions and dust settlement during transportation of coal - Not compensated
- Inadequate compensation for land, inadequate compensation for loss of homestead, conflict between existent and re-settled communities, loss of social ties if re-settled separately, new settlements often lack facilities promised especially education and

healthcare, single women denied benefits because of lack of proof, hardships faced by project affected people who are not displaced - Partially compensated

- Loss of income from land, loss of income from services used by displaced community, disruption of shifting agriculture practiced by tribal populations, lack of vocational training relevant to new market opportunities, one job per family ignores women's contribution to income generation - Partially compensated
- Loss of income from selling forest produce, loss of culturally significant assets, loss of pastures/forests for cattle - Not compensated
- Land degradation resulting in barren lands and waste dumps with increased risk of contamination if not managed properly, opportunity costs of land under abandoned mines for which the state governments do not get any revenues and cannot put to other uses - Not compensated
- Damage due to collapse of ash dykes –partially compensated

Regulatory deficits and impacts

We would argue that a number of the negative externalities around coal mining would not have occurred if there were proper rule enforcement and monitoring of activities and impacts on the lives of local people. For the externalities that have been described in the sections above, each has been addressed completely or at least in parts in our legal framework. The scope of our environmental regulatory framework covers all major externalities of forest diversion, air and water pollution, land degradation, management of extractive activities and right of people to forest use. And yet the institutions tasked to enforce these rules, such as the Pollution Control Boards and the Revenue Departments are plagued with lack of staff, lack of technical capacity or finances, and politicisation. There are also provisions for addressing social externalities that are created due to coal mining in particular, but TERI findings show that these are not complemented with statutes making them ineffective in addressing these externalities.

While our regulatory framework lays out the roles and responsibility of government through various legal provisions, the fact that externalities have been created in the process of coal mining, which have not been addressed or compensated adequately, directs our attention to the existence of regulatory failures in the governance of this sector. The state governments themselves identified several regulatory failures, but suggest that these have been difficult to address in the last four decades of state led coal mining activities.

Estimates of externality costs of coal mining

Using a life cycle approach, the study sought to arrive at external costs of coal mining and power generation. These are not exhaustive and are estimates based on limited data obtained from the states and based on other studies. The study makes a distinction between those costs that are compensated and uncompensated. The compensated costs are the costs of mitigation that need to be borne by coal and power generation (as estimated from EMPs available) and the uncompensated are the those that are the persons affected, the local or state administration or are left unattended.

Estimates of externalities are divided into two stages:

1. Coal mine development to coal washing;

2. Coal transportation to coal combustion in power generation.

This separation is done to highlight impacts arising from coal mining per se and those due to coal based power generation (minus the coal mining)

1. Total external costs of coal mining from coal mine development to coal washing

The total external cost of coal mining (including coal washing) is estimated to be Rs 246/tonne under the assumption that PAF receive the maximum compensation as estimated from the data of EMPs of select coalmines in Talcher coalfields (refer section on 'Estimation of Social Costs'). Out of this total external cost arising from coal mining, an amount of is Rs 126.49/ tonne is compensated, while the non-compensated component is Rs 119/tonne. This amount does not include health costs of coal mining as we were unable to obtain the relevant data to estimate these costs.

2. Total external cost of power generation from coal transportation to coal combustion

The total external cost of power generation from coal transportation to coal mining is estimated to be Rs 0.90/kWh. Out of this, the compensated external costs amounts to Rs 0.15/kWh, while the remaining Rs 0.75/kWh is not compensated. This does not include carbon emission cost and cost of rehabilitation.

The total external damage costs of coal mining and use across life cycle amounts to Rs 1544/tonne (i.e. Rs 1.07/kWh[1]) of coal mined when we consider the maximum R&R expenditure estimated from the EMPs. The total compensated and the uncompensated amounts are Rs 352/tonne (i.e. Rs 0.25/kWh) and Rs 1192/tonne (Rs 0.83/kWh) respectively. Table 1 summarizes these estimates.

Table 1 Total external damage cost (using compensation to PAF based on EMP data)

	Total		**Cost compensated**		**Cost uncompensated**	
	Rs/tonne	Rs/kWh	Rs/tonne	Rs/kWh	Rs/tonne	Rs/kWh
External damage costs due to coal combustion in thermal power plants	1299	0.90	226	0.16	1072	0.75
External damage costs due to coal mining	245	0.17	126	0.09	119	0.08
Total external damage costs	1544	1.07	352	0.25	1192	0.83

Note: Some numbers may not tally in summation due to the rounding of decimal places

Administrative systems

Various institutions and levels of approvals exist for coal mining. Even though coal is a union subject, the State government departments are very much involved in the decision making process of coal mining clearances. The biggest role played by State government departments is in the clearances for all conjunctive resources used by the coal and TPP

[1]The specific coal consumption is assumed to be 0.69 kg per kWh of electricity and has been used for all the conversions

sector. The administrative and clearance procedures have an important role in the complete life cycle of coal mining and the goods and services that are produced thereof.

The payments made by proponents towards these procedures are mainly processing fees in the form of application fees, permit fees, consent fees or renewal fees. Beyond these processing fees, there are deposits to ensure that the proponent will undertake his/her environmental and social responsibilities after the prospecting or mining activity is completed; there are payments for the use of resources such as water cess and for development of relevant infrastructure (common corridors) in the form of development charges. These establishment contingency charges are meant to cover the costs incurred during the process such as land acquisition from private owners. Beyond these charges, all costs incurred by the state government departments are met by their budget allocations under plan and non-plan heads for their functions. The expenditures reported by the departments are not demarcated based on the sector it is spent on but on the function that is performed.

The charges for administrative processes are separate from compensation that is made to the state for the resource that is extracted and the payments made towards compensatory activities for reducing externalities that are created as a result of the mining activity.

The administrative costs of approvals and oversight of coal mining are difficult to estimate. From our limited exercise, it amounts to Rs. 1/tonne of coal mined. Coal mining involves considerable expense on security. Providing security is shared between CIL, CISF and the state police. Discussions with Coal India suggest the security cost for the company alone are around Rs 40 per tonne.

Legal framework

Under the Constitution of India, the Centre has jurisdiction over regulation of mines and mineral development. At the same time States are also empowered to legislate on regulation and development of mines and mineral development, but subject to the powers of the Centre. With respect to major minerals, states have little powers except possession, receiving royalty and few other payments for major minerals. A mining lease is granted by the state but in doing so the state is governed by the conditions and procedure as laid down by the Mines and Mineral Development and Regulation Act (MMDRA) and Mineral Concession Rules (MCR) 1960. States' rights are even more limited in terms of coal, where the Ministry of Coal (MoC) allocates coal blocks and the States assess mining lease applications based on the criteria established by and approvals granted by the Ministry of Coal, Government of India. States have the power to levy a tax on mineral rights but exercise of this power has to be in conformity with the MMDRA.

Since electricity is a concurrent subject under the Constitution of India, both the Centre and the States have the jurisdiction to legislate on electricity. Along with the general concurrent powers on electricity, States have the explicit power to levy a tax on sale or consumption of electricity. However, they do not have the competence to impose any tax on generation of electricity, as generation amounting to production falls under the purview of the Centre. The two most important provisions vis-à-vis export of electricity to other consuming states are Article 286 and entry 92A of List I. The former prohibits States from levying taxes on purchase or sale of goods outside their territory and the latter declares taxation on inter-state

sale of goods as a subject matter for the Union. Thus, States are only allowed to tax consumption or sale of electricity which is completed within the boundaries of the State.

States have introduced several payments for electricity, coal mining and externalities from time to time. In case of coal or minerals, levies have often been struck down by the courts as infringing upon MMDRA. In case of electricity, legislation and subordinate legislation of several States have provided for electricity duty, cesses, and concessional power. There are also instances of state level levies for addressing environmental externalities.

Resettlement and rehabilitation policies

Several states, such as Andhra Pradesh, Odisha, Jharkhand, have their own policies to address social externalities such as resettlement and rehabilitation. Some policies incorporate provisions for including project affected people in the project benefit stream. Coal India Limited has revised its R&R Policy in 2012 to 'cultivate and maintain' good relationship with project affected people. The CIL and NTPC R & R policies also overlap significantly with those of the Centre and the States. It is a common complaint by CIL and its subsidiaries that the differing policies across states slow it down greatly in its purposes.

R & R policies do not capture the various dimensions of the value of land. They treat land simply as transactable property, which is a fallacy. Firstly, land serves as a source of livelihood and the centre of the social existence of the family. Second, the location of land in relation to non-privately-owned common property resources such as forests, pastures and water sources imbues it with value. Third, the re-location of a large number of land-owners affects a significant number of land-less individuals, especially those who provide services to the populations displaced. The amount of compensation *legally* due to a land-owner under eminent domain legislation, therefore, simply addresses the beginning of the loss caused by the involuntary acquisition of land.

Limited as the R&R policies are, following them would be the minimum expected of a land acquiring entity. Yet, the benefits supposedly guaranteed by these policies often never materialize. The move to make R & R policies part of the law is a welcome move. However, the new Land Acquisition and Relief Rehabilitation (LARR) Act suffers from the same inadequacies as its policy predecessors. It assumes that the best way to further public interest is in the assertion of 'eminent domain'. It is positive, however, in that the issue of resettlement and rehabilitation are finally being addressed through legislative proposals rather than simply policies. It is still to be seen to what extent would the new R&R provisions as laid out under the LARR Act apply to coal bearing land.

Demands of states for free/preferential power

Coal bearing states are burdened by a number of coal externalities which are increasing on account of power generation plants being set up in the states. From the field discussions, it emerged that Odisha would like the Centre to have a policy framework for preferential power so as to give the state legal right to enforce even the existing provision. While Odisha links the demand for free power to that given to host states in case of hydro power, the percentage of free power demanded is greater at 25% as in the state's opinion externalities from coal are continuous rather than one time impacts as in the case of hydro power.

Jharkhand wants to be compensated not only for power produced in their state but also for the coal that is transported outside the state. Coal being transported to other states, and the associated washing, leads to severe environmental stress in the host state. Therefore, states want to levy a charge on coal being transported to other states.

Coal bearing states have already negotiated preferential treatment in case of some of the large power projects of NTPC and the UMPPs. In case of NTPC, while earlier plants provided about 20-25% share to host states, under a new agreement of 2011, host states will be getting a larger share of 50%. Similarly the existing/proposed UMPPs provide significantly greater share to the host state as compared to other states. For the new proposed UMPPs, Odisha is demanding an even greater share of 50% power. However in these above cases, the tariff (both variable and fixed) as determined by CERC or through competitive bidding, as the case may be, will apply. This provision ensures that the host state will have right to access certain amount of power on a preferential basis but do not provide any tariff rebates.

In case of Independent Power Projects (IPPs), states like Odisha, Jharkhand, and Madhya Pradesh are demanding 10-12% power at variable cost and a cess on power exported to other states. In addition, some states like Jharkhand are demanding right to refusal for part of the power production by IPPs. Some states have built this provision of concessional power into their energy or investment policy. Most states, have posed these conditionalities in the MoUs they have signed with power developers in which the state has assured assistance to developers in land acquisition, provision of water, maintenance of law and order and facilitating coal linkage in return for concessional power. As these IPPs come on stream, the states are also demanding their share and so far the provisions have not been contested. The demand of states from the centre is for free power and Odisha has specifically demanded 25% free power from coal based stations and 33% free power from washery rejects coal based thermal stations. In addition, states demand a cess on power exported to other states or a tax on power generated. Many of the coal bearing states are indeed considering free power as a source of additional revenue for the state exchequer.

Free power: Legal perspective

In TERI's view, at present, the state's demand for free power from thermal power stations has no statutory basis. These are provisions that have found their way in the policy documents of states. In some states, free power or power at variable cost is one of the conditions in the Memorandum of Understanding (MoU) signed with the power developers. Thus, it is being introduced as not a statutory obligation or a fiscal measure, but a contractual arrangement between the parties' involved – State government and the power developer. As long as the States seek power at variable cost or free of cost from all the power plants, it is justifiable. However, any policy that mandates free power from only those plants that are selling/exporting power to other states can be challenged in the court of law as imposing restrictions on freedom of trade, commerce or intercourse among states.

Impact on tariffs of demands for free/concessional power

The study examined the impact on tariffs of free/concessional power given by developers to the host states. An analysis carried out for a 500 MW coal based power station shows that 12% free power will raise the levelised base tariff of Rs 3.39 by 52 paise or 15%. If power is

provided to host state at variable cost, levelised tariff will rise by 24 paise or 7%. If free power is provided in a staggered manner @6 per cent in the first 15 years and @18 per cent in the remaining 15 years, the tariff will rise by 25 paise or 7%. If free power is provided only once the major loan commitments have been met @20% for the last 18 years, tariff will rise at least by around 15 paise or 5%. The NPV of the revenue stream available to the state government for each option is also estimated. The results are given in Box 1 below.

Box 1 Impact of free/variable cost power on levelised tariff

	Levelised VC (Rs/kWh)	Levelised FC (Rs/kWh)	Levelised Tariff (Rs/kWh)	% change in tariff from base case	NPV of Government revenue (Rs.Cr)
Base Case	1.62	1.77	3.39		
12 %Free Power to state	1.87	2.05	3.92	15%	1242
12% power at Variable Cost to state	1.62	2.01	3.63	7%	613
12% free power staggered (i.e. 20% free power for 18 years)	1.72	1.83	3.55	5%	580
12% free power staggered (6% for first 15 years followed by 18% for subsequent 15 years)	1.74	1.90	3.64	7%	807

The above analysis shows the impact on generation tariff. Increasingly, as distribution companies invite power from developers through competitive bidding, supply and demand situation will determine to what extent the developer will be able to pass on the burden to the consumers. The developer will get into different long and short term arrangements to get maximum return on investment. It may be that the developer may pass on the entire burden to the consumer. It is also possible that the burden may be shared between the consumer and the developer.

States are looking at short term arrangements for utilizing this free or concessional power. Discussions brought out that Odisha, for instance, would either use this concessional power for its own consumption in years when hydro generation is low, or sell it through short term contracts. In recent months, however the prices of power sold through energy exchange have come down, with financially stressed Discoms preferring to load-shed rather than buy power in the market. There is newspaper reports that suggest that Chhattisgarh is no longer interested in buying the power committed to it by IPPs (as right of first refusal) as it is no longer profitable for the state.

Compensation and benefit sharing

Compensation has two connotations: (i) remuneration and other benefits received in return for services rendered and (ii) payment of damages by a person who has caused an injury. This meaning thus involves the prerequisite of either a service or an injury or a loss. (TERI, 2007).The prime basis for any payment for the use of resources could be that due to exploitation, the resources become exhausted and its owners must be compensated for either

the actual loss or the opportunity cost or both. Certain externalities vis-à-vis environmental degradation, loss of forest cover, adverse public health, large scale displacement, loss of livelihood are created as a result of development or exploitation of resources.

A key issue to note is that compensation for environmental and social impacts is not part of sharing in resource wealth or benefits and should not be considered as such. This tendency to conflate the two is responsible for a considerable amount of lack of clarity on this issue. Negative environmental and social impacts are part of costs of the economic activity and need to be reflected as such. Compensation for such impacts is important for economic, ethical, fiscal and political reasons. In attention to some of these concerns that relate to a "using of the resources for the benefit of the other" or "cost-shifting which is not reflected in prices" create a sense of environmental and social injustice, and could result in a conflict of interests between the local, state, and national levels, also between the people of the states (TERI, 2007). Negative externalities associated with coal development suggest that compensation arrangements need to address both horizontal and vertical inequities.

To compensate for externalities arising out of coal mining and coal based thermal power generation, the study has examined different options – tax, cess, and free power.

Study recommendations

The study has the following recommendations to make with regard to the sharing of benefits and burdens based on the findings, but also to improve outcomes in the coal rich states

Recommendation 1: On shares of the power produced through free or preferential power

- We do not recommend the use of free power to cover negative externalities .Demand for free power can have different implications for power deficit and power surplus states. Current developments in the power sector suggest that payment in kind, i.e. free power, may become an unpredictable source of revenue and so is not suitable as a funding source to address environmental damage.
- The demand for free power from thermal power stations does not emanate from a statute and are more in the nature of contractual arrangements to be negotiated between the power producer and the host state for facilitation of such projects
- As long as the States seek power at variable cost or free of cost from all the power plants, it is justifiable. However, any policy that mandates free power from only those plants that are selling power to other states can be challenged in the court of law as imposing restrictions on freedom of trade, commerce or intercourse among states.

Recommendation 2: More equitable benefit sharing

- We suggest that the proceeds from the sale of free or concessional power, where agreed upon by the host state and the power producer, should be used for general purposes as a means of sharing benefits with host states. We also suggest that this benefit sharing should flow down to the local community. Local community should be able to enjoy the benefits from these projects at least as much as any other region. Prayas, 2012 suggests that around 4-5% of the power produced should be set aside for local communities. There should be a similar process of benefit sharing with local community in case of coal production. The Mines and Minerals (Development and Regulation) Bill 2011 addresses this concern. It provides for 26% of profits of coal mines to go to a District Mineral Foundation[2], part of which would be used to make recurring payments to affected people. We suggest that this provision should be enacted at the earliest
- States need to ensure that part of the enhanced royalty collected is earmarked for development of human capital in the mineral area The case for the earmarking funds for development of human capital in the mining region is to convert natural capital that is used up in the form of minerals to human capital, thereby operationalizing the weak sustainability principle.
- There is need for setting up an intergenerational fund to share the benefits of this depleting resource with future generations.(TERI, 2007)
- As recommended in TERI, 2007 and Prayas, 2012 all efforts should be made to ensure that local people and communities whose lives are disrupted by the coal mining at various phases of their life cycle should be prime beneficiaries of resource development. Where local people have no access to electricity, this can involve provision of cheap or free power to the local community from the electricity produced.

Recommendation 3: Burden sharing from coal mining and power production

Payments to resource rich states and to people in the region should serve three primary goals, viz, compensation for externalities, correction for distributional injustice, and deterrence or incentives for improved environmental behaviour. (Kathleen, 2002)

- The most attractive legal and administrative route to address existing impacts is to have a Union imposed, but state collected cess associated with damage costs of impacts of coal mining or per unit electricity generated.
- We suggest a two part cess linked to (i) uncompensated environmental and social impacts of coal mining levied by the Central government on coal produced in states and (ii) an environmental and social cess levied by the Centre on electricity generation in a state for uncompensated impacts of coal power generation based in states. In our estimates the cess on coal mining to be imposed on coal comes to Rs 119 per tonne of coal and cess on coal based power generation to be imposed on TPP

[2] There are now discussions to provide amount equivalent to royalty for the Foundation as is the case for other minerals.

comes to Rs 0.75 per unit of electricity. If a single cess is levied linked to total damages, then this will amount to Rs 0.83 /kWh.

- This cess should replace any other existing similar cesses imposed on coal or coal based power production for mitigating environmental impacts
- The proceeds from this cess need to be earmarked for environmental and social remediation as detailed in the subsequent recommendation.
- We recognize that to avoid future impacts, stricter environmental standards and even stricter monitoring and compliance is required. The objective ultimately is a lower environmental and social footprint of coal mining and power generation. Any levy cannot be a substitute for a strong enforcement of the laws and rules.
- In order to incentivise improved environmental and social performance, a rebate on cess can be announced after a period of 2 years from the introduction of the cess for those whose environmental and social performance show improvement, and who goes beyond compliance.
- We also recognize that a
    - Cess should not be seen a means for companies to avoid being more environmental and social responsible.
    - A Cess is suggested only as a short term means to compensate for the existing impacts and to work towards a stricter regime and to drive research in cleaner technologies and practices.
    - The Cess can be withdrawn when the situation improves or a rebate on cess can be allowed to incentivise companies that are going beyond compliance.
    - Companies impose different levels of stress as a result of their activities and should, therefore, be treated differently. Rebates can be imposed for lesser polluting companies once a baseline is established on the current levels of emissions, etc. or those producers that use cleaner technologies.

The cess on coal and power generation will have fiscal and equity implications. The cess levied by the Centre may:

- Be passed on in full to power consumers, and hence to the state/s where power is consumed. Cost of power will increase across the country.
- Be passed on in part to the consumer. For example, the cess on coal mining can be absorbed by CIL and thus by the Centre. Or the state governments may reduce the rates of electricity duty on consumption of electricity in order to reduce the burden on the end consumers.
- In a cost plus scenario, it is easier to keep a check on the extent to which the cess is passed on to the consumer. In a competitive bidding scenario, it is more difficult to ensure that thermal power producers do not pass on the entire cess amount to the consumers.

Since richer states and richer consumers in all states also consume more power than the poorer states and poor people in general, there is also an element of interstate and interpersonal inequity in the current situation, as the coal rich states are poorer than most

states and also many of the districts where the coal is located are particularly poor and without access to basic amenities and services. The people impacted most by coal mining and power generation are also those living in these districts. A cess that is imposed, collected and utilized to address these inequities will result in greater fairness across states and their people.

Recommendation 4: Setting up a coal environmental and social remediation fund/ thermal power plant environment and social impacts mitigation fund

Our policy suggestions call for an approach to burden sharing that goes beyond interstate transactions, but which also includes local communities and areas. To do this we suggest the setting up of Funds to address the needs of impacted people

We recommend the setting up of Fund/Funds with clear allocation rules or guidelines for the use of funds obtained from the cess imposed on coal and power production. The money from the cess collected should go into a state level Fund/Funds. The design of the Fund should reflect objectives and the purpose for which it is being set up. The key objective of this Fund will be the redressal of past environmental problems and social displacement arising from coal mining activity, and to assist future mining to be conducted in an environmentally safe and socially acceptable manner even as it contributes to economic growth, job generation and local development in the state. It is important to be clear what the cess money can be used for and what it should not be used for.

The Fund money should not be used for the following:

- Afforestation, as CAMPA already covers that
- In preventive and remedial activities of coal and power companies that they are legally expected to address
- Activities covered under the Clean Energy Cess on Coal

Fund utilization

"Because suffering is localized, compensation also needs to be localized" this was the message from the coal rich states. The amount collected in the proposed Funds has to be used to address uncompensated environmental and social externalities arising out of coal mining and coal based power generation. It aims at improving the lives of local people affected by impacts of coal mining and power production.

The cess is not a substitute for enforcement of existing rules and compliance with the norms in place. The cess would complement the current regime of approvals, monitoring and compliance. It would support activities to mitigate externalities associated with coal mining and coal based thermal power generation, and distributes the burden and benefits more equitably. More specifically, the fund can/should support the following:

- Remediate cumulative environmental damages in the coal mining regions.
- Support efforts to reduce the coal dust problem
- Support efforts to improve quality of water bodies
- Support efforts at dump management

- Support programmes for the rehabilitation of abandoned mine sites. Creative models exist internationally to convert closed mines to productive economic assets or some other appropriate after mine use options. This should be standard procedure for all mines.
- Clean up of all critically polluted areas. This can be done with research institutes, NGOs, etc. in the region
- Encourage continual monitoring and improvement in environmental management and reduced social footprint through creation of platforms involving developer, states and local people
- Promote research, education, training and the exchange of information on environmental management, science and technology issues related to coal mining and power production
- Promote exchange of best practices in mining and thermal power generation
- Recognise environmental excellence through awards, both at an individual and corporate level, but also of well-run coal districts.
- Provide directly or support expertise to the mining industry to carry out competent EIAs
- Set up a cell in each taluk of the coal mining region to address R & R issues and also monitor PAP in all, but especially, R & R hot spots
    - Set up ways to assist rehabilitated families to manage the compensation money received
    - Develop educational initiatives, support balwadis, women's education
    - Support local initiatives at enhancing local capacity and skills, training centres
    - Support/ contribute to other programmes that promote community development in the locality or region
- A special concern in all coal mining areas which is often not sufficiently addressed is the health of communities (other than coal mine workers) living in the region. While clearly improved oversight and enforcement of environmental laws and rules is necessary, there should be mechanisms in place to ensure that mining communities have access to medical insurance and well-functioning facilities for treatment in case they are affected. Companies and the state government can jointly support the medical care.
- Strengthen institutions of oversight such as SPCBs, departments of mines, environment, land revenues, etc., though investment in human capacity locally to monitor environmental and social issues.

Staffing

The Fund should have Core staff consisting of:

- A paid Director; two senior professionals with environmental and social backgrounds; a research associate, administrative support

- The oversight should be provided by a Board or Committee with multi stakeholder governance, comprising 8 members:
    - 2 State Government Representatives; 2 Local community Representatives; CIL representative; Representative of Publicly owned TPPS (NTPC/ DVC/ state generation companies); Representative of IPP; Representative of key research institute in the state

Recommendation 5: Improved environmental and coal governance is a must to reduce ecological and social stress in coal rich states

- The MOEF, the MOC and the State bodies need to strengthen institutional coordination before giving mining and environmental clearances.
    - Government departments should also give clearances in time wherever such applications have been filed in compliance with all laws etc. Delays in obtaining genuine clearances also mask the regular v/s irregular operators.
    - The Government should make available all the documents pertaining to the proposed coal mining to concerned stakeholders and villagers affected by the mining operation well in advance.
    - Free prior and informed consent is key to improving social acceptability of projects
- Proactive disclosure of information in connection with RTI;
    - Spatial data bases should be created.
    - The websites of the all concerned government departments that regulate coal mining and power production in the States should be uploaded regularly, at least once in 6 months.
- Effective implementation of EPA, FCA, PESA and other acts that will improve actual functioning on the ground
- Clearly there is a need for far stricter monitoring of power plants and mines for emissions and other environmental impacts.
    - A multi-stakeholder committee, such as suggested by Prayas, 2012 could be set up including independent experts, representatives of the SPCB, local self-government institutions and citizens.
    - Need of capacity and resources for monitoring impacts;
    - Strengthen local panchayat capacity in environmental governance; Empower local panchayats in mining regions financially by sharing royalty with them
    - No mine or power producer should be allowed to continue operations if environmental rules and social obligations are flouted;
    - Recognize and incentivise good corporate behaviour
    - Local people should be involved in monitoring and reporting any illegalities so as to correct in time.
    - Social audits & participatory monitoring of impacts should be encouraged

- Natural resource and environmental accounts for the coal sector should be developed

Recommendation 6: Reduce social and ecological stress by keeping within carrying capacity of the region

- Cumulative impact studies and carrying capacity studies need to be carried out given the large volume of mining and planned power capacity expansion
  - Such studies are especially required in ecologically sensitive river basins
  - The existing conditions found in particular areas as obtained through the CEPI should be paramount in decision making for opening new mines or locating new plants
- Reduce environmental footprint through use of green technologies and improved practices
- Pricing of water and land right to ensure more efficient resource use in coal development and power generation
- There is need of a detailed study to examine the impacts of coal mining on surface water and ground water in the region

Recommendation 7: Improving health in coal mining regions

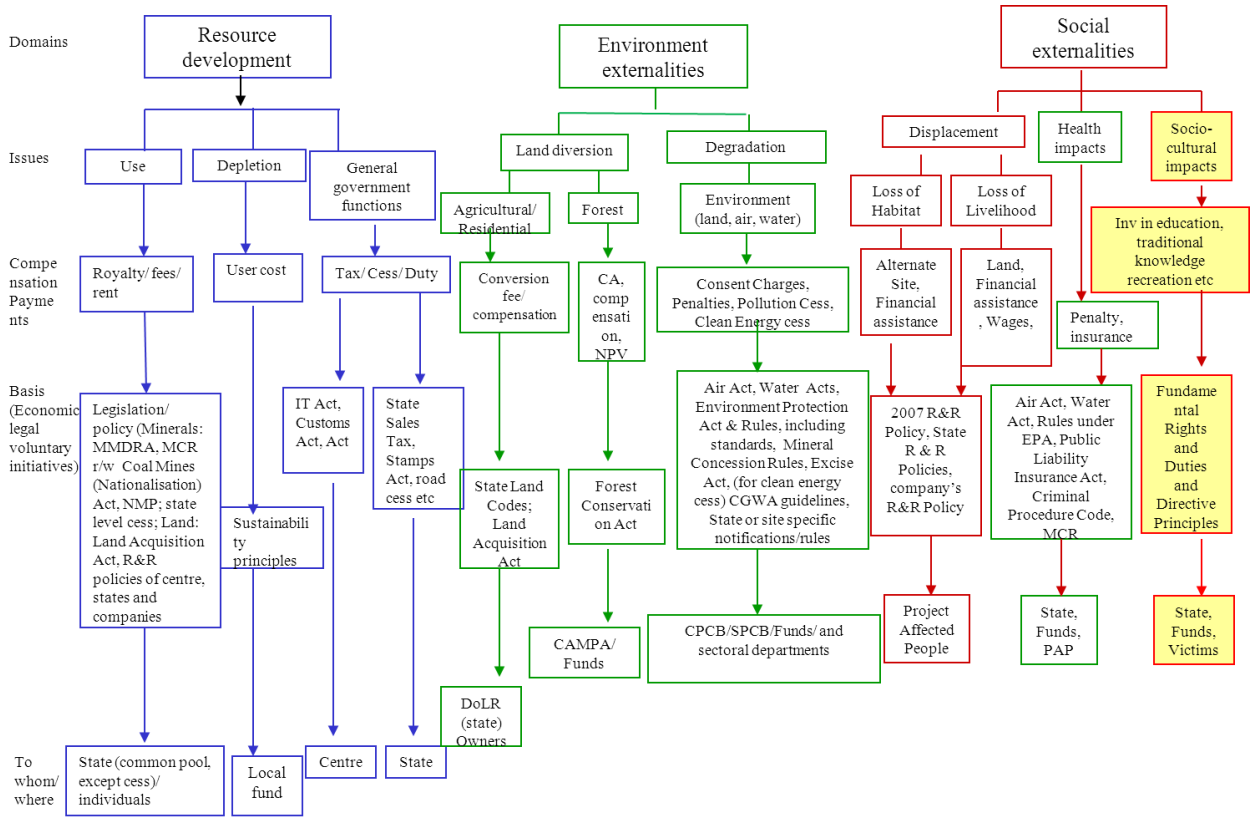
- Improve surveillance and monitoring of diseases and disorders in the mining regions in the states
- Get coal mining and power industry to partner with Panchayats and primary health centres to provide both diagnostics and treatments that are industry linked
- Reduce air pollution in road and freight corridors. Greater control of sulphur dioxide as a pollutant is required.
- More careful assessment of health risks of arsenic and radioactivity in fly ash is required to ensure more informed decisions on fly ash utilization.
- Set up hospitals with speciality facilities on coal related diseases and mechanisms in place to ensure that local communities have access to medical insurance and well-functioning facilities for treatment in case of ill health due to degraded environment

1. Introduction

Background

As the country moves towards an all India market for power with open access and increasing participation of merchant power plants, not only coal but also power is being transported out of resource rich states and being consumed in other states. The states selling power in their state get remunerated from the revenue of sale of electricity and electricity duty. The coal bearing states, however, complain of nominal revenues and limited employment opportunities. In case of power generation, besides coal, other natural resources such as land and water also get utilised in the host states. In addition, these resource rich states bear the additional burden of mitigating the externalities of coal mining and power generation, as well as the administrative costs involved in the entire process of coal mining and power generation. Coal bearing states have repeatedly aired their concerns about the externalities they face in connection with coal mining and power generation. In the case of coal bearing areas, royalty and in some cases, cess is considered to be compensation to states. For many years, and especially since coal prices started rising in 2004, the issue for coal rich states was the payment of royalty at ad valorem instead of specific rates. When coal prices were rising, maintaining specific rates meant that coal producing states were not benefitting from rising revenues. In 2012, coal royalty was moved to ad valorem rates, but after considerable policy negotiation. The Cabinet Committee for Economic Affairs approved the switch from unit-based to ad valorem rates (eg. 14 % of pit-head value of coal) of royalty on coal and lignite, which would ensure that revenues accruing to coal-bearing states would better reflect the market value of the mined coal. At current prices, this means a significant increase in coal royalty revenue for these states.

Royalty, however, is payment for the use of the resource, and if appropriately charged, can reflect depletion costs. But there are other externalities associated with coal mining that are not captured by royalty payments and which have been demanded by states. In 2006, TERI was asked by the Inter State Council to undertake a study to examine compensation issues being demanded by coal rich states. In that context, TERI prepared a comprehensive listing of main externalities associated with coal development, the existing framework for compensation, and also the externalities for which currently no compensation mechanism exists. (Figure 1) This framework was updated to reflect current developments and new understanding. The adequacy or suitability of the compensation payments is a separate issue. The social cultural impacts are highlighted to indicate that no compensation mechanism really exists for this type of externality.



Source: updated from TERI, 2007.

Figure 1 Framework for compensation of externalities from coal development

The dissatisfaction with existing payments has lead states to make demands for a greater compensation for the externalities they suffer in mining the coal that is used in the production of power that benefits other states. In May 2011, the Chief Minister of Odisha raised these issues in his speech at the Regional Consultations to Finalize an Approach to the Twelfth Five Year Plan.[3] While acknowledging that "... for Odisha and other mineral bearing states, mining and related industrial activities are very important", he also highlighted that "...these activities impose significant economic, environmental and social costs in terms of displacement of people on account of land acquisition, loss of their livelihoods and mounting pollution problems." He clearly identified the central concern – "[w]here as power and coal consuming states benefit because of low costs of coal and power, revenues from electricity duty on consumption and revenue from sales of surplus power, the host states like Odisha bear most of [the] economic, environmental and social costs." In October of 2011, Asim Dasgupta, the former Finance Minister of West Bengal advised the incumbent Chief Minister to demand the Rs. 5000 crore in coal royalty that he believes the Central

[3] A transcript of the speech is available on the website OdishaDiary.com at http://odishadiary.com/CurrentNews.asp?id=26974.

Government owes Bengal for coal mined since 1991.[4] In August 2012, Jharkhand's Chief Minister Arjun Munda said the coal reserves of the state were both a "boon and a bane". [5]

Another demand that has been made is the demand for "free power". This is a relatively recent position taken by coal-bearing states that draws from the National Policy for Hydro Power Development. The Chief Minister of Chhattisgarh, for example, has urged that this policy should be extended to coal-bearing states as well. The Government of Odisha seeks to advocate a demand of as much as thirty three percent free power in an Eastern Zonal Council meet. In fact, the Odisha government provides for preferential treatment to the state with respect to energy generated from the power plants based in the state.

With regard to Concessional/preferential procurement of electricity by the host state, CERC in its advice to the Central Government has stated that it finds the provisions of such policies issued by state government as 'not consistent with the statutory Tariff Policy under the Electricity Act 2003'. In CERC's view concessional sale of power to host state would lead to increase in cost of electricity to distribution utilities of other states. It would also impact competition in the electricity market'.

The immediate rationale for this study emerges from these demands by coal bearing states, reiterated at a meeting held on August 8, 2012, convened by the Planning Commission to discuss issues relating to a policy initiative for equitable sharing of benefits arising from coal mining and power generation activities among states.

Coal rich States, despite their contribution to the country's GDP and energy security, lag behind the national average on key indicators related to income, life expectancy, literacy and access to basic services like health and drinking water. Coal produced in these States serves as an important input in meeting the energy demands of other States. However, the States feel that the benefits and burden that accrue out of coal mining are not distributed equitably. According to these States, they bear all the negative environmental and social externalities associated with coal mining but are left out of the benefits. The mandatory washing of coal for transport to states, further aggravates the externalities in the host state while the receiving state benefits from cleaner power. Externalities on account of coal washing are becoming a major concern with host states.

Coal rich states contend that the current mechanism for sharing of benefits arising out of coal mining and power generation does not take into account adequately the costs incurred by them for these externalities and the administrative costs of facilitating various clearances for coal mining. The TERI framework for compensation in Figure 1 also shows that there are certain gaps in the current compensation regime.

The overall legal and regulatory regime for compensation in the form of various payments for coal and electricity is discussed in Chapter 7. The main benefit to which the coal bearing States are entitled by law is in the form of royalty and a few other payments on coal. Unlike other minerals, coal bearing lands are acquired by the Centre and deprive States of surface rent. In terms of electricity, States are only allowed to tax consumption or sale of electricity which is completed within the boundaries of the State. Thus their primary source of revenue

[4] "Demand coal royalty from Centre, Left's Asim tells Govt." (Indian Express: October 25, 2011). Retrieved from http://www.indianexpress.com/news/demand-coal-royalty-from-centre-left-s-asim-tells-govt/865093.
[5] "Coal Royalty Gets State 5834 Crore in Five Years" (Jharkhand State News: August 14, 2012) Retrieved from http://www.jharkhandstatenews.com/coal-royalty-gets-jharkhand-rs-5834-crore-in-five-years/

from electricity is Electricity Duty on consumption. States have introduced several payments for electricity, coal mining and externalities from time to time. In case of coal or minerals, levies have often been struck down by the courts as infringing upon the MMDR Act. In case of electricity, legislation, subordinate legislation and policies of several States have provided for electricity duty, cesses, and concessional power. In recent times, there have been instances of state level levies for addressing environmental externalities.

Objectives of this study

To study the various issues involved in the equitable sharing of benefits arising from coal mining and power generation in resource rich states and propose recommendations for equitable sharing of benefits between resource rich host states and consuming states.

Terms of reference

The Terms of Reference as specified in Annexure 1 of study sanction letter M-12026/5/2007 – Coal dated 5th March 2013 are listed here with:

I. Realistic assessment of the negative impact of coal mining on land acquisition, land re-use, rehabilitation & resettlement, environmental and ecological degradation, physical infrastructure in the resource rich host state. This assessment will be based on previous research studies for some of these aspects.

II. Expenditure on Administrative machinery of the host state to process the approvals and address the negative impacts of coal mining as stated in point (1).

III. Impact of agreeing to the states proposal for either certain percentage of free power from the coal based power plant located in host state similar to the benefits given for hydro power plant or supply of certain percentage of electricity at variable cost.

IV. Impact of agreeing to the states demand for first right of refusal for supply of certain percentage of electricity from such plants.

V. Provisions in the present legal and regulatory framework for imposition of tax or duties for the electricity generated in host state primarily for export to consuming states and recommend suitable amendments, if such provisions are not there

VI. Similarly provisions in the present legal and regulatory framework to impose tax or duties on mining activities beside royalty by the Central Government for mitigation measures to address the environmental degradation in the resource rich states.

VII. Mechanism for sharing of such taxes and duties between Central Government, resources rich states and consuming states

Approach and methodology

A. The problem

Broadly, there are two sectors involved in this study – coal and electricity. There is a significant body of research which supports the conclusion that coal-bearing states have

been bearing a number of externalities that have not been sufficiently compensated. (TERI, 2007). The complaint of coal-bearing states is that part of the revenues accruing from electricity consumed in other states should rightfully be theirs, since it is generated using their coal and imposes costs on their natural and human resources.[6] The central issue, however, is not about sharing of revenues from electricity consumed, but about being compensated for the externalities caused by coal production. The essential policy question here is this – how are coal-bearing states compensated for the externalities from coal mining and those from electricity production?

B. Research questions

Some of the key questions that emerge to address the ToR are as follows:

- What is a realistic assessment that we can arrive at of selected impacts of coal mining - land acquisition, land re-use, rehabilitation & resettlement, environmental and ecological degradation, physical infrastructure?
- To what extent are the states already compensated for these externalities through existing rules and regulations, both national and state specific?
- What are the aspects of externalities that are not addressed?
- What are the additional administrative costs incurred by the state in terms of approvals and addressing the negative impacts? Are administrative costs of approvals not covered by existing fees, etc.?
- What are the existing provisions for 'free power' or concessions to host state from power generation and what are concerns/implications for power consuming states?
- What will be the impact of the following demands/proposals by host states on average cost of power generation and state revenues:
    - Share of a certain percentage of free power from the coal based power plant located in host state or
    - Supply of certain percentage of electricity at variable cost.
    - First right of refusal for supply of certain percentage of electricity from such plants.
- To what extent do these demands have a legal justification?
- What legal and policy avenues are available to coal-bearing states to be compensated?

C. Methodology

Given that this was a short term, 6 month study, original and extensive field based estimates of environment or social externalities were not undertaken.The research work relied heavily on the analysis of data and figures available through secondary sources. The analysis is also

[6] As outlined in their representations to the Power & Energy Division of the Planning Commission. Document M-12026/05/2007-Coal.

based on the data on air and water quality collected from State Pollution Control Boards of Jharkhand and Odisha. Inputs obtained through consultations with Department of Water, Department of Energy, Department of Mines, Department of Forests and Department of Revenue in the two states has also been incorporated in the analysis (A detailed report of the consultations at the state level is provided in Annex A).

An air modeling exercise was carried out to estimate district wise emissions from coal mines in case of Odisha. In 2011, TERI had conducted field surveys in Jharkhand to understand social impacts of coal mining activities.[7] The results of the field survey have also been incorporated in the report.

The following section lists out the research methodology used to address each task of the Terms of Reference.

ToR I

An assessment of the negative impacts of coal mining on land acquisition, land reuse, rehabilitation & resettlement, environmental and ecological degradation, physical infrastructure in four key coal rich states: Jharkhand, Odisha, Chhattisgarh and Madhya Pradesh (selected in consultation with the Planning Commission) was undertaken. While the TOR did not refer to social and environmental impacts of power production, it was felt that the argument for benefits and burden sharing from coal based power production would be incomplete, if these impacts were not considered. The assessment of impacts and costs followed a life cycle approach of coal mining and coal based electricity generation.

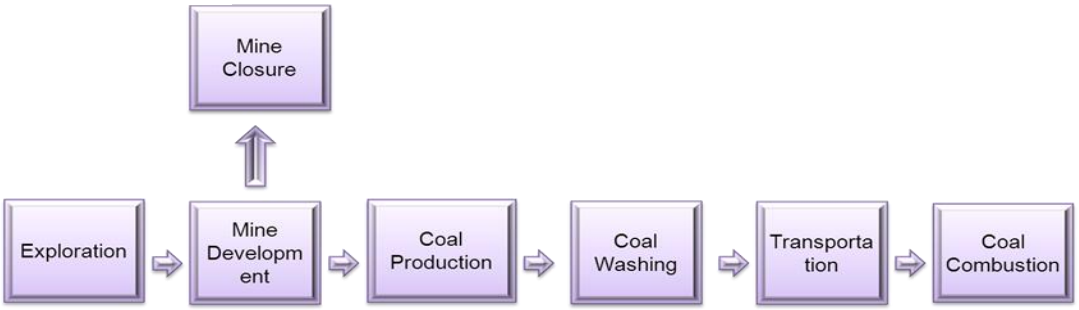
Comprehensive assessments of environmental and social externalities require the consideration of all stages of the life cycle of a product. In such a Life Cycle Assessment (LCA), there is a need to assess raw material inputs into the production process as well as conjunctive resources used, such as land, water, energy. In general, there are three phases – production, operation/use, and disposal. Figure 2 provides an illustration of the main stages of the life cycle of coal mining, and another of a coal based power plant. It is obvious that the life cycle of the latter includes the former, and they are separated here only for purposes of doing the impact assessments.

The assessment involved the following:

1. A review of the secondary literature on coal mining impacts in India and especially in the selected states – government reports, sectoral studies, etc.
2. An examination of the EMP and EIAs of selected mines in districts (those to which access was provided or found on the internet.)
3. Consultations with state government officials from State Pollution Control Boards, Department of Land and Revenue, Department of water, the mining company officials.
4. Estimation of emissions for coal mining and related health impacts in Odisha as a case-study

[7]Under the project titled "Responsible sovereignty and Energy Resources" supported by Konrad Adenauer Stiftung (KAS)(TERI 2011)

Coal mining



Coal based thermal power plant

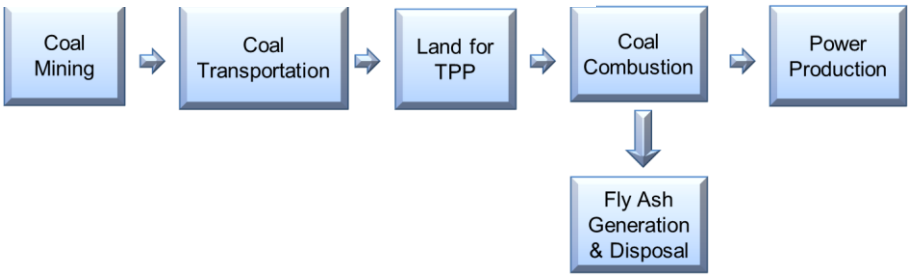


Figure 2 Life cycles of coal mining and coal based power production

ToR II

Expenditure on Administrative machinery of the host state to process the approvals and address the negative impacts of coal mining as stated in ToR I.

The approach to study the expenditure on administrative machinery were divided into two distinct heads of costs borne by the state governments -

A. The costs incurred by the host state during administrative procedures for approvals and clearances of coal mining in the state

B. The costs incurred by the host state to address the negative impacts of coal mining or negative externalities during the coal mining processes

To follow this approach, the study listed all the clearances undertaken by the state government for facilitating coal mining. This was followed by mapping the processes which the state administration goes through for coal mining clearances. This was done in consultation with state level officials involved in clearances and approvals.

Based on the findings of ToR I, the direct negative externalities arising from coal mining were listed along the different stages of the coal life cycle. After understanding the impacts of these externalities, the study assessed the actual expenditure related to some of these externalities– based on expenditure statements of government departments, but somewhat focused. Thus, for example, the study sought to assess the administrative costs of addressing the following:

- Forest land cleared (costs of addressing CAMPA requirements)

- Implementing and enforcement of R & R plans
- Ecological Rehabilitation
- Cleaning water impacted by mining
- Land remediation costs (if abandoned)
- Creation and maintenance of road infrastructure

ToR III & IV

- Impact of agreeing to the states proposal for either certain percentage of free power from the coal based power plant located in host state similar to the benefits given for hydro power plant or supply of certain percentage of electricity at variable cost.
- Impact of agreeing to the states demand for first right of refusal for supply of certain percentage of electricity from such plants

Methodology

Under this task, the impact of free power/power at variable cost/right of refusal on the cost of generation was examined. Scenarios were generated to examine the impact on state revenues from different % of free and variable cost power electricity. The methodology used includes:

1. Review of the existing state government policies or provisions providing for free power/right of refusal to state government and actual implementation of these policies. This was undertaken through literature review and interaction with concerned state departments and power utilities.
2. The impact of free/additional power through right of refusal (wherever applicable) was studied on the generation tariff of a hypothetical plant
3. Stakeholder interactions with project developers to understand issues of viability and other concerns on account of free power

ToR V

Present legal and regulatory framework for imposition of tax or duties for the electricity generated in host state primarily for export to consuming states (and recommend suitable amendments, if such provisions are not there)

Methodology

In this ToR, the legal and regulatory framework for various levies on electricity was studied to assess the extent to which a tax, duty or cess can be levied on electricity generated for consumption in other states. The methodology involved:

1. Review of Constitutional provisions, Acts, rules, policies at the level of Centre and identified states.
    a. An analysis was carried out of the abovementioned instruments in public domain and obtained through consultation with state departments.
    b. Rulings of the courts and regulatory commissions were reviewed, where applicable.

2. Based on the analysis above and findings from ToR III and IV, recommendations have been made with respect to the space that host states have as per the current regime to levy a charge on generation of electricity meant for consumption in other states.
    a. Examine the validity and feasibility (legal) of the demands made by states.

ToR VI

Present legal and regulatory framework to impose tax or duties on mining activities beside royalty by the Central Government for mitigation measures to address the environmental degradation in the resource rich states

Methodology

In this ToR, the legal and regulatory framework for various levies on mining of coal was studied to examine how different environmental externalities are compensated for to different entities, especially to the resource rich states. The methodology and approach is similar to the ToR on the legal and regulatory framework for electricity. It includes:

I. A review of Constitutional provisions, Acts, rules, policies at the level of Centre and identified states. Rulings of the Supreme Court, High Courts and the Green Tribunal will be reviewed, where applicable.

II. Mapping the legal space available to states to be compensated for environmental externalities caused by mining of coal and highlighting any gaps therein.

III. Examining the validity and feasibility (legal) of the demands made by resource rich states in the context of environmental degradation.

ToR VII

Mechanism for sharing of such taxes and duties between Central Government, resources rich states and consuming states

Methodology

Based on the analysis and findings from earlier tasks under TOR I to VI, and stakeholder discussions, a mechanism to share the compensation and its utilisation is proposed.

2. Coal rich states

Socio-economic profile

The study focuses on the following coal rich states: Chhattisgarh, Jharkhand, Odisha and Madhya Pradesh. They collectively account for 9.6% of India's GDP, 14% of its population and 30% of the total forest cover (see Table 2).

Table 2 Profile of the four selected states

	Odisha	Chhattisgarh	Jharkhand	Madhya Pradesh
Share in India's GDP %)[1]	2.5	1.6	1.7	3.8
Share in India's population (%) [2]	3.5	2.1	2.7	6
Share in India's forest cover -2011 (In %) [3]	7	8	3.3	11.2
Contribution of coal to states GDP (In %)[4]	3.8	4.9	16.1	3.6
Royalty from coal -2010 (Rs. in Crore)[5]	881	939.5	1152.4	1022.7

[1] Planning Commission, 2013
[2] http://www.census2011.co.in/states.php
[3] http://www.fsi.org.in/cover_2011/chapter2.pdf
[4] Planning Commission, 2013; IBM, 2012
[5] Lok Sabha Unstarred Question No. 1178, dated 01.03.2006; Lok Sabha Unstarred Question No. 3661, dated on 01.12.2010; Rajya Sabha Unstarred Question No. 782, dated on 08.08.2011, Indiastat

Though these states are resource rich, they lag behind the country on several key human development indicators. In 2009-10, 36 -48% of the population of these states was below the poverty line. They also do poorly in water and sanitation and in energy access. While a number of power plants are coming in these states, Odisha and Jharkhand still have a large part of their population with no electricity, below the poverty line and lacking in basic amenities. (see Table 3).

Table 3 Key socio-economic indicators

	Dependent on traditional biomass for cooking (firewood+crop residue+cowdung cake) (% HH)	Access to toilet (latrine within the premises) (%HH)	Access to drinking water (within and/or near the premises) (%HH)	Access to electricity (for lighting) (% HH)	BPL % (2009-10 by Tendulkar Methodology)
Chhattisgarh	85.4	24.6	73.5	75.3	48.7
Jharkhand	68.8	22.0	68.1	45.8	39.1
Madhya Pradesh	79.7	28.8	69.5	67.1	36.7
Odisha	84.6	22.0	64.6	43.0	37.0
India	65.9	46.9	82.4	67.3	29.8

Source: Planning Commission, 2013
Note: Except BPL figure all other figures correspond to Census 2011

Minerals and coal

The states are rich in minerals, especially coal, which forms an important base of economic activities. (Figure 3)

Coal is also an important source of revenue for these states. Since 2006, with the increased production rates, the payments from royalty have increased at a CAGR of about 10-12%in these states. In 2010, the total revenue from coal mining amounted to Rs. 1,152 crore in Jharkhand and Rs. 1,023 crore in Madhya Pradesh (Table 2). With a move to *ad valorem* rates since 2012, the fiscal position of the coal states should further improve considerably.

Table 4 Coal mines, reserves, production in Odisha, Chhattisgarh, Jharkhand, and Madhya Pradesh

	Odisha	Chhattisgarh	Jharkhand	Madhya Pradesh
Resources as on April 2011 (In million tonnes)	69159	49280	78936	23126
Reserves as on April 2011(In million tonnes	24492	12879	39761	8871
Share in total coal resources of India (In %)	24	17	28	8
Share in total coal production of India (In %)	19	21	21	13
Number of coal mines as on 31.3.2011	28	62	174	71
Open cast	17	21	72	21
Underground	11	40	75	48
Mixed	-	1	27	2
Major coalfields	Ib-valley & Talcher	Mand-Raigarh & Korba	Jharia & North Karanpura	Singrauli

Source: Data compiled from IBM, 2012

It is important to note that there is a considerable uncertainty about the coal reserves of the country because of the estimation and classification methodology. The earlier estimates were not based on the United Nations Framework Classification (UNFC) methodology. UNFC methodology for energy and mineral resources is a universally applicable scheme for classifying/evaluating energy and mineral reserves/resources. It was adopted in 2004 by the United Nations Economic Commission of Europe (UNECE).

Coal in the study states

Odisha

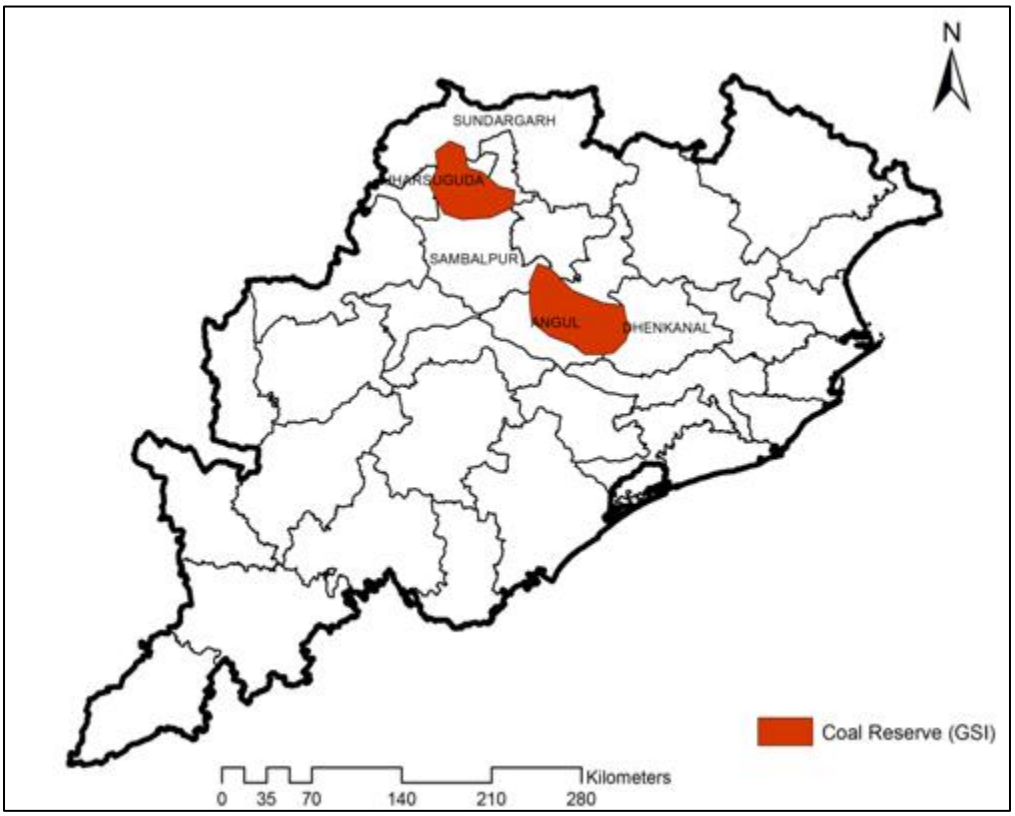


Figure 3 Major coal rich regions in Odisha

Odisha is rich in mineral deposits including coal, iron ore, bauxite, limestone and others. Out of this, coal accounted for 88% of the total mineral reserves in Odisha in 2011-12 (Economic Survey, 2013).

In Odisha, total resources of coal are estimated at 69159 million tonnes (as on April 2011). Out of this, 24492 million tonnes of resources are proved reserves, i.e. they can be economically extracted given the current technology and prices. The remaining resources are either indicated or inferred. Indicated resources are estimated at 33987 million tonnes, while the inferred are estimated at 10680 million tonnes (IBM, 2012). Odisha accounts for 24% of the total coal resources of India, and contributes to 19% of total coal production in India (ibid). The number of coal mines in Odisha as on 31.3.2011 is estimated at 28 comprising 17 opencast mines and 11 underground mines.

The major coal bearing areas in Odisha include Ib-valley and Talcher coalfield. Ib –valley spans the area of 1460 sq. km and constitutes districts such as Jharsuguda, Sundargarh, and Sambalpur. Talcher coalfield spans the area of 1813 sq. km and constitutes districts such as Angul and Sambalpur (Satapathy, 2006). The total coal bearing area in Odisha spreads over 7.6% of the total state area[8].As can be seen from Figure 3 Angul and Jharsuguda districts account for most of the coal reserves in Odisha.

[8] http://www.mcl.gov.in/Others/ecoalfields.php, last accessed on 4 June 2013

Chhattisgarh

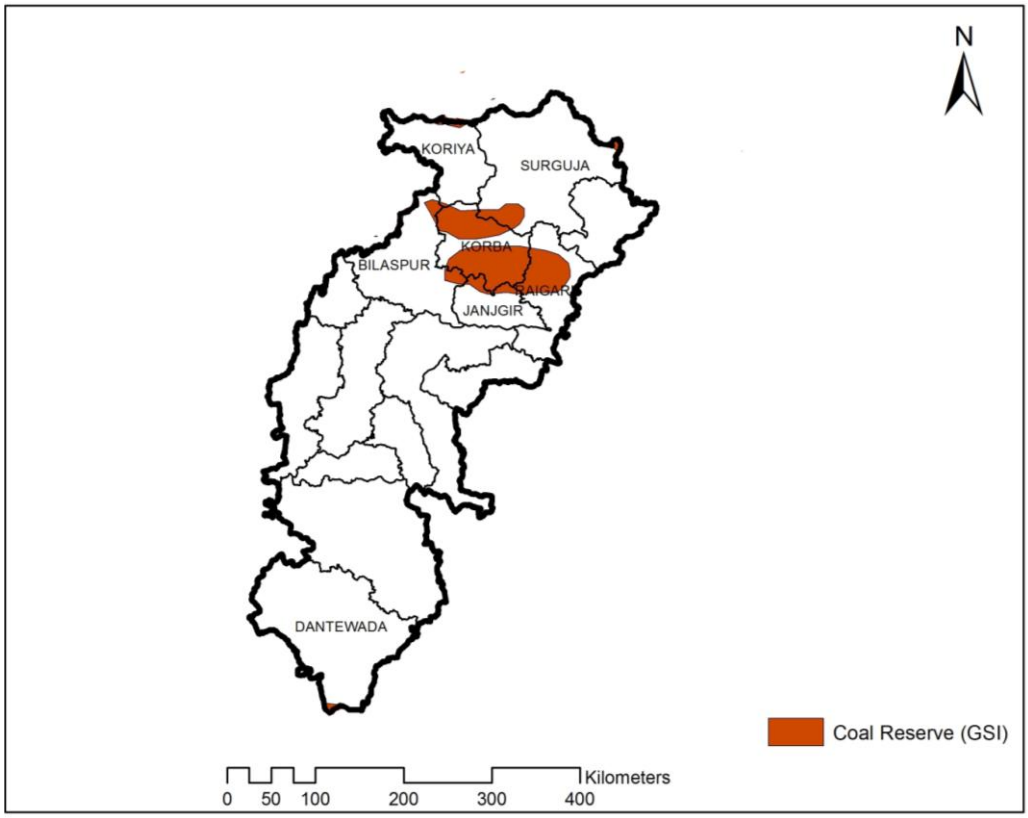


Figure 4 Major coal rich regions in Chhattisgarh

In Chhattisgarh, total resources of coal are estimated at 49280 million tonnes (as on April 2011). Out of this, 12879 million tonnes of resources are proved i.e. they could be economically extracted given the current technology and prices. Indicated resources are estimated at 32390 million tonnes and inferred resources at 4011 million tonnes. Chhattisgarh has 17% of total coal resources of India, and contributes to around 21% share in total production (IBM, 2012)The number of coal mines in Chhattisgarh as on 31.3.2011 is estimated at 62 (ibid) comprising of 21 opencast mines, 40 underground mines, and 1 mixed mine.

The coal resources are found in 13 coal fields in Chhattisgarh. Of all the coal fields, Korba and Mand-Raigarh have the highest share in total resources of the state. Mand-Raigarh coalfield constitutes the share of 48% in total coal resources, followed by 24% of Korba (IBM, 2012). Figure 4 shows the location of coal fields in Chattisgarh. The major coal producing unit is the public sector subsidiary of Coal India Limited i.e. South Eastern Coalfield limited (SECL). The SECL coal deposits lie in the districts of Bilaspur, Korba, Raigarh, Surguja, and Koriya. Korba, however, is the major mining district covering an area of 530 sq.km with reserves estimated at around 10115.21 million tonnes[9]. Korba district is also the major producer of thermal power.

[9] http://www.secl.gov.in/

Jharkhand

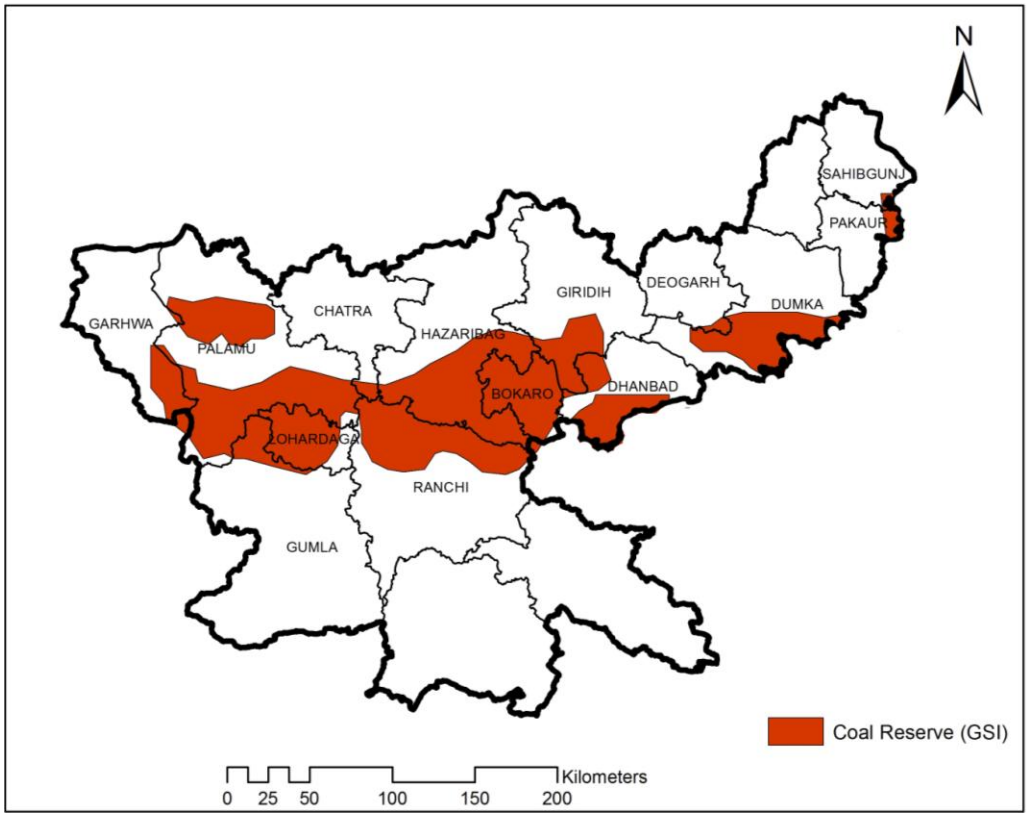


Figure 5 Major coal rich regions in Jharkhand

Jharkhand is rich in natural resources like minerals and forest resources. It has one of the world's largest deposits of coal and iron ore along with rich deposits of uranium, mica, bauxite, granite, gold, silver, graphite, magnetite, dolomite, fireclay, quartz, fieldspar, copper etc. Coal resources in Jharkhand are estimated at 78936 million tonnes (as on April 2011) (IBM, 2012). Out of this, 39761 million tonnes of resources are proved i.e. economically extractable given the current technology and prices. Indicated resources are estimated at 32591 million tonnes and inferred resources at 6584 million tonnes. Jharkhand has 28% of total coal resources in India, and contributes to 21% share in total Indian coal production (ibid). The total number of coal mines in Jharkhand as on 31.3.2011 is 174. Out of this, 72 are opencast mines, 75 are underground mines, and 27 are mixed mines.

Figure 5 shows the location of coal fields in Jharkhand. The majority of coal reserves are concentrated in Jharia coalfield, which accounts for 38% of total coal reserves in the state. Other coalfields comprising reserves include Raniganj, East and West Bokaro, Ramgarh, North and South Karanpura, Aurangabad, Hutar, Deogarh, Daltongunj, and Rajmahal (IBM, 2012). The major coal producing companies in the state are Central Coalfields Limited (CCL), Bharat Coking Coal Limited (BCCL), Eastern Coalfields Limited (ECL) along with the Central Mine Planning and Design Institute Ltd (CMPDI) that is responsible for the planning and exploration of mining in the state. The captive coal mines in the state are held by Tata Steel, Tenughat Vidyut Nigam Ltd. and Damodar Valley Corporation. Total area of operation of CCL is estimated at 2600 sq. km and of BCCL at 425 sq.km. Other companies like TISCO, ISCO, ECL etc. are collectively spread over 50 sq.km

Madhya Pradesh

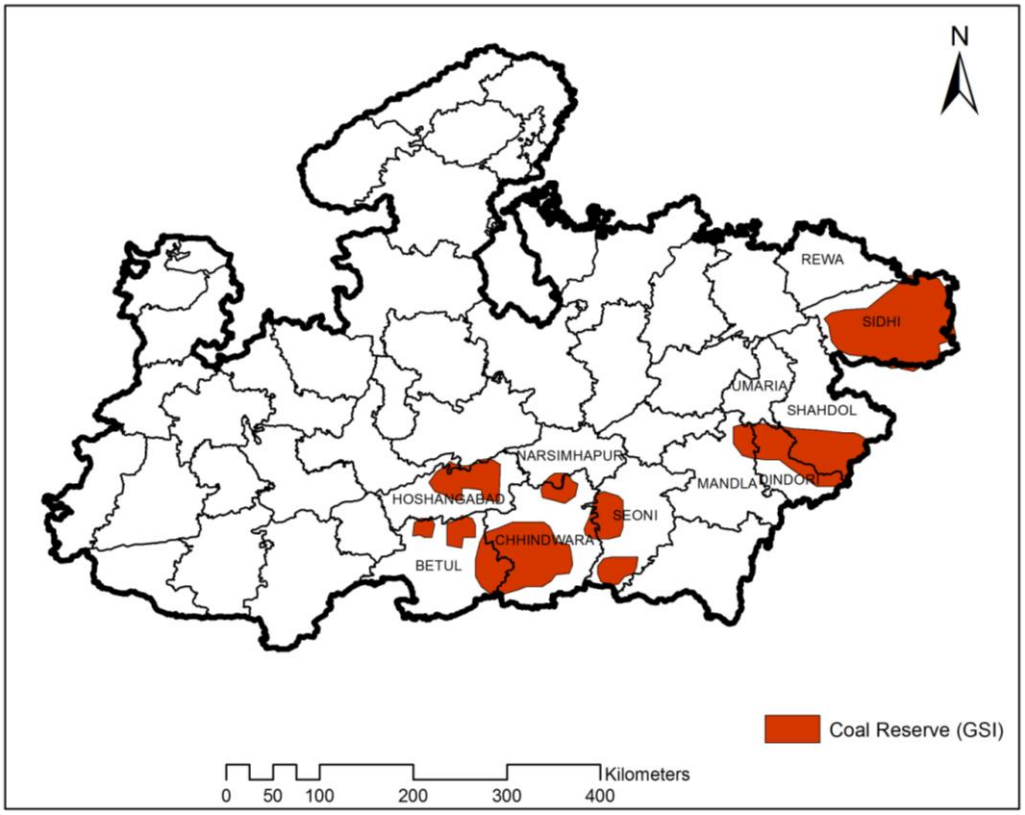


Figure 6 Major coal rich regions in Madhya Pradesh

Madhya Pradesh is the important producer of minerals such as diamonds, slate, pyrophyllite, diaspore, coal, limestonne, copper ore and manganese among others. Coal resources in Madhya Pradesh are estimated at 23126 million tonnes (as on April 2011) (IBM, 2012). Out of this, 8871 million tonnes are economically extractable given the current technology and prices. The remaining resources of 12191 million tonnes fall in indicated category and 2063 million tonnes in inferred category. Madhya Pradesh constitutes 8% of total coal resources in India, and contributes to 13% of Indian coal production. The total number of coal mines in Madhya Pradesh as on 31.3.3011 is estimated at 71, comprising of 21 opencast mines, 48 underground mines, and 2 mixed mines.

Figure 6 shows the location of coal fields in Madhya Pradesh. Coal producing districts in Madhya Pradesh include Betul, Shahdol, and Sidhi districts. Coal is concentrated in the following coalfields: Johilla, Umaria, Pench-Kanhan, Pathakhera, Gurgunda, Mohpani, Sohagpur, and Singrauli. Singrauli is the major coalfield in Madhya Pradesh, constituting around 57% of the total coal reserves of the state.

The major coal producing companies in the state are Western Coalfields Limited located in Pench, Kanhan, and Patharkheda coalfields, and Northern Coalfields Limited located in Singrauli coalfields. The thickest coal seam (135 m) of Asia is found at the Singrauli coalfield in the Sidhi district of Madhya Pradesh[10].

[10] http://www.destinationmp.com/mines-minerals.html

Power scenario in the study states

These states also account for considerable power generation. NTPC has substantial power generation capacity housed in the identified states. A number of UMPPs are coming up these states including the 4000 MW Sasan Project in MP and the 4000 MW Tilaiya Project in Jharkhand. Table 5 shows the installed power capacity fuel wise in the identified states. While Madhya Pradesh and Odisha, have a fairly well distributed capacity across fuel types, Chhattisgarh and Jharkhand are almost completely dependent on coal based generation.

Table 5 Mode wise breakup (MW)

Sl No	State	Thermal			Total Thermal	Nuclear	Hydro Renewable	RES (MNRE)	Grand Total (MW)	% share of coal based capacity in total
		Coal	Gas	Diesel						
1	Chhattisgarh	5176	0	0	5175.94	47.52	120	281.15	5624.61	92.02%
2	Jharkhand	2049	0	0	2048.88	0	200.93	20.05	2269.86	90.26%
3	Madhya Pradesh	5045	257.2	0	5302.15	273.24	3223.66	489.81	9288.86	54.31%
4	Odisha	4332	0	0	4332.1	0	2166.93	97.3	6596.33	65.67%

(This includes state, centre and private sector projects)

Table 6 shows that barring Madhya Pradesh, the coal bearing states, Odisha, Chattisgarh and Jharkhand have very low levels of electricity deficit. In contrast, Jharkhand's neighbouring state Bihar has deficits has high as 16.7%. Then there are number of states in north and southern region which have much higher power deficits. While, mismanagement of power sector, may partly explain the higher deficits in some states, lack of natural resources in these regions is also a cause of the deficits. Therefore, providing free power to the resource rich states needs to be examined from the perspective of whether the coal bearing states genuinely need power for their states or whether they want to use it only as a source of revenue by selling it to other states (which are already hugely electricity deficit).

Table 6 Electricity shortage 2012-13 (%)

State	Electricity Shortage
Chhattisgarh	1.7
Odisha	3.3
Madhya Pradesh	9.6
Jharkhand	3.9
All India	8.7
Bihar	16.7
Tamil Nadu	17.5
Karnataka	13.9
Uttar Pradesh	16.6

Source: CEA

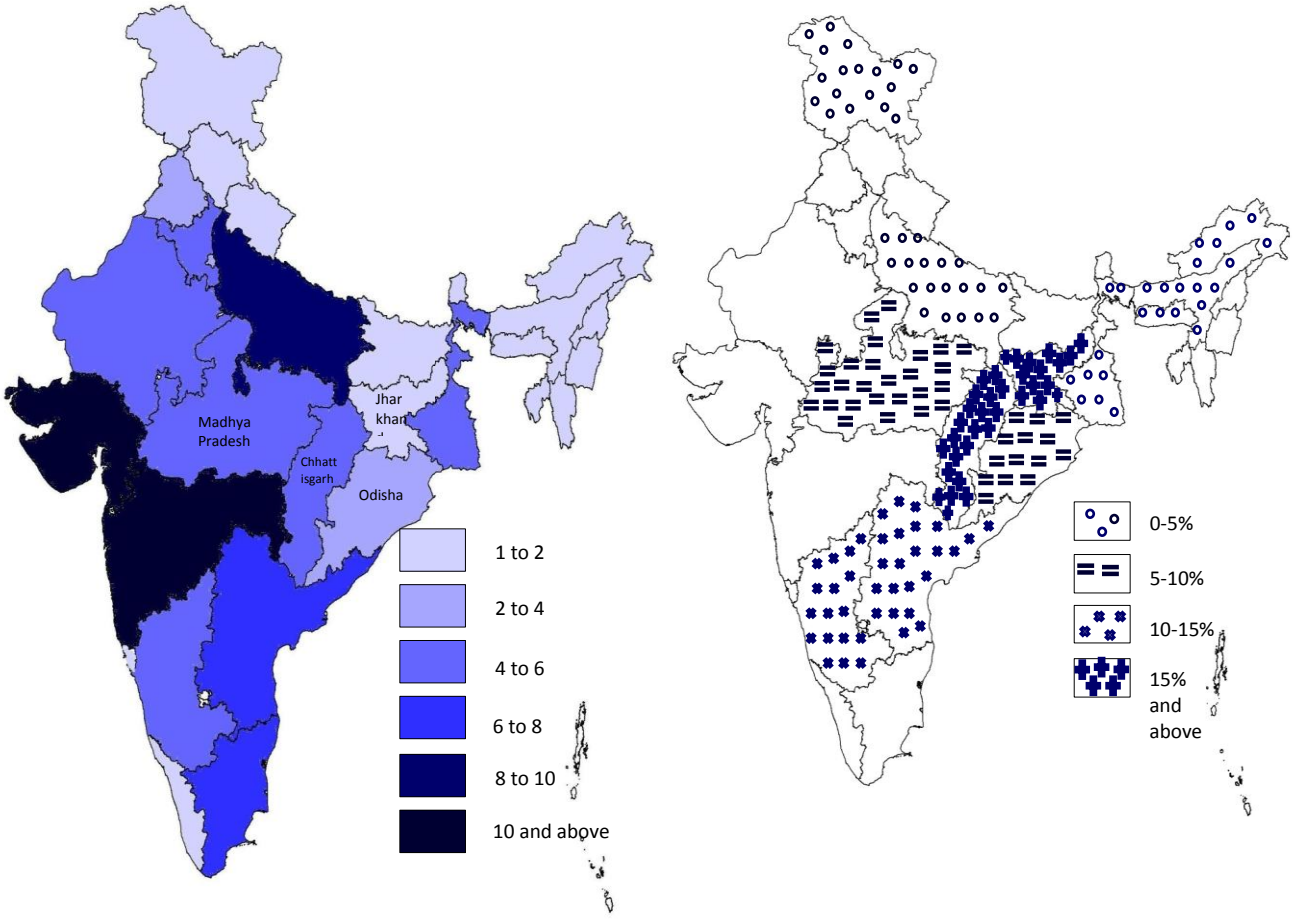


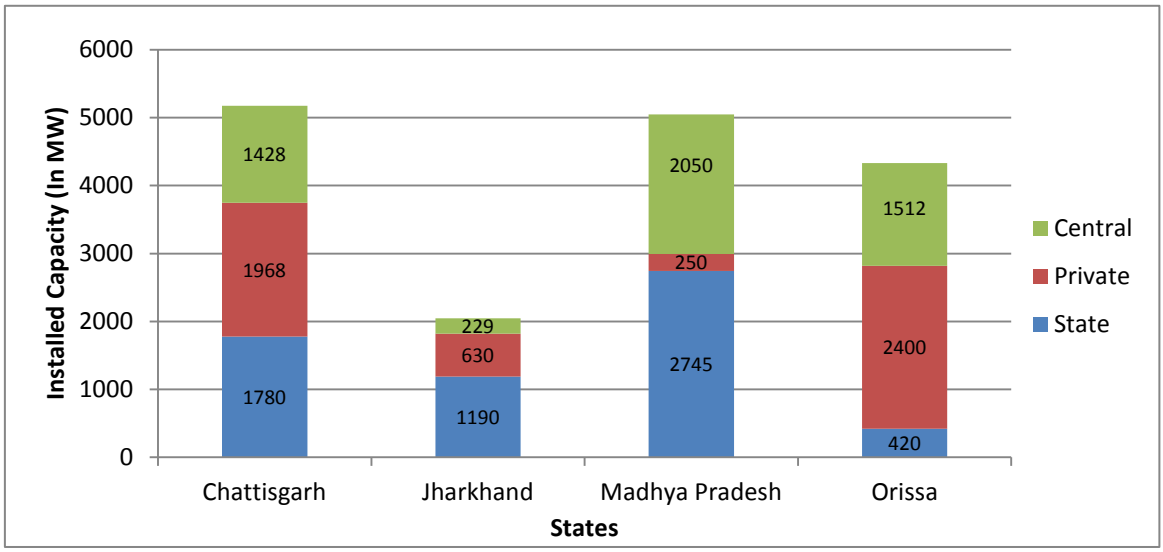
Figure 7 a: Installed coal based generation capacity (in MW) in the States as % of all India coal based capacity; Figure 7 b: State-wise production of non-coking coal as % of all India production

Figure 7(a) shows the coal based generation capacity in states' as a percentage of all India capacity. Figure 7(b) shows the production of non-coking coal in the states as a percentage of total production in 2011-12.

The four states together produced around 70% of the total non-coking coal production in 2011-12 but accounted for around 16% of the total installed generation capacity of India. Clearly a lot of the coal produced is being used in the other states and benefit them in terms of power produced.

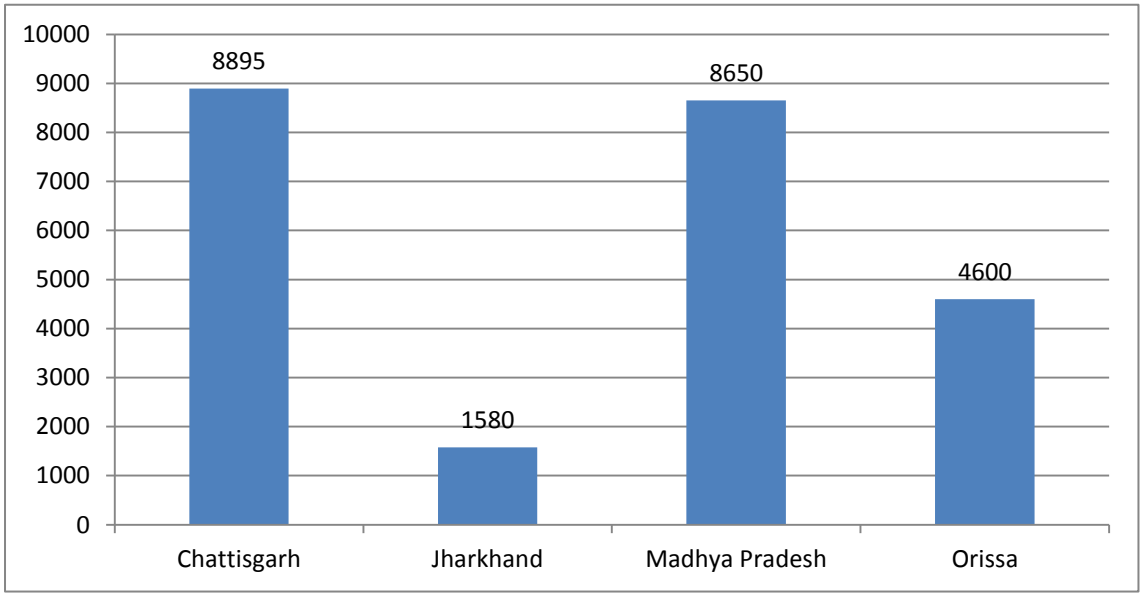
Installed and planned capacity expansion in the XII plan in resource rich states[11]

For the 12thPlan, amongst these states, major coal based capacity addition is planned in Chattisgarh and Madhya Pradesh at 8895 MW and 8650 MW followed by Odisha and Andhra Pradesh at 4600 MW and 4420 MW respectively. Figure 8 gives a status of existing coal based generation capacity in the six identified states. Figure 9 gives the planned coal based generation capacity to come up during the XII plan.



Source: CEA Generation Report

Figure 8 Status of existing coal based generation capacity (MW) in the states



Source: Working Group on Power for 12thPlan, Planning Commission

Figure 9 Planned coal based thermal generation capacity during 12th Plan Period

[11] These figures on capacity expansion are estimates of the Planning Commission and may differ from the expected capacity addition that the respective states envisage based on the MoUs signed with IPPs. Many more MoUs have been signed by states in recent years but quite a few may not come up due to various reasons including coal shortages and insufficient interest of the developers in actual execution.

3. Assessment of negative externalities from coal mining and coal based power generation

Coal mining externalities

Coal mining is said to have significant impact on the environment and ecology if not controlled, monitored and evaluated consistently. The magnitude and significance of environmental degradation depends on the method of mining and beneficiation, processing methods, scale and concentration of mining activity, geological and geomorphologic setting of the area, nature of deposits, land use pattern before the commencement of mining operations, ecology of the area and the natural resources etc. The major problems associated with coal mining include destruction of forest and biodiversity; significant pollution of land, air and water resources; and the adverse impact on local communities. Figure 10 outlines some of the key social and environmental impacts of coal mining. The secondary literature on coal mining externalities also recognizes noise pollution as a negative impact. However, during stakeholder consultations in coal mining states of Jharkhand and Odisha, it was found that noise pollution is not much of a problem in coal mining. Therefore, in this study, noise pollution has not been analyzed.

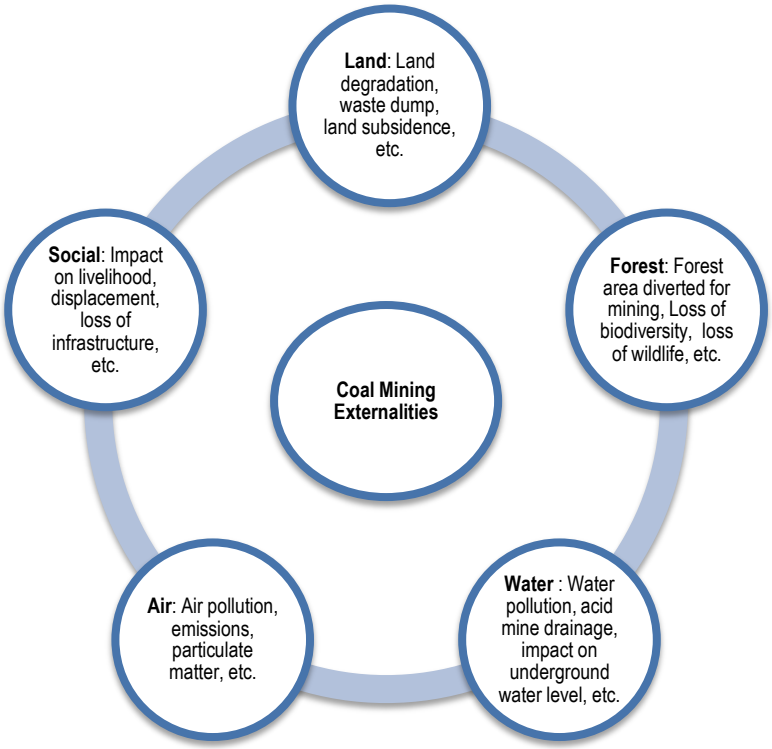


Figure 10 Coal mining externalities

Environmental externalities

Loss of forest and biodiversity

The development of coal mines has led to the loss of forest cover and simultaneously affected biodiversity and wildlife corridors in these forest areas. According to the Ministry of Coal (MoC), about 60% of coal resources are located in the forest areas (MoC, 2005). Most coal blocks allocated in the last few years have been in or adjoining forest areas. Of all the coal leases acquired by Coal India Limited (CIL), 28% lay under forest region i.e. out of about 2,00,000 ha of coal leases 55,000 ha lies under forest cover (Greenpeace Report, 2012).

The MoC estimated that given the rising demand the need for forest land for mining will increase from the about 22,000 ha in 2005 to about 75,000 ha by 2025.

Table 7 gives forest land diversion due to coal mining between 2005 and 2011 in the selected states. In Angul-Talcher region in Odisha, for instance, forest cover has reduced by 11% between 1973 and 2007 due to coal mining (Singh P. , 2010). In Damodar valley coalfield in Jharkhand, forest cover, which once stood at 65% of the total area, has been reduced to 0.05% (Priyadarshi, 2010)

Table 7 Forest land diversion due to coal mining in four states between 2005 and 2011

State	Area Diverted (Hectare)
Odisha	794.77
Chhattisgarh	2432.07
Jharkhand	2019.67
Madhya Pradesh	2504.61

Source: Rajya Sabha Unstarred Question No. 2195, dated on 13.12.2011, Indiastat

Coal mining, especially open cast mining and the evacuation of coal requires large tracts of land for extraction processes, industrial purposes like thermal power plants and captive plants; as well as ancillary processes such as overburden dumps, pipelines, railway lines and public works. Open cast mining results in not only the destruction of standing forests but also in loss of vital connecting corridors for mega fauna (including tigers), destruction of watersheds of peninsular rivers especially when streams are diverted and the displacement of communities that either dwell in forests or are dependent on them.

Forest areas in coal producing states of Madhya Pradesh, Jharkhand, Chattisgarh and Odisha are sources of non-timber forest products such as mahua, tendu, chironji, bamboo, mushrooms and numerous medicinal herbs among others. With the loss of forests for coal mining, communities dependent on these forest resources lose their traditional sources of livelihood.

Compensatory afforestation

The procedure of diversion of forests to non-forest uses has been defined under the Forest Conservation Act (FCA) 1980 which stipulates the requirement of an approval from MOEF to change the land use to non-forest purposes. The FCA also makes directions for compensatory afforestation (CA) for diversion of forests and de-reservation and the forest department is identified as the agency that proposes diversion on behalf of the user agency. The feature of net present value (NPV) stipulates that the 'new user' of the forest land must bear the cost of the losses due to forest diversion and is meant as payment towards protection of environment and not in relation to a proprietary right. The calculations for NPV range between Rs. 5.80 lakh per hectare to Rs. 9.20 lakh per hectare depending on density and quality of forests. The Kanchan Chopra Committee defined 11 steps for valuation of NPV of forest which includes products and services to be valued such as timber, carbon storage, eco-tourism and NTFP.

While the features of CAMPA including NPV are in place now to ensure that the loss of forests due to diversion is compensated, it is obvious that once prime forests are diverted it

is almost impossible to restore the same level of species diversity, canopy cover, carbon sequestration potential, wildlife habitats and watershed capacities among other characteristics that are unique to a forest area. In some cases the contrast between diverted forests and the compensatory afforestation areas is stark especially when the diverted forest was dense forest and the new afforestation includes plantations that may not be appropriate for those watersheds and climatic zones (such as the Eucalyptus plantations by NCL in MP). Moreover, there is a lack of assessment of the biodiversity created and ecosystem services generated in the afforested areas. It has been pointed out that diversion of forest land for compensatory afforestation has social impacts as it results in dual displacement of two different sets of people from their common lands without consultation, compensation, or the provision of alternatives. [12]

Coal blocks are allocated by the Ministry of Coal (MoC) and the role of Ministry of Environment and Forest (MoEF) and state departments has been limited to approvals and clearances for mining purposes instead of being one of the deciding entities for the allocation of forest land to industrial purposes. The outcomes of forested coal block allocation seem to be based on political and strategic factors instead of scientific principles. For instance, if the plant which is to be linked with the coal mine gets commissioned before the mining operations go live, there is an automatic pressure on the state administrative machinery as well as the forest clearance system to expedite procedures and give an approval despite loss of forests to avoid sunk costs of the public or private investments.

Utilization of CAMPA funds

As per TERI's calculation based on forest land diversion, rates of compensatory afforestation, and rate of contribution towards NPV, a total of Rs. 4.7 billion should have been made available to the four states during 2005 and 2011 to compensate for the losses resulting from forest diversion due to coal mining (see Table 8). However, there are questions being raised with respect to the availability of these funds to the state and their utilization to address the losses.

Stakeholder consultations in states of Odisha and Jharkhand have revealed that the biggest challenge for states to undertake compensatory afforestation is the non-availability of land to afforest especially in the vicinity of existing forest areas (which is the stipulation by the FCA) and even in other districts where afforestation could be possible.

[12] Madhu Sarin, background paper of the Task Force on Natural Resources, Centre state Relations Committee

Table 8 Forest land lost to coal mining and assessments of CAMPA payments

	Land diverted (in hectares) (2005-2011)[13]	Rate of CA (Rs per hectare)[14]	Payments towards CA	NPV (Rs5.8-9.2 lakh/ha)[14]	Total CAMPA (Rs)	Total CAMPA (Rs. Billion)
	A	B	C= A*B	D = A *5.8 lakh[15]	C+D	
Odisha	795	23450	18642750	461100000	479742750	0.5
Jharkhand	2020	19790	39975800	1171600000	1211575800	1.2
Chhattisgarh[16]	2432	35000	85120000	1410560000	1495680000	1.5
Madhya Pradesh	2505	25000	62625000	1452900000	1515525000	1.5

Air pollution

Coal mining activities at various stages of coal mining contribute either directly or indirectly to air pollution. For instance, activities such as drilling, blasting, excavation, etc. result in emissions of particulate matter and gases which reduce the air quality and subsequently disturb the ecological balance and affect the health of people.

The major air pollutants from open cast coal mining are in the form of suspended particulate matter and settled dust matter; the concentration of pollutants varies with the different regions and different climatic zones. Further, the problem of air pollution is aggravated with the presence of mine fires, as have been witnessed in Jharia, Raniganj, and other mining regions

MoEF in 2009 (MoEF, 2009) conducted an assessment of 88 industrial areas /clusters to identify the polluted areas and take concerted actions. According to the study, most coal mining districts including Dhanbad, Korba, Angul, Talcher, Jharsuguda, and Singrauli, were found to be critically polluted. As per a study conducted by Goswami, (Goswami, 2010), SPM had reached an alarming level of 1848 kg per square km in Talcher region in Odisha.

An interaction with the Odisha Pollution Control Board by the study team brought forth that nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) levels for most of the coal mining areas are within the prescribed limits, however, high concentration of suspended particulate matter (SPM) and dust levels is a major problem in and around the mining areas. Fugitive dust emissions, in particular, have been a major cause of concern. Presence of layers of dust on agricultural fields has adversely affected the production in and around the mining regions. The Odisha Pollution Control Board provided the TERI team with the report on Environmental Management Status of mining activity in Odisha. The report included results of ambient air quality monitoring undertaken to assess the air quality status in coal mining regions of Talcher and Ib valley. According to the monitoring results, SPM concentration of

[13] Data source: Rajya Sabha Unstarred Question No.2195, dated on 13.12.2011, Indiastat
[14] Data source: FIMI, 2006
[15] Taking the minimum of the range of Rs.5.8 to Rs. 9.2 lakh per hectare
[16] Taking the minimum of the range of Rs. 35,000-50,000 per hectare given as a rate of CA for Chhattisgarh

different coal mines in Talcher and Ib-valley mining regions exceeded the prescribed limit (see Table 9 and Table 10).

The Jharkhand State Pollution Control Board also stated that the air quality around coal mining regions in Jharkhand has deteriorated to a large extent. The MoEF had to even impose a moratorium on new projects in 4 blocks of Dhanbad district. The Board provided TERI team with the results of ambient air quality monitoring of 22 collieries in Dhanbad district. As per the results, the value of Respirable Suspended Particular Matter (RSPM) exceeded the prescribed limit at all collieries. SO_2 and NO_x levels in these 22 collieries were however found within prescribed limits.

Table 9 Ambient air quality monitoring at different mines in Talcher coal mining area

SI. No.	Name of mines	Date of monitoring	location of Sampling	SPM concentration in µg/m3	Prescribed Standard in µg/m3
1	Lingajaj OCP	30.01.2013	Near CMPDI camp	732	600
			Near CGM office	443	
2	Ananta OCP	30.01.2013	Near Electrical Substation	618	600
			Near field canteen	560	
3	Balaram OCP	31.01.2013	Near Project Office	744	600
			Near Field time office	629	
4	Hingula OCP	31.01.2013	Near site office	414	600
5	Bharatpur OCP	01.02.2013	Near Regional Store	417	600
			World Bank Environmental Monitoring station	691	
6	Jagannath Colliery	01.02.2013	Near Time Office	583	600
			Near field office	594	
7	Bhubaneswari OCP	02.02.2013	Near Old Time office	594	500
			Near New Time Office	675	

Source: Environmental Management status of mining activity in Odisha, Material for Parliamentary Standing Committee Meeting provided to the study team during their visit to Bhubaneswar on 28th June 2013

Table 10 Ambient air quality monitoring at different mines in Ib valley coal mining area

SI. No.	Name of mines	Date of monitoring	location of sampling	SPM concentration in µg/m3	Prescribed standard in µg/m3
1	Talabira Coal mine of M/s. Hindalco	28.02.2013	Near project office	540	500
2	Belpahar OCP	12.03.2013	Near project office	440	600

SI. No.	Name of mines	Date of monitoring	location of sampling	SPM concentration in µg/m3	Prescribed standard in µg/m3
			Roof of Triveni guest house	180	
			Near workshop 2	520	
3	Lilari OCP	12.03.2013	Near project office	460	600
			Near workshop 2	540	

Source: Environmental Management status of mining activity in Odisha, Material for Parliamentary Standing Committee Meeting during their visit to Bhubaneswar on 28th June 2013

Emissions estimation for Odisha

Coal Mining emissions of various pollutants were estimated by TERI for the state of Odisha by using India based emission factors derived by Chakraborty et al., 2002.

Emission factors used in the study are given below:

Suspended particulate matter (SPM) (g/s) = u^0.4 *a^0.2 * {9.7+0.01p+ b/ (4+0.3b)}

Sulphur dioxide (SO_2) (g/s) = a^0.14 *{u/ (1.83+0.93u)}*[{p/ (0.48+0.57p)} + {b/ (14.37+1.15b)}]

Oxides of Nitrogen (NO_x) (g/s) =a^0.25*{u/ (4.3+32.5u)}*[1.5p+ {b/ (0.06+0.08b)}]

Where;

a = Area of production (Km^2)

u = Wind speed (m/s)

p = Coal production (Mt/year)

b = Overburden Handled (Mm^3/year)

Coal production (Mt/year)

State-wise overall coal production for the year 2011-12 is obtained from MoC, 2012. According to Ministry of Coal, ninety percent of coal production in the country is carried out by open cast mining (OC) and rest ten percent is done through underground mining (UG) (MoC, 2012). So, coal production through open cast mining in the state is obtained by applying the ratio of OC/UG as 90:10. The district wise emissions were estimated for the state of Odisha based on production capacities and other related information.

Area of production (Km^2) and overburden handled (Mm^3/year)

Area of production and overburden handled was available for a number of mines in the state. This data has been extracted from the EMPs of various mining companies. The ratio of area of production to coal production and overburden handled to coal production was calculated and derived from the sampled data. These ratios have been applied to calculate district-wise mining area and corresponding overburden handled for various districts.

Wind speed (m/s)

District-wise nearest IMD station was identified with the help of Geographic Information System (GIS) and wind speed data of identified stations was taken from (Indian Meteorological Department, 1999).

Table 11 District wise emissions from coal mining in Odisha

Location, districts	Production (Mt/yr)	Area	OB (Mm^3/yr)	Wind speed (m/s)	Emission (T/d)		
					PM	SO_2	NO_x
Talcher, Angul	76.3934	1972	62.0461	1.86	6.7	0.3	2.1
Angul, Angul	0.2654	7	0.2156	1.86	1.6	0.0	0.0
Sundargarh, Jharsuguda	9.4032	243	7.6372	1.9	3.7	0.2	0.3
Jharsuguda, Jharsuguda	17.1381	442	13.9194	1.9	4.4	0.2	0.4
Sambalpur, Sambhalpur	2.2750	59	1.8477	1.3	2.2	0.1	0.1
Total	105.48	2723	85.67		18.6	0.9	2.9

The ratio of coal production to area of production is 0.039 (Mt/Km^2) and ratio of coal production to overburden handled is 1.23 (Mt/Mm^3) for Odisha. District -wise emissions of all pollutants (SPM, SO_2 and NO_x) are given in Table 11.

Water

Coal mining activities adversely affect the environment especially water. It degrades the quality of water by not only disturbing the pH balance of the surrounding water resources but also by increasing the levels of suspended particulate solid, total dissolved solids and some heavy metals. Further, the overburden generated also contaminates surrounding water bodies and increases heavy metal concentration especially of iron (Fe), copper (Cu), manganese (Mn) and nickel (Ni) which reduces the utility of water for domestic purposes. Acid Mine Drainage (AMD) is also the most persistent pollution problems especially in the mines of North Eastern Coalfield (Singh G., n.d.)

According to one estimate, an average amount of 98000 crore litre of polluted water is discharged from mines belonging to Mahanadi Coalfields Limited (MCL) every year, containing high level of heavy metals and suspended matters (Panda). A separate study estimates that 9480 kilolitres of waste water is discharged per day by coal mines in Angul-Talcher region of Odisha (Reza, 2010). The Damodar River which flows through 6 coalfields (North and South Karanpur, East & West Bokaro, Ramgarh, Jharia, and Raniganj) has been classified as heavily polluted by CPCB (Priyadarshi, 2010).

In addition to coal mining, coal washing activities are a major source of water pollution. A study of the Damodar valley area showed that one coal washery alone was discharging about 45 tonnes of fine coal into the Damodar river every day and there are as many as 11 coal washeries in the region with an installed capacity of 20.52 million tonnes annually(ibid). A study by (Dubey, 2012)in Singrauli industrial area also indicates that the surface and ground water of the area has been severely polluted due to release of the liquid effluents by coal based industries such as by product coke- plants, coal washeries and thermal power plants.

Pollution of water due to coal mining activities has resulted in severe impact on local communities. In the Singrauli district of Madhya Pradesh, for instance, a high incidence of white spots, skin infections and lumps of dead skin has been reported. A high percentage of gastro-intestinal parasitic infection has also been found in the focal sample of cattle in the village affected by effluents from coal based industries and coal mining (Dubey, 2012).

Availability of water is also a concern as mining activities require large quantities of water. According to (Reza, 2010), an average of 86.26 million cubic meters per annum is drawn from the river for industry/mining activity in Angul-Talcher region of Odisha. Many coal mining regions are reported to confront the problem of over exploitation of ground water resources resulting in alarming lowering of water table. However, these findings are in contrast to inputs drawn from consultations with Department of Water in Odisha. As per the department, ground water consumption for coal mining activities is quite low as compared to other industrial activities. They also pointed out that coal mines are prohibited to use ground water and have to source water from other available sources of surface water. This, however, does not take into account ground water extraction which accumulates in unconfined aquifers which result in loss of water in surrounding wells.

The interactions with the water department and other stakeholders in Odisha however brought forth the problem of generation of waste water and pollution of adjoining water bodies as a result of coal mining. Similar concerns of water pollution were also raised during interaction with SPCB of Jharkhand.

Jharkhand State Pollution Control Board provided the TERI team with reports on water quality of 13 rivers for the month of February, March, and April and reports of drain water of 37 sampling locations. In the case of river water analysis report, most of the parameters determining the quality of river were found within prescribed limits. Only in the case of Garga River near Telmucho Bridge, Bokaro in Jharkhand, the BOD level was found beyond the prescribed limit of 3 mg/l for the month of March and April 2013. In the month of March, it was estimated at 7.2 mg/l and for April, it was estimated at 6.4 mg/l. The final report on abatement of pollution of Damodar River System shows a clear need for treatment of water in all the drains flowing into the Damodar, although most of these drains carry waste from the mine area as well as domestic waste. Therefore, attributing water pollution to only from mines in these cases could be misleading. The report reproduces in the Annexure. However, in case of thermal power stations like Patratu, Bokaro, Santhaldih and Durgapur TPS JSPCB report clearly mentions need for treatment of water which is released from these stations on account of out-of-range levels of BOD, COD and TS.

Odisha Pollution Control Board provided the study team with the report on Environmental Management Status of mining activity in Odisha. The report entailed results from the monitoring of waste water quality of different coal mines in Talcher and Ib-valley area. According to the findings, all the 3 parameters determining water quality of mine drainage- pH level, suspended solids, and oil and grease level, were found within the prescribed limits set by CPCB. However, information on the other parameters is absent. The tables showing this information are reproduced in Table 58 and Table 59 in Annexure C.

CPCB in 2011 (CPCB, 2011) conducted an analysis based on monitoring water samples collected from different coal mines in different areas of Madhya Pradesh and Chhattisgarh. These samples were analysed for general parameters like pH, conductivity, chemical oxygen

demand (COD), total suspended solids, total solids, fluoride, chloride, sulphate and nitrate. Heavy metals like Lead (Pb), Chromium (Cr), Copper (Cu), Nickel (Ni), Cadmium, Zinc (Zn) and Manganese (Mn) were also analysed. In addition, drain water samples were collected and analysed. The impact of coal mine discharge on ground water and river water was evaluated by collecting the representative samples from rivers and bore wells. The results of the analysis of coal mine discharge water, ground water, drain water, and river water for selected areas in Chhattisgarh are given in Table 49, Table 50, Table 51 and Table 52 (see Annexure C Analysis of Water Quality) respectively. Similar results for Madhya Pradesh and presented in Table 53, Table 54, Table 55, Table 56 and Table 57 (given in Annexure C).

According to the CPCB analysis, most of the parameters determining the quality of discharge water, ground water, and river water were found within the prescribed limits. In Chattisgarh, only the TSS exceeded the prescribed limit for few of the mines. In Madhya Pradesh, only the sulphate, manganese, and fluoride exceeded the limit set for coal mining discharge water (See Table 53 and Table 54 in Annexure C). Presence of heavy metals such as lead, chromium, copper, nickel, cadmium, zinc, and manganese were also analysed, but were found below the detection limit.

Thus, according to the monitoring data made available by SPCBs and CPCB, most of the parameters determining the quality of water are within prescribed limits. However, this contrasts with inputs drawn from primary consultations of the study team which point towards a deterioration in quality of water due to coal mining. Given these contradictions, nothing conclusively can be said about the state of water quality in coal mining regions in the 4 states. A detailed water quality study in the coal belt is clearly required.

Land degradation

Mining activities create long lasting impact on the landscape. Open cast mining and allied activities have been found to degrade the land significantly. The activities including excavation, stacking of waste dumps, discharge from workshops, construction of tailing ponds, etc. destroy the top soil and leave behind large tracts of degraded land. Coal mining activities require big areas of land resulting in shrinking of cultivable lands and degradation of local environment and ecology. Long period of opencast mining has created mountains of over burden in these areas resulting in degradation of fertile land and also deterioration of air quality/water quality and deposit of silt in the river bed.

Generation of large quantities of overburden waste leads to severe degradation of land. In Dhanpuri open cast mine in the Shahdol district of Madhya Pradesh, for instance, coal mining has led to large scale degradation of land primarily due to large overburden generation. The large overburden generation is due to the availability of coal at higher depths and the absence of use of underground mining technology to extract them. Consequently, opencast mining technology is used, leading to large amounts of waste generation.

The waste land in Angul region in Odisha has increased from 5% in 1973 to 28% in 2011 (Panwar, 2011). Another study by (Khan & Javed, 2012)shows that land use/land cover has changed drastically during 1993-2010 in open cast mining area of Singrauli region due to mining and industrial activities. Area under dense forest has declined by 6.7%, under cultivable land by 2.9%, and under water bodies by 3%. The results of the study are given in Table-7. In Jharia, a total of 75.77 square km area of land has been affected due to fire (17.32

sq.km.), subsidence (39.47 sq.km), excavation (12.68 sq.km) and dumps (6.30 sq.km) (Singh, et. al, 2007).

Table 12 Details of the land use/land cover changes in Singrauli during 1993-2010

Land use categories	Land use/cover (1993)		Land use / cover (2010)		1993-2010 Net change (sq. km)	1993-2010 Net change (%)
	Area in (km^2)	Area in (%)	Area in (km^2)	Area in (%)		
Dense forest	129	17.7	80.1	11	-48.9	-6.7
Open Forest	144	19.8	148.09	20.33	4.1	0.6
Open scrub	24.6	3.4	42.24	5.8	17.7	2.4
Cultivated land	113	15.5	91.8	12.6	-21.2	-2.9
Uncultivated land	142.6	19.6	147.5	20.25	4.9	0.7
Mining pit	7.5	1	11.12	1.53	3.6	0.5
Overburden Dumps	18.6	2.6	39.2	5.38	20.6	2.8
Waste land	24.8	3.4	31.05	4.26	6.3	0.9
Rocky area	7.6	1	7.6	1.04	0	0
Settlement	32.2	4.4	44.97	6.17	12.8	1.8
Ash pond	2.3	0.3	8.44	1.16	6.2	0.8
Water body	59.1	8.1	37.5	5.15	-21.6	3.0
Thermal power plant	10.8	1.5	10.8	1.48	0	0
Dry river	1.7	0.2	4.6	0.63	2.9	0.4
Plantation	10.8	1.5	23.43	3.22	12.6	1.7
Total	728.4	100	728.4	100	183.2	25.98

Source: Khan & Javed, 2012

In some areas, over burden has been dumped near banks of rives, even on river beds. (Stakeholder consultations with Jharkhand State Pollution Control Board). Lack of proper land reclamation and mine closure further compounds the problem.

Closed/not operational/Abandoned mines

India does not have a detailed inventory of abandoned mines (Bhushan, 2008); however, as per CSE estimates, there are at least 240 abandoned coal mines where no reclamation has taken place (CSE, 2012)As per the data made available through Rajya Sabha questions, there are 26 abandoned or non-working mines in Jharkhand (see Table 13). However, this seems to be a conservative estimate given that until 2003 there was no planning done for mine reclamation and closure and considerable number of mines were left abandoned. Although mine closure and restoration are now an important component of mine planning, not much seems to be happening in practice.

Table 13 Number of abandoned coal mines in Jharkhand (as on 01.04.2012)

Subsidiary	No. of Abandoned Mines
Eastern Coalfields Ltd. (ECL)	7
Bharat Coking Coal Ltd. (BCCL)	4
Central Coalfields Ltd. (CCL)	15
Total	26

Source: Rajya Sabha Unstarred Question No. 944, dated on 03.12.2012, Indiastat

At the all India level, as per Ministry of Statistics and Programme Implementation, there were 102 abandoned mines as of 2008. Out of this, only 53 mine comprising 660 ha. Have been reclaimed (See Table 14).In a 2011 interview of CCL, one of the officials mentioned that no reclaimed land has been handed over to the State by CCL as yet. They also highlighted that often more attention is given to land backfilling and not on increasing the land value.

Table 14 Rehabilitation of mining land/reclamation of abandoned mines in India (2003-2004, 2005-2006, 2007-2008 and 2008-2009)

Items	2003-2004		2005-2006		2007-2008		2008-2009	
	For the Year	Cumulative	For the Year	Cumulative	For the Year	Cumulative	For the Year	Cumulative
No. of Abandoned Mines	7	91	0	102	0	102	0	102
No. of Abandoned Mines Reclaimed	5	45	0	53	0	53	0	53
Total Area Reclaimed in Abandoned Mines (In Hect.)	6.01	642.18	0	660	0	660	0	660
No. of Mines (Working) where Reclamation/Rehabilitation is Being Carried Out	128	817	111	1062	10	1135	37	1202
Area of Such Reclaimed/Rehabilitation in working Mines (In Hect.)	591.52	9315.49	836	10666	390	11200	524	11771

Source: Ministry of Statistics and Programme Implementation, Indiastat

Mine fires and land subsidence

Underground mine fires and land subsidence are the main problems of underground coal mining. In India, the longest running mine fires have been in the Jharia coalfields. The fires in Jharia have raged for over 70 years covering an area of 2,000 hectares and consuming 40 million tonnes of coking coal. The mine fires in Jharia have been mainly caused due to the small stocks of coal left by private companies below the surface infrastructure like rivers, railway lines and buildings which are causing differential movement in the overlying strata (Lok Sabha, 2012).

The fires in Jharia have increased the threat of land subsidence, development of fissures, land collapse, and formation of deep holes in the area. As per a BCCL report, some of the fires had endangered production outlets, surface structures, railway lines, roads and drainage channels (Priyadarshi, 2010). The fires have also resulted in gas poisoning, difficult geo-mining conditions, sterilization of coal, and hindrance to production, explosions, and damage to structure and adjacent properties (Singh, 2006).

As per a CSE 2008 report, 35000 houses in the town of Jharia are under 'immediate threat' from mine fires. In 2002, the Chief Minister of state mentioned that relocation of nearly 0.3 million people with approximately 0.1 million houses and other buildings had become inevitable.

The Jharia Rehabilitation and Development Authority (JRDA) had been set up to facilitate the rehabilitation. Total number of houses to be constructed is estimated at 79159 requiring 1504.99 ha. of land and the requirement of fund is estimated at Rs. 4780.60 crores. However, it is reported that the residents of the place refused to shift to the new relocation sites as the houses were small and there were no jobs available in the new sites as the people living near the mine fire sites were dependent on the illegal trade that takes place there[17].

Coal washing

Coal washing has various economic as well as environmental benefits. This has resulted in increased demand for washed coal. Box-2 gives the various benefits that result from coal washing and the policies adopted by the government to encourage the activity. However, coal washing also results in negative environmental impacts locally. A large amount of rejects are generated during washing. These rejects pose serious environmental hazards as proper disposal grounds for these rejects do not exist in coalfields. The rejects are generally dumped on the ground and hence lead to degradation of fertile land. These rejects are also susceptible to spontaneous combustion leading to CO, CO_2, and particulate emissions. Moreover, wet washing is the most commonly adopted technology and is highly water intensive. Coal washing plants with the capacity of 10 million tonnes per annum (mtpa) generally require 2.5 million liters per day (MLD). By 2017, for a coal washing capacity of 100 mtpa, water requirements will rise up to be 25 MLD; sufficient for a population of 125,000 (Dutta & Pandey, 2011). In addition, water once used becomes highly polluted with coal dust making disposal a problem. Effluents when discharged into water bodies may cause serious harm to the local environment. This has been a major problem in the Damodar River in Jharkhand and West Bengal.

Coal producing states argue that the burden of washing of coal and the consequent environmental damage is for the coal bearing state to bear alone. The importing states, on the other hand, it is argued, will have low smoke and low ash content coal to burn, resulting in an environmental injustice to the former. The resource producing state is left to bear the effects of pollution from washeries and/or from producing power from the rejected coal. Coal washing also results in depletion of ground water and pollution from ash. The study team was asked

[17] http://www.bloomberg.com/news/2013-01-09/india-said-to-speed-plan-to-save-300-billion-burning-coal-mine.html

"*If coal is a national resource, why are these 4-5 states left to bear the burden of all the ash? Let us distribute the pollution also equitably*."

Box 2 Benefits of coal washing

Coal washing helps improve the quality of coal, and thereby improve overall efficiency of power plants. Washing helps in removing mud and stone, which otherwise would be transported along with the coal, leading to higher transportation and greater particulate & other emissions. The Central Fuel Research Institute in 2001 estimated that a reduction of ash content from 40% to 34% through washing can help reduce fly ash by 8 million tonnes (Chand, 2008). Various studies have been done to estimate the impact of coal washing on CO_2 emissions in India:

A study by US DoE has estimated CO_2 emission to reduce by as much as 11% due to use of washed coal in India (Zamuda & Sharpe, 2007)

A 10% reduction in ash will reduce CO_2 by 190 kg/kWh, which amounts to saving of 13 million tonnes of carbon from existing plants and another 8 million tonnes when applied to plan capacity growth in next 20 years (Mark, 2011).

CFRI has estimated that if coal is washed & ash content is reduced from 40% to 34%, CO_2 emissions would reduce by 23 million tonnes (Chand, 2008).

Current Scenario:

Use of washed thermal coal has increased many folds over the last 10 years. However, it is still a small proportion of the total coal produced in India. As per MOSPI statistics, total installed capacity of washeries in the country is around 131.24 Million tonne per year (MTY) a total of 52 washeries, both PSUs and Private, were operating in the country.

Drivers of coal washing:

The Government of India has notified that that coal containing more than 34 per cent of ash needs to be washed. The notification stipulates that unwashed coal cannot be transported beyond 1000 km. Much of the washing capacity has been installed in response to regulation promulgated in 2001 by MoEF.

Super critical steam parameters based power plants requiring lower ash coal are being set up. Integrated mine washery projects are being encouraged, and the Government soon plans to introduce the policy of washing all coal.

Washing of coal to produce cleaner power results in a distribution of environmental costs from those living around power plants and consumers of power to those around coal mines where the workers are located. This spatial allocation of environmental burdens is not sufficiently discussed in debates on why CIL should be providing cleaner coal to power plants. Critical Environment Pollution Index (CEPI) is a number given to the environmental quality in a location. The index developed by CPCB in 2009 captures various dimensions of environment quality including air, water and land in industrial areas. This index was intended to act as an early warning tool that would help in categorizing the industrial clusters/areas in terms of priority of planning needs for interventions for SPCBs.

We see from Box 3 below that a number of critically polluted areas occur in the 4 states studies. However, many of the proposed TPPs are coming up in critically polluted clusters (CEPI > 70, MOEF 2009) or in their vicinity. (Prayas, 2011))

Box 3 Summary of key polluted areas

- Singrauli, Madhya Pradesh

Critically polluted area with Critical Environment Pollution Index (CEPI) of 81.73, (MOEF) ground water pollution in coal mining, almost all coal blocks allocated are located in forest areas

- Talcher, Odisha

Critically polluted area with Critical Environment Pollution Index of 82.09, (MOEF) Detrimental to land use pattern – significant decrease in forest cover and agricultural land due to mining, barren land has increased, Wildlife corridor threatened – Tiger reserves

- Jharia, Jharkhand

Orphan mines, land degradation, mine fire, Coal theft & Illegal mining, and Water pollution (Tiwary and Dhar 2006, Field observations)

- Korba, Chhattisgarh

Critically polluted area with Critical Environment Pollution Index of 83, (MOEF) Displacement of indigenous population, air pollution

Social externalities

On discussing the impacts on local lives by specific externalities caused by coal mining with the study team, the representatives of the various departments summarized the situation follows:

"The effects of externalities differ from person to person and area to area."

Social externalities from coal mining primarily include displacement of people, loss of livelihood, and negative impact on the health of communities residing near the mining regions.

Health and safety

Coal mining operations pose safety and health hazards for mine workers and communities at large, some of which include inhalation of dust, toxic fumes and gases; exposure to radiation and toxic metals; noise induced hearing loss; heat stroke; exhaustion etc. Local communities residing near mining regions suffer from environmental impact of coal mining activities including water scarcity, air pollution, water pollution, etc. Most of the coal mining regions are found to be critically polluted as per the study conducted by MoEF in 2009 (MoEF, 2009). These environmental impacts lead to severe health implications for communities residing near the area. People in coal mining areas suffer from air/water borne diseases like diarrhoea, skin complications, asthma, typhoid, etc. and also from some more critical ailments such as tuberculosis, cancer and bronchitis.

In Odisha, pollution due to fluoride has led to increased incidence of spots over the body, incurable skin infections and lumps of dead skin (Panda, n.d). Some of the diseases caused by air and water pollution in the Talcher mining area in Odisha are given in Table 15. In Chhattisgarh, the impact of pollution on health has been so adverse that local communities have been forced to migrate in many cases (Chhattisgarh Human Development Report, 2005).

Table 15 Health impact in Talcher – 2004-05

Air Pollution	
Disease	Occurrence
TB	230
Pnemuololeosis	58
Scrotal cancer	47
Contact dermatitis	181
Asthma	221
Lungs and bone cancer	38
Water Pollution	
Disease	Occurrence
Eczema	387
Scabies	512

Source: Panda D, nd.

TERI, in 2011, conducted a field survey to understand the social impacts of coal mining activities[18]. The results of the survey corroborate the above findings. Seventy three percent of the households interviewed suggested that the air pollution has increased after the start of mining in the area. 68% of the households complained of deterioration in the quality of water. As per the survey, the problems have been particularly acute due to water shortage and dust emissions. (See Table 16)

Table 16 Social impacts of coal mining activities

Responses	**Increase in Air Pollution Noticed**	**Changes in Quality of Water**
Yes	73%	68%
Not much	24%	19%
No difference	3%	12%
Can't say	0	1%

Source: TERI, 2011

During stakeholder consultations in Odisha and Jharkhand, adverse health impacts on the people living in and around the coal mining regions were pointed out as a serious cause of concern. However, due to paucity of data and lack of scientific studies it is difficult to ascribe health problems in the region to pollution from coal mines alone.

[18]The survey was conducted under the project on "Responsible sovereignty and Energy Resources" supported by Konrad Adenauer Stiftung (KAS) (TERI 2011). The survey was based on a quantitative research method involving one to one interview. In total 400 people were interviewed, which comprised of 100 mine workers (50 from Jharkhand and 50 from West Bengal), 100 displaced families (50 from Jharkhand and 50 from West Bengal), 100 villagers residing close to mines (50 from Jharkhand and 50 from West Bengal), and 100 villagers residing at a distance from coal mines (50 from Jharkhand and 50 from West Bengal). (TERI, 2011)

Displacement and other social issues

Mining activities, in general, generate costs in the form of involuntary displacement, loss of livelihood and social exclusion. Between 1950 and 2000, according to conservative estimates, the coal mining sector is reported to have displaced between two and two and a half million people (Terminski, 2012). Further, in the context of displacement generally, while tribal populations constitute 8% of the population of the country, they constitute 40-50% of the displaced population (Benghara, 1996).The problem, though historic, was exacerbated by the emergence of the "open-cast" technique used for coal mining which, as compared to underground mining, requires large tracts of land while providing fewer opportunities for employment. Mining induced displacement has increased significantly as coal production has shifted from underground to opencast mining (Singh 2007). As per the Ministry of Coal (2005), more than 80 per cent of the coal production till 2025 is projected to come from opencast mines, affecting a minimum of 1, 70, 000 families involving over 8, 50, 000 people. Table 17 provides an overview of displacement figures for different coal mining projects in four states i.e. Odisha, Jharkhand, Chhattisgarh, and Madhya Pradesh.

Table 17 State wise and project wise displacement

States	Mining projects	Timeline	Displacement
Odisha	MCL projects in Talcher coalfields since inception	As on 30.9.2010	8604 families [a]
	Talcher region		1.7 lakh people [b]
Jharkhand	Rohne project		173 people (Barwania & Chirwan village)[c]
	Parej East Open Cast Project		1172 people [d]
	Rajmahal coal project		6000 families [e]
	Piparwar coal project		460 families [e]
	Bengal Emta mines		2103 people [f]
Chhattisgarh	Gevera project		7058 people [g]
Madhya Pradesh	NCL's Khadia mine project, Chilika Daad village in Sonebhadra district		12000 people (600 families) [h]
	Gorbi Block B open cast mines in Singraulli district		2883 people [i]
	Singrauli region	During 1980s	20504 people (8504 families)[j]

a Samiti, 2010
b Consultations with Energy Secretariat in Odisha
c Coal Insights, 2012
d CSE, 2008
e Sherman, 1992 & Mahapatra, 1991. As cited in Jain & Bala, 2006
f Stakeholder consultation with Department of Revenue in Jharkhand.
g Environment Impact Assessment report of Gevera open cast mining project
h Greenpeace, 2011
i Singh and Mehraj, 2010
j Sharma and Singh, 2009

Moreover, the effect of the "resource curse" is well established in coal mining regions. Shahdol in Madhya Pradesh, Dhanbad in Jharkhand, Sambalpur in Odisha and Karimnagar in Andhra Pradesh are among the top coal-producing districts in the country. Yet each one of these districts was identified as one of the 250 most impoverished districts in the country in 2006; they all continue to receive assistance from the Backward Regions Grant Fund Programme. As per a TERI perception survey conducted in 2011 in coal mining regions of Jharkhand and West Bengal[19], only around one fourth of the total households interviewed witnessed an increase in income. Thirty percent witnessed no impact on the income levels, while forty six percent suffered a decline in income.

This is a result of inadequate delivery of resettlement and rehabilitation benefits. In Odisha, for instance, out of 8604 families which are displaced due to MCL projects in Talcher coalfield, only about 5542 families i.e. about 64 % of the total have received any resettlement benefits as of 30.9.2010 (Samiti 2010). Similarly, in Singrauli (Madhya Pradesh), out of 8504 families displaced during 1980s due to various coal mining and power projects, only 4563 families (i.e. 55% of the total) have received resettlement benefits (Sharma and Singh 2009). According to the TERI perception survey of 2011, displaced communities had to wait 13 years, on average, for compensation.

Moreover, mining leads to destruction of common property resources (common grazing land, common pond etc.) which are the basis for survival of village people, landless tribes, women and other groups. No attempts are made to enumerate these resources, value them, establish income from them, or provide a basis for compensation. The neglect of these issues has created space for coal theft, pilferages, and illegal mining. There are various instances where people who earlier depended on common property resources for their livelihoods, have now turned to scavenging, stealing, and pilfering of coal due to destruction/degradation of these resources due to coal mining. Conversion of land for afforestation purposes under CAMPA can also led to loss of common lands as pointed out before.

One of the most egregious legacies of coal mining displacement is that it results in the worsening of the condition of already vulnerable groups. Women and children are more adversely affected than men, who are more mobile and manage to get employment elsewhere. The larger share of people displaced in coal rich states are tribal populations as they comprise large shares of the population of these states; this, despite estimates of the effect on tribal populations being incomplete and despite tribal land ownership ostensibly receiving special Constitutional and legislative protection. In response to a Lok Sabha question in December 2012, the mines given in Box-3 were identified as having dislocated local /tribal people.

Discussions with state government officials revealed that a District Collector spends 12-14 hours each week dealing with coal-related social issues. A lot of time is spent in convincing people to relocate. The issues relating to dealing with people are not only because they have lost their natural livelihood options but they also suffer from significant health diseases due to air and water pollution. As an estimate, the team was told, mining projects need approximately 10-15% more managerial time and effort than other projects

[19] TERI, 2011

Summary of externalities from coal mining in study states

The nature and extent of environmental and social externalities in the four states are given in Table 18.

Table 18 Extent of environmental externalities due to coal mining in Odisha, Jharkhand, Chhattisgarh and Madhya Pradesh

Sl. No	Type of impact	Odisha	Jharkhand	Chhattisgarh	Madhya Pradesh
		Extent of damage (In ha/tonnes/litres etc.)			
1	Destruction of forest & biodiversity	795 ha. diverted between 2005 and 2011[20]	2020 ha diverted between 2005 and 2011[20]	2432 ha. diverted between 2005 and 2011[20]	2505 ha. Diverted between 2005 and 2011[20]
2	Air pollution	Air quality of Angul-Talcher region (In µg/m3) Fluoride- 2.6 SO_2- 26.4 SPM-179 RPM-85[21] *SO_2& NO_x levels are generally within prescribes limits. However, SPM level for many mines has been recorded higher than the CPCB standards[22]	SO_2& NO_x level are within permissible limits. However, RSPM level exceeded for almost monitoring stations. RSPM level was found to be as high as 493.05 µg/m3 against the prescribed limit of 150 µg/m3[23] According to CSE 2008, avg. ambient air SPM concentration for 11 yrs. of MADA in Jharia is 425 µg/m3, the max. concentration being as high as 958 µg/m3	SO_2, NO_x & SPM levels are within permissible limits for two locations in Korba district[24]	SO_2 & NO_x level are within permissible limits Annual average concentration of SPM - 502 µm at Jayant mines in Sidhi district. Threshold limit is 360 µm[25]
3	Water pollution	9480.8 Kl of waste water is discharged everyday[26] Average Result in Angul-Talcher region (In mg/l): Fluoride – 0.716; BOD – 1.62; Cd – 0.0004;	Jharia region discharges about 2.22 Mm3 of wastewater every day[27] 495 tonne of fine coal is discharged into Damodar river every day by 11 coal washers operating in the region[28] Average concentration in	Most parameters in Chirmiri, Bhatgaon, & Korba areas were within permissible limit except for	All parameters in Pathakhedia, Pench, Kanhan & Sohagpur areas were within permissible limits. Only sulphate, manganese, & fluoride were

[20] Indiastat
[21] SPCB-Orissa, 2010
[22] Mine-wise monitoring data of Talcher & IB valley, Odisha SPCB
[23] Colliery-wise monitoring data provided by Jharkhand SPCB
[24] MoEF, GoI
[25] Sharma & Siddiqui, 2010
[26] Reza, 2010
[27] Ministry of water resources, 2009
[28] Estimated from Priyadarshi, 2010

Sl. No	Type of impact	Odisha	Jharkhand	Chhattisgarh	Madhya Pradesh
		Extent of damage (In ha/tonnes/litres etc.)			
		Pb – 0.01 * 20% of sample mines exceeded the prescribed standard set for fluoride[21]	sediments of Damodar river & tributary: -Silica- 28 ppm -Arsenic-0.001 to 0.6mgl/l -Mercury-0.0002 ti 0.004 mg/l -Floride- 1 to 3 mg/l -Nickel-0.024 mg/l[29]	suspended solids which exceeded for Hasdeo river & discharge & ground water of few mines[30]	above limits in case of few mines[30]
4	Land degradation	In Angul-Talcher region, 1,012 hectares of land is expected to be degraded & 250 million cubic meters of soil will be dumped as overburden	In Jharia, a total of 75.77 square km area of land has been affected due to fire (17.32 sq.km.), subsidence (39.47 sq.km), excavation (12.68 sq.km) and dumps (6.30 sq.km)[31] A conservative estimate report number of abandoned mines in Jharkhand at 26[32]		748.7 ha of the total forest land of 1076 ha. Affected due to land degradation in Dhanpuri mine in Shahdol district[33] In Singrauli, between 1993 and 2010, area under dense forest declined by 6.7%, under cultivable land by 2.9%, & under water bodies by 3% Area under overburden dumps & waste land increased by 2.8% & 0.9% respectively[34]
5	Displacement	8604 families are displaced due to mining operations of MCL in Talcher coalfields [35] Displacement figures could be as high as	Rohne coal mining project: 128 people in Barwania village & 45 people in Chirwan village [37] East Parej coalfield: 1172 persons[38]	Potential number of land oustees in Gevera open cast project is 7058[40]	NCL's Khadia mine project in Singrauli displaced 12000 people[41] Land oustees in Gorbi mines estimated at 2883[42]

[29] Priyadarshi, 2010
[30] CPCB, 2011
[31] Singh, R. et al 2007
[32] Indiastat
[33] Singh & Mehraj, 2010
[34] Khan & Javed, 2012
[35] Samiti, 2010

Sl. No	Type of impact	Odisha	Jharkhand	Chhattisgarh	Madhya Pradesh
		Extent of damage (In ha/tonnes/litres etc.)			
		1.7 lakh people in Talcher region [36] TERI estimates suggest it could go as high as 5 lakh people	Rajmahal coal project-6000 families. Piparwar coal project-460 families. Bengal Emta mines-2103 people [39]		20,504 people displaced due to coal & thermal power projects in Singrauli region [43]
6	Loss of common property resources	No estimates available			

Externalities of coal transportation

There are very large transportation requirements in the use of coal. Coal is first mined and brought to a stacking point within the coal yard through use of dumper trucks. From there, coal is transported by MGR, railways, road and even ropeway to the user.

Power plants are a major consumer of non-coking coal. In case of pithead plants, the distance from the coal mine to the power station can range from a few kilometers to 30-40 km. If there is no railway link than an MGR is built by the power developer to link to nearest rail station. Non-pithead stations are located further off. Some of NTPC plants like Kahalgaon and Vindhyachal TPP for instance are around 80 kms for the mine.

Externalities in coal transportation by rail and road include emission of particulate matter in the form of coal dust, emissions of particulate matter in the form of diesel locomotive exhaust, production of noise and vibration by train movement and possibility of fires due to spontaneous combustion of coal. Respiratory conditions are common among the communities residing near coal mining regions. Dust emission due to coal transportation was considered a major area of concern by different stakeholders in Odisha and Jharkhand.

Estimation of coal spillage and resultant fugitive emissions

Table 19 illustrates an estimation of coal spillage and resultant fugitive emissions from in a year from the movement of coal (from storage point onwards till the consumer – such as power plants, etc.).

[37] Coal Insights- 28th November 2012
[38] CSE 2008
[40] EIA report of Gevera mine
[41] Greenpeace, 2011
[42] Singh & Mehraj, 2010
[36] Consultations with Energy secretariat in Odisha
[39] Department of revenue, Jharkhand
[43] Sharma & Singh, 2009

Company wise annual data is available for quantity transported through rail, road and MGR. This data helped in arriving at an estimate of the state wise transport of coal through different modes. For instance, since BCCL and CCL are largely functional in Jharkhand, figures for these two companies were taken for estimating movement of coal in Jharkhand. A distinction was made regarding the quantity of coal transported by rail for short lead and longer lead. For coal spillage, the CERC norm for transit loss for 0.2% per tonne for pithead and 0.8% of coal dispatched for non-pithead stations[44]was used. It was assumed that since journey by road and MGR is of shorten duration, the norms for pithead stations would apply. In case of railways, for shorter lead time journey, the norm of 0.2% was applied and for a longer lead time the norm of 0.8% was applied. Since no norm was available for fugitive dust as a result of coal spillage, the study assumed fugitive emissions at 10% of the coal spillage, as was considered in case of iron ore in an earlier TERI study (TERI, 1997).

Table 19 Estimation of coal spillage and resultant fugitive emissions from in a year from the movement of coal (2011-2012)

State	Quantity transported by rail in 2011 (million tonnes)	Quantity transported by road in 2011 (million tonnes)	Quantity transported by MGR in 2011 (million tonnes)	Coal transported by rail (short lead) (million tonnes)	Coal transported by rail (long lead) (million tonnes)	Spillage of Qty Transported by rail (tonnes)	Spillage of Qty Transported by road (tonnes)	Spillage of Qty Transported by MGR (tonnes)	Total Spillage (tonnes)	Fugitive emissions (tonnes)
	A	B	C	D	E	F (D+E)	G	H	I	J
Jharkhand (BCCL +CCL)	46	35	21	14	32	287432	70720	42720	400872	40087
Madhya Pradesh (NCL)	21	5	33	13	9	94116	9270	66400	169786	16979
Chhattisgarh (SECL)	44	44	19	4	40	328301	88030	37932	454263	45426
Odisha (MCL)	60	26	15	12	48	410108	51246	29596	490950	49095

Source: TERI Estimate

Externalities of coal based power generation

Air pollution

The main emissions from thermal power plants are Carbon Dioxide (CO_2), Nitrogen Oxides (NO_x), Sulphur Oxides (SO_2) and air borne inorganic particles such as suspended particulate matter (SPM) and other trace gas species. CPCB, 2003 has reported that thermal power plants contributed 89% of sulphur dioxide and 82% of particulate matter of total emission load generated from different categories of industries.

[44] CERC Terms and Conditions for Tariff, Regulation, 2009

The study estimated emissions of SO_2, NO_x and CO_2 from coal based power plants in the states based on emissions factors arrived at CPCB, 2003 and NPL, 2008. These are given in Annexure D.

A 2012 study by Mittal, 2012 estimates that the total CO_2 emissions from thermal power plants increased from 323474.85 Gg in 2001-02 to 498655.78 Gg in 2009-10. Similarly the SO_2 emissions increased from 2519.93 Gg to 3840.44 Gg and NO emissions from 1502.07 Gg to 2314.95 Gg during this period. The study, by considering the estimates of coal consumption projected by Planning Commission in 2002 projects that the CO_2 emission by 2020-21 will increase to 850,000 Gg, SO_2 to about 6000 Gg and NO to about 4500 Gg during the same time period.

A number of studies have estimated emissions from thermal power stations and also quantified damages in monetary terms. Bhattacharya, 1997 estimated the cost of damage per unit of electricity to be small at around 0.012 US Cents. Kumar and Rao, 2001 have estimated willingness to pay for improved quality at Rs 1.45 per person per year based on a study around the Panipat Thermal power station in Haryana.

In case of power generation, emissions become a major concern also as power plants tend to get concentrated around the region where coal is available. Prayas 2011 suggests that two districts in Chattisgarh, Janjgir-Champa (30470 MW) and Raigarh (24380 MW) have the highest concentration of proposed thermal power stations in the country. Many of these regions are generating power for export to other states and are bearing pollution while benefits of electricity go to other states.

Relhan, 2011 estimated that for 2002-03, Chattisgarh was exporting half of its power to other states and hence half the total emissions of the state were on account of meeting requirements of other states. On similar lines, the study estimated that 13% of pollution load from power plants in Madhya Pradesh and 9% in Odisha were attributable to generation for export.

Fly ash generation

Indian coal has very high ash content, ranging from 35-50%, but low sulphur, chlorine as well as trace metal content. When coal is combusted it produces about 40% fly ash. The generation of fly-ash leads to the problem of air, water and soil pollution, disrupt ecological cycles and set off environmental hazards. The disposal of fly-ash requires large quantities of land, water, and energy, and its fine particles, if not managed well, can become airborne. Currently, 131 million tonnes of fly-ash generated every year (CEA, 2011). Such a huge quantity poses challenging problems, in the form of land usage, health hazards, and environmental dangers. The following table gives details of ash generated in 2010-11 based on reporting made by select thermal stations in a few state to CEA.

Table 20 State wise fly ash generation for the year 2010-2011

S.No	States	No. of TPS	Installed capacity (In MW)	Annual ash generation (In tonnes)
		A	B	C
1	Odisha	3	3880	9050000
2	Madhya Pradesh	4	6193	9710000
3	Jharkhand	5	3068	4140000
4	Chhattisgarh	5	5480	11840000
	India		80458	131000000

Source: CEA, 2011

Studies indicate the presence of arsenic in ground water, around power plants, agricultural fields and is a serious concern which is now demanding attention both nationally and internationally, even charged as being a dumping hub for As". (Pandey et al 2011). World average of Arsenic content for bituminous and lignite coals are, respectively, 9.0 and 7.4ppm, but Indian bituminous coal is 22.3–62.5 ppm. Arsenic in Indian coal is well discussed in Pandey et al. Its fate in the bio systems is key to understand the health risks of arsenic to industry workers and to people living in the vicinity of power plants. Routes through which arsenic can enter the human body include inhalation, through the skin, and through water and contaminated food.

The fly-ash could be gainfully utilized in various applications such as in brick manufacturing, low lying area filling, in roads and embankments, in dyke-raising, and in cement and concrete industry. However, ash utilization in all these industries together is estimated at only 38% (Alami & Akhtar, 2011). The stakeholders in Odisha provided the TERI team with the status of utilization of fly-ash and bottom ash for 32 power plants with total plant capacity of 11582.3 MW. As per the data, 24.05 million tonnes per annum (mtpa) ash was generated for the year 2011-12, out of which only 55% was utilized in brick-making, cement making, land filling, embankment etc. The disposal of fly-ash puts strain on land and water resources in the country. More than 1000 acres of land are being used by power plants simply for ash storage. Wet disposal of fly-ash is the most common method of disposals in India which puts pressure on the water resources in India.

However, there is need of more careful assessment of health risks of fly ash such as radioactivity and arsenic, in order to make more informed decisions on where and how this ash should be utilized.

Health impacts

Thermal power plants are associated with adverse health impacts including pre-mature deaths from lung cancer, respiratory illness, and heart diseases.

A NEERI, 2006 report to the Ministry of Statistics, Planning and Implementation estimates that the people living within 5 km radius of coal based TPP suffer from respiratory problems. The cost of health effects has been found to be Rs. 0.00013 - 0.047 per kWh of electricity generation in the case of coal based plants.

Relhan 2011 estimated the health costs from power generation in Korba district. The study estimated health damage cost (long term mortality cost and morbidity costs) at Rs 100.5 to 11759.6 million rupees. Since about 53% of power from this region was exported out in 2002-03, the health damage cost to the host state due to export was estimated in the range of at Rs 53.18 million to Rs 6232 million based on the methodology used.

A study by (Cropper et al, 2012) estimated pre-mature deaths per tonne of particulate matter, SO_2 and NO_x for 89 thermal power plants in India for the year 2008. According to the results of the study, an average of 23 people die per 1,000 tonnes of particulate matter emitted. By comparison, an average of 10 people die per 1,000 tonnes of SO_2 emitted, and 9 people die per 1,000 tonnes of NO_x emitted. However, though the health impacts are greater in the case of particulate matter, the total number of deaths due to SO_2 and NO_x are higher owing to the larger amount of SO_2 being emitted. SO_2 causes an average of 500 deaths per plant, NO_x roughly 120 and particulate matter about 9 deaths per plant. The authors suggest that Indian coal being low in sulphur, emissions from sulphur dioxide are less of a concern here, and hence less control are in place contributing to large number of deaths per plant relative to particulate emissions. (Cropper et al, 2012)

Stress on natural resources

Besides coal, thermal power plants require large amounts of resources, primarily water and land. Coal TPPs require a huge amount of water for coal washing, cooling and ash disposal (NEERI, 2006). For power plants located on main land, the raw water is generally drawn from fresh water source such as river, lake, canal, reservoir, and barrage. For power plants located in coastal areas, water for cooling of condenser and auxiliaries is drawn from the sea or creek which provides for water requirement of the wet ash handling system (CEA, 2012).

Various estimates are available for use of water in thermal power stations. Wise (2013) estimates that upto 60-100 litres of water are needed per unit of electricity produced. The consumptive use of water by coal based TPP is about 3.92 million cubic meters per 100 MW per year (Prayas, 2011). Water is fast emerging as a key issue in the production of power. CEA, 2012 recognizes that difficulties are already being faced in siting thermal power plants due to non-availability of water, particularly in coal bearing states like Odisha, Jharkhand and Chhattisgarh.

The requirements of coal and land are equally substantial. As per TERI estimates a 500 MW plant would require around 0.5 million tonnes of coal per year (assuming 85% PLF and calorific value of coal at 3500 Kcal/kg).CEA, 2007 estimates that the total land requirement of a 2x500 MW power plant based on indigenous coal as 1420 acres. This includes 600 acres for the power plant, 500 acres for ash dyke, 100 acres for township and 200 acres for facilities outside the plant area.

As per data made available by the Odisha Energy Department, around 10500 MW of power capacity being developed by IPPs is expected to be commissioned within the 12th Plan period. The following table illustrates requirement for land, water and coal for these stations. The planned capacity of 10500 MW will require 8380 acre of land, 374.5 Cusec of water and 53.85 MTPA of coal. Overall Odisha has signed MoUs for 38270 MW of power which will require 30073 acre of land, 1339.31 Cusec of water, and 200.7 MTPA of coal. Clearly, this will put a lot of stress on the state for resources.

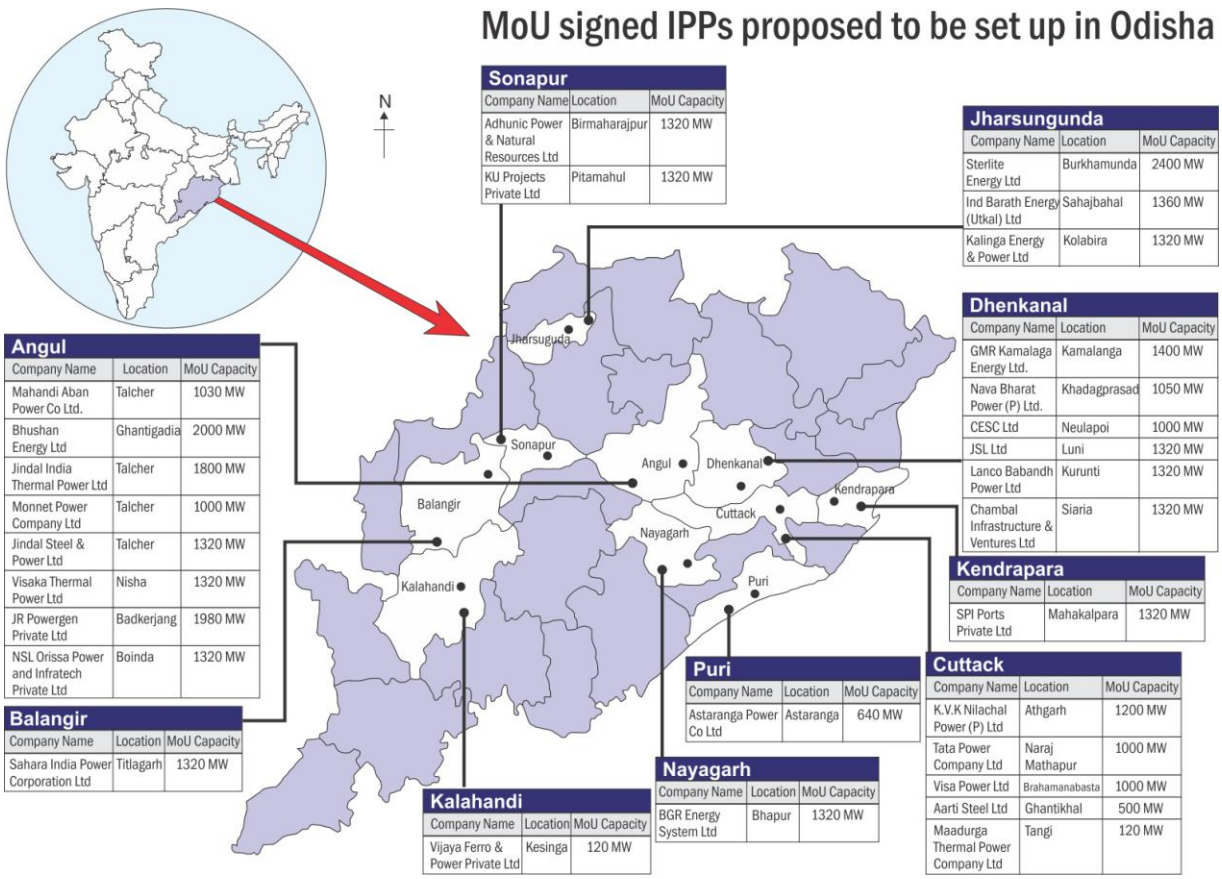


Figure 11 Proposed private power projects (MoUs signed with Odisha state government)

Table 21 Resource requirement for planned IPPs in Odisha

Sl No.	Company name	Capacity (MW)	Location	Land requirement (Acre)	Water requirement	Coal requirement
1	GMR Kamalanga Energy Ltd.	1400	Kamalanga, Dhenkanal	1177	46	7.28
2	Jindal India Thermal Power Ltd.	1800	Deranga, Angul	1050	48	5.65
3	Monnet Power Company Ltd.	1050	Malibrahmani & Nisha	1042	37	5.9
4	Sterlite Energy (P) Ltd.	2400	Bhurkamunda	2115	72	14.4
5	Ind Barath Energy (Utkal) Ltd.	1360	Sahajbahal, Lakh-anpur, Jharsuguda	725	42	7.36
6	Lanco Babandh Power Ltd.	1320	Kurunti, Kharagprasad	1400-total, 948-main plant	40-Ph-1; 40-Ph-2	7
7	Maadurga Thermal Power Company Ltd.	120	Bainchua, Tangi, Cuttack	37	1.5	0.5
8	KVK Nilachal Power Pvt. Ltd.	1050	Kandarei, Athangarh	834	48	5.76

Data Source: Department of Energy, Odisha

Displacement of people

Tables 22 and Table 23 provide estimates of some thermal power plants located in Chhattisgarh and Odisha respectively. The column headed "Proponent-Estimated Displacement" captures the number of land oustees and homestead oustees estimated by the project proponents in their Environmental/Social Impact Assessments. This figure has been shown where it was found available, either in Environmental Management Plans (EMPs) obtained from the concerned companies or in the Environmental Clearances (ECs) available on the website of the Ministry of Environment and Forests.

The column headed "TERI Estimated Displacement" is a rough estimate of the number of people possibly displaced based on the area of private land acquired for the project and the population density (based on the 2011 census) of the relevant district. The information on land requirement was taken from EMPs, ECs and news articles (in that order, based on availability). The displacement estimate does not classify based on loss of land or loss of homestead."

Table 22 Estimated displacement in Chhattisgarh

Sl No.	Project	District/ State	District Pop./sq.km.	Private land for project	Project affected population (Proponent estimates)	Project affected population (TERI estimates)
1	NTPC Lara	Raigarh	228.7	2334 acres (9.45 sqkm)	Not available	2161
2	Korba West PCL Bade Bhandar	Raigarh	228.7	1.16 sqkm (Govt. + pvt.)	Not available	265
3	DB Power Baradarha	Janjgir-Champa	450	2.54 sqkm	0 home oustees, 39 land oustees	1143
4	Lanco Amarakantak Patadi Ext.	Korba	183	2.08 sqkm	450 PAFs	380
5	Vandana Vidhyaut Salora	Korba	183	1.95 sqkm	0 home, 275 land oustees	356
6	Athena Singhitarai	Janjgir-Champa	450	3.72 sqkm	0 home, 863 land oustees	1674
7	SKS Chattisgarh Raigarh	Raigarh	228.7	3.53 sqkm	Not Available	807
8	TRN Energy TPP	Raigarh	228.7	2.21 sqkm	Not Available	505
9	RKM Powergen Uchpinda	Janjgir-Champa	450	3.64 sqkm	4 families home oustees, 660 Land Oustees	1638
10	Visa Chhattisgarh TPP	Raigarh	228.7	3.16 sqkm	Not available	722

Sl No.	Project	District/ State	District Pop./sq.km.	Private land for project	Project affected population (Proponent estimates)	Project affected population (TERI estimates)
11	SLB Energy Katghora	Korba	183	0.28 sqkm	Not available	51
12	KSK Mahanadi Nariyara	Janjgir-Champa	450	8.3 sqkm	2541 PAFs (?)	3735
13	Spectrum Coal Ratija	Korba	183	0.68 sqkm (Phase I+II)*	Not available	124

Table 23 Estimated displacement in Odisha

Sl No.	Project	District/ State	District Pop./sq.km.	Private land for project	Project affected population (Proponent estimates)	Project affected population (TERI estimates)
1	NTPC/Darlipali	Sundergarh, Odisha	188	1274 acres (5.15 sq.km.)	400 "fully affected" 600 "partly affected families[a]	968
2	NTPC/Gajamara	Dhenkanal, Odisha	268	796 acres (3.22 sq.km.)		863
3	GMR/Kamalanga	Dhenkanal, Odisha	268	1050 acres (4.25 sq.km.)	3 houses, 812 land oustees	1125
4	Jindal/Deranga	Angul, Odisha	199	950 acres (3.84 sqkm)	0 houses, 434 land oustees	764
5	Monnet Malibrama/Nisha	Angul, Odisha	199	4 sqkm	146 families displaced, 46 families lose land	796
6	Sterlite/Bhurkamunda	Jharsuguda, Odisha	245	839.5 acres (3.39 sqkm)	71 PAFs, 465 PAPs	830
7	IndBharat/Sahajbahal	Jharsuguda, Odisha	245	1.93 sqkm	Private purchase	473
8	Lanco Babandh/Kuruntti	Dhenkanal, Odisha	268	4.73 sqkm	Private purchase	1268
9	Maadurga/Baincha	Cuttack, Odisha	666	30 acres (0.12 sqkm)	Likely Private purchase	80
10	KVK Nilachal/Kandarei	Cuttack, Odisha	666	3.80 sqkm	254 PAFs	2530

4. Agencies, administrative expenses and regulatory failures in coal mining

Institutions involved in coal governance

The governance framework for coal involves different levels of institutions – central, state and local authorities – as well as multiple institutions that work on cross cutting issues which are of importance when estimating impacts on the environment and society at large.

The major institutions involved in the coal sector's governance are as follows:

Central Government	State Government	Local Government	PSUs, Non-governmental and quasi governmental
•Ministry of Coal •Central Pollution Control Board •Ministry of Environment and Forests •ENVIS centres •Geological Survey of India •Ministry of Home Affairs •Ministry of Labour and Employment - Directorate General of Mine Safety •Office of Coal Controller •Ministry of Power •Minitry of Road Transport and Highways •Ministry of Railways •Ministry of Rural Development •Ministry of Water Resources	•Department of Environment •Department of Forests •Department of Energy •Department of Home Affairs •Department of Health •Industrial Development Corporations •Department of Land and Revenue •Department of Mines •State Pollution Control Board •Department of Transport, roads and highways •Department of Rural Development •Department of Water Resources	•District Collector/Magistrate •Gram Sabha •Panchayati Raj Institutions •Municipal departments	•Public Sector Undertakings •CIL and Subsidiaries •CMPDI •Private Enterprises •Research and academic Institutions •Civil Society organizations

Approvals and agencies

Even though, coal is a union subject, the State government departments are very much involved in the decision making process of coal mining clearances. The biggest role played by state government departments is in the clearances for all other resources of the state that may be conjunctively impacted by coal mining. The administrative and clearance procedures have an important role in the complete life cycle of coal mining and the goods and services that are produced thereof.

Each of the institutions/agencies/departments involved in supporting the development of coal mines works in its own domain to provide approvals and clearances that are aimed at ensuring that the impact of an activity such as coal mining does not prove detrimental to the social and environmental conditions and at the same time provides legitimacy to the mining activity. The procedures involved in approvals and clearances are scientific, technological, economic and social assessments based on the established legal and policy framework that govern economic activity. Most of these processes only incur man power costs and

establishment costs, but these can still be time consuming so as to provide clarity on the exact implications of the economic activity and the conditions that must be met to ensure their minimization.

The major approvals and clearances required before actual mine development and coal production are as listed below along with the major authorities or agencies involved in the process. (see Table 24).

Table 24 Approvals and agencies.

Approvals / clearances	Authority / agency involved
Mining Lease	
Approval or Purchase of Geological Report	CMPDIL (purchase could also be from SCCL, MECL) Directorate General of Civil Aviation and Ministry of Defence (for unexplored blocks if aerial reconnaissance is conceived)
Mine Plan	CMPDIL Coal Controller
Mine Safety	Directorate General of Mine Safety
Mining Technology & Conservation Measures, and Coal Categorisation	Coal Controller (under the provisions of Colliery Control Rules and the Coal Mines (Conservation & Development) Act)
Mining Lease	State Government (Mining Department), Ministry of Coal (GoI) – Reviewed at various levels within the Departments at the State & Central Government level
Environment	
EIA / EMP Studies	State Pollution Control Board State Environmental Impact Assessment Authority State Water Resource and Water Supply Department District Administration (for various aspects of site clearance) Coal Controller Department of Environment (MoEF)
Forest	
Forest Clearance & Valuing Compensatory Afforestation	Committee to Advise GoI (MoEF) Office of Chief Conservation of Forests, (Regional Office of MoEF) State Forest Department & District Authority Department of Forest (MoEF) State Revenue Department Hon'ble Supreme Court
Land Acquisition	Ministry of Coal (under provisions of CBA) State Department of Revenue
Infrastructure (Electricity, Water, Railways, Road, etc.)	Appropriate Departments of the State Government & Ministries of Central Government

Source: IDFC, 2009

Besides being involved in these approvals and clearances, state government departments also incur administrative costs of

- Addressing Compensatory Afforestation Fund Management and Planning Authority (CAMPA) requirements
- Cost of administering diversion of forests
- Costs of reforestation at alternative locations

- Implementing and enforcement of R & R plans – address loss of infrastructure, livelihoods and rehabilitation of displaced population
- Costs of addressing water pollution from coal mining and impacts on ground water levels and aquifers
- Costs of addressing air pollution impacts
- Cost of monitoring the air and water pollution indicators
- Costs to monitor the compliance of mining establishments on the above
- Costs of addressing mine closures, land remediation (if abandoned) and management of waste dumping
- Creation and maintenance of road infrastructure

Agencies and their functioning in coal mining facilitation

Table 25 describes the major administrative procedures undertaken by the various institutions and the administrative costs incurred by these institutions in the processes.

Table 25 Administrative institutions, procedures and costs

Stage of Coal life cycle	Processes undertaken during this stage of coal life cycle	State institution involved	Processes undertaken by the institution	Costs to the institution	Payments made towards these costs
Exploration	Prospecting, Reconnaissance and Exploration	Department of Mines	Review of application for prospecting license, reconnaissance permit and mining exploration plan. Approvals of plans, provision of clearances, granting of lease and permits	Manpower costs, establishment costs	Reconnaissance permit fee Prospecting Fee Application fee for Reconnaissance permit Application fee for prospecting license Application fee for mining lease Security deposits for reconnaissance permit, prospecting license and mining lease
		Department of Forests	Assess viability and major impact on forests and grant forest clearance for prospecting and exploration	Manpower costs, establishment costs	

Stage of Coal life cycle	Processes undertaken during this stage of coal life cycle	State institution involved	Processes undertaken by the institution	Costs to the institution	Payments made towards these costs
		Department of Environment	Approvals of plans after assessing impacts on the environment, grant of environmental clearance for prospecting and exploration	Manpower costs, establishment costs	
Mine Development	Formulation of detailed mining plan, mine closure plan, land acquisition, development of infrastructure	Department of Mines	Review of applications for mining lease and scrutiny of mining plan, mine closure plan. Grant mining lease	Manpower costs, establishment costs	Dead rent
		Department of Forests	Assessment of impact on forests. Calculate requirements under CAMPA and identify afforestation sites. Grant Forest Clearance	Manpower costs, establishment costs, costs to undertake afforestation activities under CAMPA	Payments made under CAMPA divided under compensatory afforestation and NPV
		Department of Environment	Assessment of environmental impacts from mining activities. Grant environmental clearance	Manpower costs, establishment costs	
		State Pollution Control Board	Grant of consent to establish and consent to operate for new infrastructure for mining operation – water, electricity, roads - and authorization for hazardous waste.	Manpower costs and establishment costs at levels of Headquarters of Department as well as Regional centers.	Consent to establish fees paid to the State Pollution Control Board

Stage of Coal life cycle	Processes undertaken during this stage of coal life cycle	State institution involved	Processes undertaken by the institution	Costs to the institution	Payments made towards these costs
		Department of Water Resources	Grant of conditional clearances for diversion of water ways or streams. Provision of water for mining activity.	Manpower costs, establishment costs Increase in the use of conjunctive resources – for mining purposes and for new settlements resulting from displacement	Water rent/rate/cess/tax
		Department of Revenue District Collector District Magistrate Tehsildars	Land acquisition from private land holders, formulation and implementation of Rehabilitation and Resettlement Plans.	Manpower costs and establishment costs at levels of Headquarters of Department as well as revenue division and District offices. Opportunity cost of land used for resettlement	Establishment contingency costs - 10% of land acquisition cost out of which the District collector retains 5%, Government public finances retain 4.25%, Revenue Division Center retains 0.05% and the Head Quarters of Department of Revenue retains 0.25%
		Industrial/Infrastructure Development Corporation (if the state has such an organization)	Mediatory functions between company and people; support district authorities in land acquisition and preparation of R&R	Manpower costs, establishment costs	Facilitation charges of 10% of the land acquisition cost

Stage of Coal life cycle	Processes undertaken during this stage of coal life cycle	State institution involved	Processes undertaken by the institution	Costs to the institution	Payments made towards these costs
		Department of Transport, roads, highways Department of Housing Municipal departments	Assess the requirements for new infrastructural requirements for mining activity and R&R and create new infrastructure.	Manpower costs, establishment costs, costs to develop new infrastructure	Development charges
Resource extraction	Coal mining, transport of coal from mine to power plants, other states and other end use purposes Abatement of pollution arising from coal mining	State pollution control board	Continuous monitoring to ensure compliance to rules, regulations and conditions on mines. Issue notices on non-compliance. Monitoring for air and water pollution in mining regions. Periodically renew of consent to establish.	Manpower costs and establishment costs at levels of Headquarters of Department as well as Regional centers and District offices whichever is applicable.	Charges for renewal of consent to operate. Water cess under Water (Pollution and Control of Pollution) Cess Act, 1977 and Amendment 2003
		Home Department	Ensure law and order in coal mining areas and take action on illegalities[45]	Manpower costs, establishment costs	
		Municipal Authorities	Provide services such as waste disposal, sewage treatment for areas adjoining mining areas as well as areas of settlements of displaced people.		
		Department of Forests	Addressing requirements of CAMPA –	Manpower costs, establishment	

[45] Mineral Administration Costs are incurred towards monitoring after approvals and commencement of mining operations, satellite mapping, gate checks using IT systems, enforcement of police, patrols by forest department, checks by Pollution Control Boards and other departments. These costs incurred in mineral protection are not directly charged to developers.

Stage of Coal life cycle	Processes undertaken during this stage of coal life cycle	State institution involved	Processes undertaken by the institution	Costs to the institution	Payments made towards these costs
			afforestation activities	costs, costs for afforestation and related activities	
		Department of Mines	Renewal of leases and consents	Manpower costs and establishment costs	Royalty
					State level levies such as cess Sales tax collected by State government Property/house/municipal tax to local government Local government body taxes
Mine Closure	Land remediation, restoration and reclamation Implementation of mine closure plan	Department of Environment	Ensuring compliance to mine closure plan	Investment in land reclamation of abandoned mines	
		Department of Mines	Ensuring compliance to mine closure plan	Manpower costs and establishment costs	Fixed deposit for Mine closure is made under ESCROW account managed by CCO
		State Pollution Control Board	Management of abandoned mines through reclamation	Manpower costs and establishment costs Investment in land reclamation of abandoned mines	

Administrative expenses towards environment protection

Needless to say, with the involvement of numerous institutions and decision making levels, environmental protection and regulation has various costs and expenditures. There are one-time costs of creating consensus for enacting laws, rules and guidelines for environment management and then there are on-going costs to implement these and monitor

performance against these rules. Some of these costs can be classified as expenditures and the outlay for them measured in monetary terms; but some of these costs cannot be directly measured.[46]Most of these expenditures and costs vary on a case by case basis dependent on spatial factors (specific to location), temporal factors (specific to time frames) and factors related to the actors and institutions involved; making it extremely difficult to estimate the costs and expenditures of environmental regulation.

It is assumed that there is no such thing as costless environmental regulation because the premise is that in a market economy, any new expenditure on regulation represents a loss because it diverts resources away from things that consumers have chosen for themselves. (Ackerman, 2006) On estimating the cost of environmental regulation, industry has highlighted fears that environmental regulations (especially new regulations) impose significant costs, slow productivity growth and hinder competitiveness by reducing margins. (Jaffe et. al, 1995) Some of the theoretical arguments for this claim have been presented in (Arthur D. Little, 2002), (Mercer Management Consulting, 2003), (McGuire, 1982), (Rudiger, 1975), (Siebert, 1977) and (Yohe, 1979).

Contrary to these arguments, a more recent view of regulatory costs is more benign postulating that environmental regulation either has a net positive impact on the competitiveness of the economy or that these costs are too small to matter or that a reduction in these costs may not be as beneficial as promised. (Porter & van der Linde, 1995), (Porter M. , 1990), (Jaffe et. al, 1995), (Ackerman, 2006) Discussing the debate over the costs of environmental regulatory programs, (Harringtonne et. Al, 1999), point out that there are two facets in this debate – one is whether all cost elements have been included in the estimates; and the other is systematic errors during the estimation of regulatory costs result in differences between ex post and ex ante comparisons of environmental regulation.

In order to assess the administrative expenditures and costs borne by the state governments and their various institutions for coal mining, this study listed the processes undertaken by the institutions to facilitate coal mining corresponding to each step of the coal mining lifecycle.

It should be kept in mind that while the units of these administrative/institutional costs can be person hours, actual quantification is not attempted here. Public institutions and their spending are financed by public finance mechanisms and not by market revenue. While the institutions may charge processing fees to cover some establishment costs incurred for a particular purpose (as described in the table above), the costs of providing services and public goods are met by budgetary transfers between levels of government.

Payments towards administrative costs

The payments made by proponents towards these procedures are mainly processing fees in the form of application fees, permit fees, consent fees or renewal fees. Beyond these processing fees, there are deposits to ensure that the proponent will undertake its environmental and social responsibilities after the prospecting or mining activity is completed; there are payments for the use of resources such as water cess and for

[46] In management parlance, expenditures are defined as cash outlays that do not have any expected benefits (but may be unavoidable); while costs are defined as outlays that are expected to have benefits or returns from its spending.

development of relevant (common corridors) infrastructure in the form of development charges. In the processes that the department incurs enormous manpower or establishment costs, the state department charges establishment contingency costs (or facilitation charges in case of the industrial development corporations that are funded by their own resources and not by the state government). These establishment contingency charges are meant to cover the costs incurred during the process such as land acquisition from private owners. Beyond these charges, all costs incurred by the state government departments are met by their budget allocations under plan and non-plan heads for their functions. The expenditures reported by the departments are not demarcated based on the sector it is spent on but on the function that is performed.

Nevertheless, the charges for administrative processes are separate from compensation that is made to the state for the resource that is extracted and the payments made towards compensatory activities for reducing externalities that are created as a result of the mining activity. Payments made to the Compensatory Afforestation Fund Management and Planning Authority is towards compensatory afforestation and payments for Net Present Value of the forests diverted for the purpose of coal mining. There are payments for the use of the land – dead rent - and the royalty payments for the resource extracted which is paid to the state government. Other levies by the state government include local government taxes and sales tax.

Our consultations with state government departments in Odisha revealed that while there are payments made for addressing some of the expenses incurred towards establishment costs, these don't cover manpower costs. Table 26 provides a summary of the various establishment costs incurred for administrative processes for coal mining by the different departments consulted in Odisha.

Table 26 Various establishment costs incurred for administrative processes for coal mining by the different departments

Institution	Descriptions of costs incurred
Odisha Industrial Infrastructure Development Corporation (IDCO)	The dialogue and convincing process is long, time consuming, and unavoidable. And the effort and time for land acquisition varies from place to place. For instance the time and effort for land acquisition in Keonjhar would be different from what it would take for Niyamgiri. As an estimate, mining projects need approximately 10-15% more effort than other projects involving manpower costs and infrastructure being built. IDCO charges administrative charges to private developers, infrastructure maintenance charges for PPPs, SEZs and IT parks and 10% of land cost to cover their costs. There are costs on infrastructure like existing roads, rails, highways for movement within coalfield. A common railroad corridor is being planned in Talcher for PSUs by IDCO; which would ultimately adopt a payment per use basis and railways will operate it. There is contribution from private developers as well. IDCO has been provided loan for this by Odisha Mining Corporation.

Institution	Descriptions of costs incurred
Odisha State Pollution Control Board (OSPCB)	The OSPCB has 1 board Headquarter and 9 regional officers out of which 3 regional offices of Angul, Sambalpur and Rourkela deal majorly with coal mining. Almost 25-35% of time and budget of the Talcher regional office can say to be spent on coal mining. The total manpower of the OSPCB is about 200 with 60-65 technical personnel. Talcher regional office has 12-13 personnel. In terms of budget the OSPCB spends 20-30% of their total budget of 10-12 crores on pollution analysing equipment which is common for all mining and industrial sectors.
Department of Steel and Mines	In terms of human resources dedicated to coal mining clearances, there is a coal cell that has 2 consultants, 1 section officer, 1 data entry operator and 1 person in the directorate of mines. A "mineral enforcement force" of 1000 dedicated personnel has been proposed. Currently any expense incurred on mineral protection is not directly charged to developers with 3 enforcement squads each for iron, manganese and chromium. All these requirements are expected to go up as soon as private mining lessees increase. Total department budget is 35 crore and 3 out of 10 deputy directors deal with coal mining (Talcher, Sambalpur, and Rourkela).
Department of Water Resources	Mostly manpower costs and establishment costs are incurred in clearance processes.
Department of Revenue	The R&R compensation packages do not cover additional costs that are spent on rehabilitating the population, mostly roads and amenities. Only physical aspects are compensated in compensation packages to the project affected people. Other infrastructure also has to be created – drinking water provision, electricity, roads are all borne by the state, the proponent does not pay for example for a new substation or other requirements that needs to set up for the new settlement and are beyond R&R.

Estimates of administrative costs incurred on addressing coal mining

To assess the expenditure on the administrative machinery associated with coal mining, stakeholder consultations were undertaken to ascertain the approvals and clearances required for coal mining, the processes involved in these clearances, the number of personnel involved in their respective institutions, an estimation of time consumed as a proxy of the efforts needed for these clearances along with cost figures associated with these clearances that could provide an estimation of the expenditures on administrative machinery.

During the consultations, the various departments provided details on the roles performed in the administrative clearances for coal mining along with an overview of the processes involved in the clearances; though all departments were of the opinion that expenditures on the administrative machinery for coal mining would be difficult to chalk out from their overall administrative expenditures of the state government departments consulted, only the Department of Steel and Mines in Odisha has a dedicated coal cell; personnel involved in clearances in other departments do not spend all their time on coal mining clearances and it was difficult to estimate the time invested in coal related clearances as a ratio of total time spent on administrative procedures. There are 3 circles for coal mining in Odisha each of

which has a deputy director and 30-40 employees who may be dedicated to coal. In terms of costs directly incurred for coal related procedures again it was noted that since the departments are funded directly from state revenues, there is no differentiation in allocated budget towards specific sectors rather it is towards specific functions. This factor again made it impossible to estimate the costs that the department incurs towards administrative clearances for coal mining.

Another challenge in estimating administrative costs due to coal mining is establishing the exclusivity of administrative costs due to the activity under consideration. Capital and operating expenses (personnel, materials etc.) especially those applied for monitoring environmental quality would be installed even if there was no coal mining in the region and it is presumed that there would only be a marginal increase in these expenses due to coal mining. Similarly number of Municipal services such as recycling water, garbage collection, etc. would still have to be provided, though in the case of the mining districts, conditions would be more severe.

In order to overcome the challenge of attributing costs for coal mining particularly, some estimations of costs incurred towards coal related environmental clearances have been made on the basis of revenue expenditures of the states being studied. The administrative services expenditure incurred towards the environment was calculated[47]and from this expenditure it was assumed that some amount can be attributed to coal related environmental clearances. The ratio of number of environmental clearances for coal to total environmental clearances given in a state in a year was taken as a proxy to estimate the extent of expenses that could be attributed to coal (the MOEF environmental clearances portal was used for this data) and multiplied with the administrative services expenditure incurred towards the environment. Based on these administrative services expenditure incurred towards coal related environmental clearances, as per tonne cost of administrative expenses for coal mining was calculated (by dividing with the total production of coal in the state for the year). (Table 27 below)

Table 27 Estimates of administrative costs incurred on addressing coal mining (estimated over 2007/8 – 2010/11)

State	Rs/T	Average per year admin cost (Rs. Lakh)
Chhattisgarh	0.842184	875
Jharkhand	1.18518	717
Madhya Pradesh	1.951219	1376
Odisha	0.101623	101

The estimates of administrative costs incurred on addressing coal mining estimated over the period 2007/8 to 2010/11 are given in Table 27. The average for the four states studies works out to Rs. 1/tonne of coal mined (please refer to Annexure B for details).

[47]by taking the ratio of revenue expenditures under the heads of 'Forestry& Wildlife' and 'Science, Technology & Environment' to the total Revenue Expenditure for that year; and multiplying that ratio with the total revenue expenditure on Administrative Services

There are also mineral administration costs which are incurred not only during the development stage of the mine but also include post mining processes like monitoring after approvals and mine starts operating, satellite mapping, gate checks, IT systems, police enforcement, patrols of forest department, pollution control boards, environment department and others.

However, the security costs incurred by the state, centre and CIL are not included in the costs above. The States were not able to give us these costs. Discussions with Coal India suggest the security cost for the company alone are around Rs 40 per tonne.

Security costs are of particular concern to coal bearing states. In general, law and order is a function that States should bear and states should ensure that industry is able to function with least disruption.

Regulatory framework

The Indian constitution has specific provisions for regulation of development related environmental and social externalities. This is discussed in detail in Chapter 7. This mandate to protect the environment has been strengthened with the recognition of the right to a wholesome environment as being implicit in the fundamental right to life, guaranteed in Article 21 of the Indian constitution. The evolution of environment legislations in India can be said to have begun with the UN conference on "Human Environment" 1972 held in Stockholm.

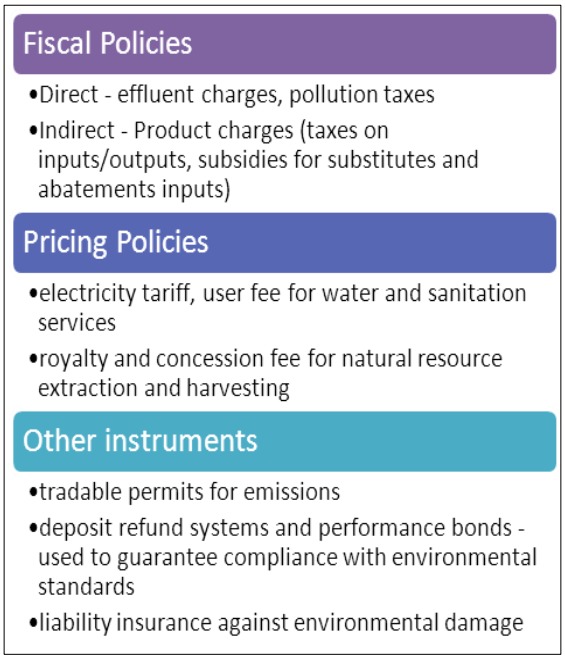


Figure 12 Market based instruments for environmental protection, adapted from (Bradley 1998)

The evolution of environmental regulation across numerous countries took the form of various instruments consisting of fines/taxes and monitoring systems; some of which later developed into other environmental economics regulations such as quotas, tariffs on pollution and creating various kinds of property rights and trading systems. Some of the prevalent market based instruments for environmental protection are listed in the adjoining figure.

The Indian legal framework also adopted a 'command and control' approach of –

- laying down standards for the quality of environment in its various aspects,
- standards for permissible levels of emissions/discharges of environmental pollutants,
- restrictions on areas where polluting activities may take place,
- examining processes, substances, equipment and materials for their impact on the environment and its abatement,
- investigating problems related to the environment,

- And laid down the procedures and safeguards for prevention of accidents that may lead to environmental pollution as well as guidelines for prevention, control and abatement of negative impacts on the environment

The implementation of this command and control approach is through a network of institutions at multiple levels that have been established with the goal of ensuring environmental stewardship to support economic activities. This network of institutions interfaces with a larger governance framework within any sector which is also multilevel and covers multiple domains within environmental, social and economic realms.

To implement the recommendations, the government of India enacted several Acts on environment. Environment Protection Act (EPA) 1986 is, however, an umbrella legislation, which has precedence over the pollution control Acts

Environmental protection

The Environmental Protection Act 1986 defines that it is the responsibility of the person carrying out industry operations to prevent and mitigate environmental of the prescribed standards described by the Central government. In the case of a discharge of environmental pollution in excess to the standards prescribed, the relevant authorities and agencies are required to take remedial measures necessary to prevent and mitigate environmental pollution. Project proponents are required to undertake all possible measures to abate water and air pollution. Since 2003, restoration schemes and land reclamation have become important components of mine planning. The project proponents are now required to submit closure plans and give details of corpus funds to MoEF five years in advance of closure. Also, they are mandated to follow various practices for effective land reclamation. This includes the practice of preservation of top soil for the subsequent use in reclamation. The different state departments have the responsibility of monitoring and ensuring compliance.

With regard to conservation of forests, Forest Conservation Act (FCA) enacted in 1980 plays an important role. It restricts the powers of state governments in respect of de-reservation of forests and use of forest land for non-forest purposes without prior approval of the Central government. The Act stipulates that, for any area of forest lost due to development, the proponents have to pay for purchase of an equivalent area of non-forest land as near as possible to the site of diversion, or twice the degraded forest area. The land is then transferred to state forest department and is declared as protected forest. The mining companies also need to fund compensatory afforestation (CA) on these lands, along with payments equivalent to the estimated net present value (NPV) of diverted forest land. Both CA and NPV are deposited to Compensatory Afforestation Fund Management and Planning Authority (CAMPA) under the state forest department, which is then realized for implementation under forest management plan. Advisory Committee headed by the Inspector General of Forests in the Ministry of Environment and Forest (MoEF) is responsible for overseeing the implementation of statute.

Land acquisition

The first piece of the legal framework was the Land Acquisition Act of 1894. It established the Government's power of "eminent domain" - all land within the borders of a nation

belonged primarily to the state. A colonial legislation in the most literal sense, it has nevertheless survived to the present day, having once been substantially amended in 1984. As it stands, the 1894 Act allows the Government to acquire any land, against the wishes of the 'owner', so long as the acquisition fulfils a public purpose and compensation is paid. Post 1984, it also allows the Government to acquire land on behalf of the private sector.

While the 1894 Act is a general legislation, legislation more specific to the coal sector – the Coal Bearing Areas (Acquisition and Development) Act - came into force in 1957. The Act allows the Central Government to prospect for coal on any land and then, if it chooses, to acquire the land after notifying the owner and allowing time for a hearing of objections. The Government can, at the time of acquisition, nominate a public company (such as Coal India Limited and/or its subsidiaries) in which the rights to the land shall vest.

One of the most controversial features of both acts is their (identically worded) provisions regarding compensation to the land owner. Compensation is calculated based on the market value of the land, but does not reflect even partially the value of minerals present under it. The fact that the mineral would not be accessible unless such access is provided via the land is not recognized. This market value of the land is calculated based on the date of the notification of the Government's intention to acquire the land.

Policy instruments for addressing externalities

As has been established in this study and various other studies on the creation of social and environmental externalities, no particular form of policy instrument from government – command and control based or market based – can be appropriate to address all environmental problems simultaneously. The nature and characteristics of the externality created along with the socio-economic and political factors decides which instruments are appropriate to implement.

Market based instruments are regulations that encourage and incentivize behaviour through market, price and economic signals rather than through explicit directives to reduce or eliminate environmental externalities. (Stavins, 1998) (Wikipedia) If well designed and implemented appropriately, these instruments create incentives that encourage environment friendly behaviour rather than forcing firms to share burdens of reducing externalities regardless of the relative costs to each of them.

Command and control instruments include emission standards, technological specifications such as for processes and equipment, limits of allowable pollution units, requirements for compliance reporting and audits for performance. Command and control regulations as are implemented by our regulatory framework specify standards for performance – most notably for limits of allowable units of pollution in a particular time period. In practice, there are high costs of limiting pollution to a certain level at the firms' side – because of large investments required to control and adhere to the standards – and at the regulators' side – because of the requirement of constant monitoring; failing which firms get incentives to forego any pollution control activity rendering the whole regime ineffective. Market based instruments also give the liberty to firms of choosing the best way to reduce externalities and employing technological solutions in innovative ways.

Prevalent market based instruments include pollution charges and environmental taxes, tradable permits or licenses, market barrier reductions and reductions in government

subsidies. Environmental taxes particularly aim to fix the costs of controlling externalities and also create opportunities to transfer resources from private to public domains. In a scenario of technological advancement, these taxes would lead to an increase in the level of controlling externalities. Also, a tax or cess on the creation of environmental externality makes the costs on firms and consumers from its implementation obvious to both these parties but at the same time does not provide a lot of scope for strategic behaviour especially from firms. (Stavins, 1998)

However, environmental taxes may not automatically adjust for inflation and their transaction costs may drive up actual costs of compliance. The efficiency of environmental taxes is directly dependent on the marginal benefit and marginal cost functions from the introduction of the tax. (Stavins, 1998)

The overall effectiveness in the form of mitigation of externalities from environmental tax and cess is in fact dependent on the utilization of the tax revenue and the primary justification of an environmental tax should be the benefit that will be derived from its implementation and not just the introduction of a tax regime for itself.

Resettlement and rehabilitation policies

As recognized in the Preamble to the National Resettlement and Rehabilitation Policy, 2007, land acquisition en masse under the eminent domain paradigm causes "…involuntary displacement of people, depriving them of their land, livelihood and shelter; restricting their access to traditional resource base, and uprooting them from their socio-cultural environment…". This necessitates "…a broader concerted effort on the part of the planners to include in the displacement, rehabilitation and resettlement process framework not only those who directly lose land and other assets but also those who are affected by such acquisition of assets."

These statements reveal an advanced understanding, at least, of the fallacy of perceiving land simply as transactable property. First, land serves as a source of livelihood and the centre of the social existence of the family. Second, the location of land in relation to non-privately-owned common property resources such as forests, pastures and water sources imbues it with value. Third, the re-location of a large number of land-owners affects a significant number of lands-less individuals, especially those who provide services to the populations displaced.

The amount of compensation legally due to a land-owner under eminent domain legislation, therefore, simply addresses the beginning of the loss caused by the involuntary acquisition of land.

Interaction between Policies

Resettlement and Rehabilitation (R&R) Policies have been promulgated at the National, State and PSU level. While R&R was usually addressed on a project specific basis, the 1990s saw the introduction of general policies directed at R&R across coal mining projects. Coal India Limited published its first R&R policy in 1994; it was most recently updated in 2012. A National R&R Policy (NRRP) was introduced in 2003 and updated last in 2007. Specific to coal-rich states, Odisha (2006) and Jharkhand (2008) have also introduced policies of their own.

R&R policies typically deal with displacement caused by several types of development projects, including mining. Therefore, Central and State policies have a significant portion of overlap. This overlap, however, is simply resolved by the question of which is the 'appropriate Government' with regard to any particular project.

According to the NRRP 2007, in the case of i) acquisition of land for the purposes of the Union and ii) a project which is executed by a Central Government agency or on the orders and instructions of the Central Government, the appropriate Government is the Central Government. In all other cases, the State Government is the appropriate Government. The appropriate Government is responsible for appointing an Administrator and/or Commissioner for R&R as the case may be, conducting an audit of the areas proposed to be acquired, conducting a Social Impact Assessment, drawing up an R&R Plan and ensuring disbursement of benefits, among other administrative duties.

The second relevant party is the 'requiring body', i.e. the entity which is acquiring the land, or on behalf of which the land is being acquired. This may be the Central or State Governments themselves, public sector undertakings (such as Coal India Limited) or even private companies.[48]All R&R policies identify the requiring body as the one which must bear the cost of the resettlement and rehabilitation package.

The CIL and NTPC policies also overlap significantly with those of the Centre and the States. CIL's R&R Policy of 2008 addressed this overlap by stating that the CIL Policy would be updated as and when the Centre and/or the States issued new guidelines. The latest CIL policy states in its Preamble that it has been drafted keeping in mind the NRRP 2007 and the practices followed across different states.

However, it is a common complaint by CIL and its subsidiaries that the differing policies across states slow it down greatly in its purposes.

Regulatory deficits and failures

The governance of the coal sector in India is not just between government and its related entities as it may seem; it is very much the relationship between central government (and its entities-executive branches and institutions) and state governments; between government and citizens or society; increasingly between government and the private sector and market forces; and finally the relationship of all these entities with the environment

Despite the existence of a policy and legislative framework, environmental and social conditions in and around the mining areas has continued to deteriorate over the years, as seen in the previous sections and there have been serious lapses in the management of social externalities.[49] These negative environmental externalities have led to health impacts for the communities residing in and around the mining regions while social externalities have led to inequity and unrest among the population that has been displaced but not compensated adequately. Table 28 gives the different externalities, the responsibility of the state and

[48] While land cannot be acquired on behalf of private companies under the Coal Bearing Land (Development & Acquisition) Act, 1957, it can be acquired in public interest on behalf of a private company under the Land Acquisition Act, 1894.

[49]This section builds on the work done In TERI 2011

project proponents with regard to addressing the externalities, and the impacts resulting from externalities that are not addressed adequately.

An analysis of the laws and policies and an evaluation of their effectiveness through various stakeholder consultations suggest that much of the problem with coal mining in India is due to the poor enforcements of different regulations at various stages of the life cycle of coal mining.

While the regulatory framework describes the actions of the government through various legal provisions, the fact that externalities have been created in the process of coal mining which have not been addressed or compensated adequately, directs our attention to the existence of regulatory failures in the governance of this sector. Several regulatory failures have been identified by the state governments themselves and while these may seem to be the low hanging fruits in administrative responsibility, these have been most difficult to address in the last four decades of state led coal mining activities.

For the externalities that have been described in the sections above, each has been addressed completely or at least in parts in our legal framework. The scope of the environmental regulatory framework covers all major externalities of forest diversion, air and water pollution, land degradation, management of extractive activities and rights of people to forest use. There are also provisions for addressing social externalities that are created due to coal mining in particular but as the study findings show there are lacunae in the current legal framework to address these externalities.

While the legal framework has been able to demarcate property rights to resources (such as coal) and responsibilities to ensure the upholding of these property rights, it has been unable to institute efficiency on the part of the administrative machinery towards the creation of public goods and services. Increasingly the lack of efficiency or adequate implementation of regulation has been blamed on the lack of resources and capacity of the administrative machinery and to the fact that there is little communication between institutions that function in the same area or domain matter resulting in a lack of coordination among them.

Beyond these it is clear that the coal sector suffers from an overlap and discrepancy in the roles and responsibilities of the institutions involved which ultimately results in a lack of regulatory efficiency. In the case of resettlement and rehabilitation for people affected by coal mining, there is a proliferation of policies in the absence of a national legal framework that has provided a pretext for the planning of R&R to be ambiguous thus creating numerous social externalities that are either inadequately compensated or not addressed at all.

Finally two of the biggest regulatory failures are those that are most difficult to legislate – the failure of leadership or political will power to take decisive action in mitigating social and environmental externalities; and the failure of public and private business entities to self-regulate in a way that creates minimum social and environmental externalities.

Table 28 lists the externalities that are created during the various stages of the coal cycle and also describes some of the gaps in addressing these various externalities and the impacts that are not adequately addressed by the current sharing of responsibility among the project proponent and the government.

Table 28 Addressing externalities – roles and agencies

Stage of coal life cycle	Externalities created during this stage	Responsibility of the proponent	Responsibility of the state	Impacts from externalities that are not addressed adequately
Exploration	Temporary disruption of wildlife and habitat due to different kinds of survey methods, vehicular traffic, ground disturbances and noise.	Take precautions to reduce impacts from exploration		
Mine Development and resource extraction	Destruction of forest and loss of biodiversity	Make payments for compensatory afforestation and NPV under CAMPA. -CAMPA funds for Odisha estimated at Rs.5 billion -CAMPA funds for Jharkhand estimated at Rs.12 billion -CAMPA funds for Chattisgarh estimated at Rs.15 billion	Implement afforestation plans and restoration of forests	Loss of prime forests, species diversity and vital ecosystem services that are permanently lost and may not be restored to original state after afforestation. **Partially compensated**
	Water pollution	All possible measures for Pollution abatement	Monitoring and ensuring compliance	Cumulative impacts of water pollution of major rivers and streams even though mining activities themselves are compliant to existing standards. Degradation of water streams due to waste water from coal washeries. Degraded water let into streams meant for agricultural use resulting in loss in productivity. **Not compensated**
	Air pollution	All possible measures for Pollution abatement	Monitoring and ensuring compliance	Cumulative impacts of air pollution that may precipitate in the form of health impacts in project affected population. **Not compensated**
	Land degradation	Proper management of overburden,	Ensure compliance to	Loss of agricultural productivity due to dust

Stage of coal life cycle	Externalities created during this stage	Responsibility of the proponent	Responsibility of the state	Impacts from externalities that are not addressed adequately
		conservation of top soil and all possible measures for dust suppression	rules regarding overburden management and dust suppression	settlement in areas adjoining coal mines. Emissions and dust settlement during transportation of coal. **Not compensated**
	Displacement	Provide compensation packages and pay for rehabilitation and resettlement of displaced population	Implement R&R plans and ensure adequate compensation is disbursed to the displaced families and provide for basic amenities to settlements Grievance redressal	Inadequate compensation for land Inadequate compensation for loss of homestead. Conflict between existent and re-settled communities. Loss of social ties if re-settled separately. New settlements often lack facilities promised especially education and healthcare. Single women denied benefits because of lack of proof. Hardships faced by project affected people who are not displaced. **Partially compensated**
	Loss of livelihood	Forms a part of R&R packages Proponent is required to offer skills development aimed at employment in the project or provide other skill development for self-employment and entrepreneurial avenues.	Ensure the provision of these features in the R&R packages	Loss of income from land. Loss of income from services used by displaced community. Disruption of shifting agriculture practiced by tribal populations. Lack of vocational training relevant to new market opportunities. One job per family ignores women's contribution to income generation. **Partially compensated**
	Destruction of common property resources			Loss of income from selling forest produce. Loss of culturally significant assets. Loss of pastures/forests for cattle. **Not compensated**

Stage of coal life cycle	Externalities created during this stage	Responsibility of the proponent	Responsibility of the state	Impacts from externalities that are not addressed adequately
Mine Closure	Land degradation	All possible measures for remediation and reclamation of degraded land and return it to original state	Ensure compliance to rules and ensure restoration of land to original state	Land degradation resulting in barren lands and waste dumps with increased risk of contamination if not managed properly. Opportunity costs of land under abandoned mines for which the state governments do not get any revenues and cannot put to other uses. **Not compensated**
	Loss of livelihood			Loss of job on closure of mine and lack of opportunities for unskilled workers.

The sub sections below highlight some of these regulatory deficits:

Pre mining stage

Environmental clearances

Problems of implementation have been found with regard to environment clearances as mandated under the EPA. As reported by the (CAG, 2012) 239 coal projects have been found operating without clearances. During stakeholder consultations with Jharkhand State Pollution Control Board, it was found that many coal mining companies in Jharkhand are operating without environmental clearances. Out of 60 CCL mines, only 35 mines were reported to have environmental clearance. Similarly, in case of ECL, out of 17-18 mines, only 3-4 had environmental clearance. The process of EIA comprising mandatory screening, scoping and public consultations is also fraught with certain inherent challenges.

A workshop conducted by TERI in 2011- "Making Minerals Development Work for the People", brought forward issues highlighted by stakeholders in the EIA and its processes. Some of the issues discussed were –

- Collection of data is inaccurate & the methodology adopted for EIA is unscientific
- There is a conflict of interest as the project proponents themselves get the EIA conducted
- Fabrication, reproducing old information, or avoiding crucial facts from the EIA document is common
- Process of public hearings/consultations is almost farcical; often government officials collude with company to intimidate those attending the public hearing and voice is snuffed.

- In absence of cumulative impact assessments, many lease areas comprising smaller areas (less than 5 hectares) are excluded from the requirement of an EIA, leading to unchecked mining and exploitation
- Most of the assessments are conducted during summer season when the land is drier and meaner. As a result, water courses are generally neglected in EIAs.
- Issue of implementation and inadequate capacity of the appraising as well as monitoring authorities make the EIA process a mere administrative formality[50]

Measures to compensate for forest land diverted

During stakeholder consultations with officials in the forest department in Ranchi, Jharkhand[51], it was found that compensatory afforestation has also not been done for many mining projects. The stakeholders in the forest department informed that coal mining companies generally transfer funds to CAMPA in time; however, the follow up action of implementing the program by the state government is not done. Non- release of funds from CAMPA due to lack of co-ordination between central and state governments has been the major reason behind the lag. Also, it was reported that in the projects in which CA has been done, no emphasis was given to restoring the original ecological order and biodiversity of the area. It was done more for the sake of meeting the policy requirement.

A recent report by the CAG focused on the activities of CAMPA highlighted numerous shortcomings on the operationalization of compensatory afforestation and unauthorized diversion of forest land which is a violation of the environmental regime. Some of these are shortcomings are summarized below –

- Only 27% of non-forest land was received by the government for compensatory afforestation and only 7% of land was actually under compensatory afforestation.
- 48% of the non-forest land received for the purpose of CA was actually transferred to Forest departments and only 14% of this land received was declared as Reserve forest.
- The CAG noted that there is poor data collection and maintenance by regional offices of MOEF and the state forest departments. There is an absence of MIS and consolidated databases for monitoring of activities.
- The report particularly mentions that there has been unauthorized renewal of mining leases in Rajasthan and Odisha without approval from central government. There has been arbitrariness in forestry clearances, unauthorized renewal of leases, cases of illegal mining, projects operating without environmental clearances and an unauthorized change in the status of forest lands. In terms of action, only 3 instances have been noted that too to the extent of show cause notice.
- The CAG noted a significant non-recovery and under-assessment of NPV and CA (penal or additional) in states of Odisha, Jammu & Kashmir, Madhya Pradesh, Tripura, Assam, Uttarakhand, Gujarat, Jharkhand, Manipur and Chattisgarh.

[50] Stakeholder workshop conducted by TERI on "Making Minerals Development Work for the People", held on December 2, 2011

[51] These consultations were made in 2011 under the project on Responsible sovereignty and Energy Resources" supported by Konrad Adenauer Stiftung (KAS) during 2011

- Adhoc CAMPA was ineffective in ensuring complete and timely transfer of money collected by states and UTs.
- Only 61% of the funds released for CA have been utilized due to delay in APO preparation and delay in release of funds.
- Expenditures incurred by Adhoc CAMPA and state CAMPA have been without legislature authorization and there have been no reports of incomes and outgoing expenditures. (Comptroller and Auditor General of India, 2013)

Also land that is taken up for compensatory afforestation is often common lands taken from people without prior consent or compensation. This land is then transferred to the Forest Department, becomes protected forest once afforested, alienating people from their use.

Performance with regard to compensation for land, resettlement and rehabilitation

According to an official at the Odisha Department of Revenue -

> *"Compensation for land is a long drawn process and even circle rates change before compensation is awarded. There are challenges in handing over as well. We have had some cases where the land was paid for but the company did not take possession which created problems for the department."* (Taradutt, 2013)

In Odisha, arbitrary differences are observed in the amount of compensation for quantitatively and qualitatively similar land (Nari Surakhshya Samiti, 2010). Worse, in Jharkhand, ten years after the original acquisition took place; oustees in Parej East have still not received any compensation (The Hindu, 2003).

At the other extreme, land compensation often works as a lump-sum wind-fall for the displaced individual, which is then spent indiscriminately (Garada, 2013). According to the same official at the Odisha Department of Revenue, there is a real need for wealth management advice to be available to displaced individuals (Taradutt, 2013).

Homestead compensation

The loss of homestead is often the only "landlessness" contemplated for compensation in the R&R plans. This is negated, for example, in the village of Agaria Tola (Jharkhand) by the Government acquiring land around 18 houses, rendering them virtually unliveable without entitling them to any benefits (Imam, 2007).

In Talcher (Odisha), from the inception of Mahanadi Coalfields Limited's open cast operations up until 2010, 65% of the project affected families have not received homesteads or homestead compensation. Out of those who have received benefits, only 17% have received a homestead plot. Neither the details of the plots nor the methodology of determination of cash compensation are freely available (Nari Surakhshya Samiti, 2010).

Moreover, rehabilitation progress statements issued by the company have been shown to not tally with the pace of house construction at resettlement sites in Jharkhand (Imam, 2007).

Employment/compensation in lieu of employment

While the policies offer, in the understanding of the displaced, an option between employment and compensation against livelihood from land, this is circumvented by the inclusion of terms in the policy such as "as far as possible". On the ground, this translates as a "statement of options, rather than an intention"; PAPs almost always receive compensation rather than a job (Imam, 2007). Further, CIL representatives' propensity to create the false expectation of a job in CIL has been criticized by the World Bank's Inspection Committee (Herbert & Lahiri-Dutt, 2004).

In Talcher, from inception to 2010, around a fifth of the families identified as PAFs have received neither employment nor compensation. (Nari Surakhshya Samiti, 2010). In Parej East, income from land plus forest produce plus agricultural labour, annually, stood at Rs. 9,600/- a year. Under the supervision of the World Bank, the projects offered jobs to PAFs which paid just over Rs. 9,000/- a year. Factoring in the cost of buying food rather than growing, net income inflows actually decreased as a result of the project (Bhushan & Suneja, 2012).

The discretionary nature of the grant of jobs means that jobs usually go to educated males from upper castes, thus widening socio-economic gaps in these areas (Fernandes W. , Mines, Mining and Displacement in India, 2007).

Worst of all, employment, when granted, was used as a bargaining chip against the family. In Handidhua (Odisha), families were threatened that if they do not comply without protest in evacuation, the job-holder would be transferred to some far off place (Somayaji S. , 2012).

Self-employment and entrepreneurship

Self-employment is supposed to be the major driver in rehabilitating the landless affected population. Success, however, has been less than stellar. Under the World Bank's CSESMP, 1660 people were trained for self-employment between 1998 and 2001; many did not even turn up out of the fear that accepting the training would mean forfeiting the promise of a job. Out of 1660, only 946 are recorded as earning a livelihood out of self-employment (Bhattacharya, 2004).

Anecdotal evidence from East Parej about the entrepreneurial attempts of displaces bears out this mixed record of self-employment –

> *"…Shikari Manjhi tried to open a Gumti - shop near the coal dump but it failed. Merilal tried a poultry farm and that too failed. Kallu also tried a poultry farm and that too failed. Beniram bought a tracer -407 (8 to 10 seater jeep normally used as a shared taxi) with the compensation money, but he was forced to sell it at a low price, because it didn't work. Dhaniram bought a car which is sitting in his garage. Mehilal Murmu started a bicycle repair shop, as it didn't work, and he has ended up raising pigs. Anil Hembrom from Lopongtandi has started a grocery shop but he is hardly there in his shop."* (Mundu, 2003)

In addition, cane-basket weaving, which was a successful initiative that blended the traditional skills of the Turi tribes with economic opportunity, fell into mis-management when the company failed to provide a stable supply of raw materials and refused to buy the baskets in violation of the original understanding between the displaces and the company (Mundu, 2003).

In the words of the Inspection Committee of the World Bank, these aspirations to self-employment schemes "…relied almost entirely on non-farm self-employment as the strategy to regain standards of living, without assessing its feasibility for income restoration..." (World Bank Inspection Panel, 2002). It also considered the World Bank's expectations for entrepreneurship development to pay dividends within five years to be "unrealistic". The Committee concluded that rehabilitation in Parej East fell well short as a result of these planning failures.

Tribal/indigenous population

Tribal populations are often excluded from the scope of the R&R policy because they cannot prove legal ownership of land. For tribal populations, the route to proving ownership is through the registration of community rights under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act. However, evidence from the Singrauli region reveals that applications for community ownership are few and actual completed registration of community rights over land are practically non-existent (Greenpeace India). Further, in Chhattisgarh, the processing rate for such applications is disappointing; with officials still uncertain about how many un-addressed applications exist. Several of these applications are in relation to lands proposed to be acquired for coal mining (Sethi, 2011).

The R&R policies require that common property resources be re-created in the new settlement area. The village of Hansdiha (West Bengal) originally included 6% of forest land in its total area with bamboo, mango and mahua trees, among others. The forest was a source of vegetables, fruits, firewood, oil, even a local alcoholic drink used in community rituals. In the rehabilitation site, however, there is no forest at all. This has had significant impacts on the day-to-day existence and the cultural identity of the displaced communities (Mourya & Chakraborty, 2012).

Under the terms of the World Bank's CSESMP, CIL and its subsidiaries were required to draft tailor-made Indigenous People Rehabilitation Plans, taking into account the specifics of the population in each mining area. They instead got approval for a generic IPRP, which was then re-utilised across locations without any adjustment. Moreover, the Annual Report on the implementation of the IPRP was often copied verbatim from year to year as well as between regions (World Bank Inspection Panel, 2002). Some distance remains, therefore, between requiring that the issue of indigenous populations be addressed and actually addressing them in an effective manner.

Resettlement facilities

Considering that the land and homestead in resettlement colonies are necessarily limited compared to what displaced populations were used to, facilities such as water, roads, electricity, medical supplies/advice and education can make the difference between stagnation and progress. Though the R&R policies prescribe that resettlement must be accompanied by such facilities, the actual provision of them is haphazard.

In Hanumanpur (Odisha), despite R&R policies guaranteeing the same, there was no cremation ground, grazing ground, temple, health facilities, proper road, drinking water, or drainage system. To the displaced individuals, all the guarantees seemed like a farce (World Bank Inspection Panel, 2002).

In Parej East (Jharkhand), Central Coalfields Limited built a school which was left without a teacher. CCL insisted that it was the State Government's responsibility to provide one; however, the Inspection Committee of the World Bank found that promises to the contrary were made by CCL when originally convincing the population to move (World Bank Inspection Panel, 2002).

Around Talcher (Odisha), for example, resettlement colonies suffer from defunct water pipelines. The potable water issue has developed into a women's movement in Odisha, under the leadership of the Mahila Jagaran Manch. They are outraged that women have to trudge miles to fetch water from natural streams and consider it Mahanadi Coalfields Limited's moral responsibility in light of its usurpation of their lands (Choudhury et al., 2012). The district Government has stepped in to remedy the situation (for which the population is appreciative) but MCL is seen as having failed in its original responsibility to provide potable water (Choudhury et al., 2012).

In addition to sometimes covering for lapses by the project proponent, the State Government also has to provide these resettled populations with documentation such as income certificates, domiciles, proof of address, APL, BPL cards, insurance schemes. This is a challenging proposition because, for example, in Jharkhand – a Scheduled Area State – many individuals do not have this documentation in the first place (Rastogi, 2013). Moreover, according to officials of the Odisha Department of Steel & Mines, the proponent does not pay anything beyond what is explicitly required by the R&R policy, such as a new substation or other requirements needed to set up the new settlement (Verma, 2013).

Mining stage

Impact monitoring and rule enforcement during mining operations

The problems of co-ordination across various government departments and institutions have resulted in various problems and have been identified as a major concern among stakeholders during consultations[52]. For instance, various problems related to dust, coal spill-outs and other environmental externalities have resulted due to lack of co-ordination between SPCBs, which have responsibility of ensuring that trucks carrying coal are covered with tarpaulin, and state transport departments which are responsible for regulating overloading of coal in trucks or trains. The problem of co-ordination between DGMS and local police with respect to mining accidents also came out during discussions. In addition to co-ordination issues, overlaps among jurisdictions have been observed, which create problems and reduces effectiveness of regulations. Regional office of MoEF and SPCBs, for instance, have similar roles and responsibilities of monitoring and enforcing various laws applicable to air, water, and land.

There is an obvious conflict in policy decisions that results in the development and continuation of mining activities in critically polluted areas such as Korba (CEPI 83.0) in Chattisgarh, Dhanbad (CEPI 78.63) in Jharkhand and Angul Talcher (CEPI 82.09), Ib Valley (CEPI 74.0) and Jharsuguda (CEPI 73.34) in Odisha.[53] Moreover the policy decisions directed

[52]These consultations were made in 2011 under the project on Responsible sovereignty and Energy Resources" supported by Konrad Adenauer Stiftung (KAS) (TERI 2011)

[53]http://pib.nic.in/newsite/erelease.aspx?relid=59156

towards increasing the efficiency of thermal power plants across the country and reduce transportation costs – only washed coal to be transported beyond 1000 kms – has resulted in coal washing activities being sited in these critically polluted areas within coal bearing states that exacerbates the problems of ash, water pollution and increases the demand for water.

Planning for coal mine closure

With regard to mine closure and restoration, for instance, the companies have been found not adhering to practices as mandated by the policies, and there have been no stringent actions taken in this regard. As per (CAG, 2012) no mine closure plans have been prepared for mines which are to be closed within 2 to 4 years. A backlog in backfilling and technical reclamation of 12,643 hectare land has been found in seven subsidiaries of CIL as on March 31, 2010. Also, the policy of preserving and re-using top soil for reclamation is not followed in practice. Out of 18 open cast mines covered in CAG audit, top soil was found to be preserved in only 5 mines. Also, it has been reported that in mines where restoration and reclamation were observed, the methods did not confirm to national standards.

The regulatory bodies are clearly ineffective in regulating and monitoring the different aspects of coal development to ensure that the developer keeps the environmental and social footprint to a minimum. While mining will have an impacts on the environment and people, good governance and rule enforcement can ensure more responsible mining practices.

Major factors that were reported for their ineffectiveness are shortages of skilled manpower and inadequate availability of equipment. These factors have been highlighted during discussions with various regulatory bodies that include SPCBs, DGMS, State transport department, State forest department etc. In addition, political influence has been reported to be the major factor behind no or inadequate responsiveness of the regulatory bodies to the observed fallacies. In many cases, loopholes in implementations are deliberately ignored given the importance of coal for electricity generation and the grave impact on the economy as a result of any disruptions in the coal supply.

Mine closure stage

Land degradation and abandoned mines

The issue of land degradation is not limited to a certain stage of the coal mining process but is a challenge across all stages of mine development, operation and closing. The issue gains importance in the mine closure stage as actual remediation and reclamation are meant to be initiated in this stage and are the biggest expenses incurred by the mine operator as well as regulatory agencies. The externality of land degradation is created to due overburden stacks and lack of mine waste management which may result in leaching of heavy metals into soil and deterioration of nearby forest and productive land because of dust from overburden dumps. As has been mentioned in sections above, top soil management is lacking in coal mines of our country and the mine waste management by mine operators has been unsatisfactory.

There is a lack of proper planning and assessment of waste generation and management on the part of the operators as well as the regulatory bodies of MOEF, Ministry of Coal and the respective state departments at the time of approvals and clearances for developing a mine.

The purpose of the approvals and clearances is to estimate the damages that may be caused during and after the productive life of a mine and not only provide guidelines for management but also ensure that the resulting costs are not higher than the benefits. Beyond these there is also a lack of monitoring on the performance on mine closure plans by the respective state departments for environment and mines.

The issue of abandoned mines is even more critical as they signify lack of safeguards and abatement from the mine developers' side and the onus for management, closure, remediation and reclamation falls with the state departments.

5. Estimation of costs of externalities due to coal mining and coal based power generation

External costs refer to cost of damage imposed on the environment and society but are not accounted for in market price of the resource. Coal mining and electricity production have various affects like impact on health due to air and water pollution, impact on agriculture, forests and global warming potential, occupational disease and accidents etc. While some of the costs may be internalized as per the EIA guidelines, certain external costs may still go unaccounted for. On the basis of the principle, that the polluter needs to pay the full price of the product (here electricity production) the use of life cycle cost as an approach for estimation of above externalities is increasingly being used for valuing true cost of electricity generation.

There are many approaches to the estimation of external costs due to coal mining and TPP. They can broadly be classified as (i) top down and (ii) bottom-up. The top down approach was extensively used by Hohmeyer (1988) for the first time to arrive at the external costs of all major fuels used in electricity generation in Germany and relied on secondary macro level estimates related to total damages. In the early 1990s, Bernow and Marron used the cost of pollution control as a proxy for possible valuation of environmental externalities for energy planning and operations. The economic principle behind the use of cost of pollution control as estimation of external cost is that the marginal abatement cost of emissions is equal to the marginal damage cost.

Bottom up approaches on the other hand; use both primary and secondary data, that project/location specific, in estimating the external cost. For example, Ottinger, et.al (1990) in estimating the environmental costs of electricity and, Pearce (1992) in estimating the social cost of fuel cycle has used the bottom up approach using secondary information. Despite enjoying certain advantages due to better results, there are challenges associated with collection of primary data. For instance, primary data collection may be time consuming because it involves the employment of dose–response functions to track the emission path way from the source to the receptor (D. Mahapatra et al, 2011). Other concerns include consequent monetization of the impacts, difficulty in learning the project specific social impacts in the form of displacement and loss of livelihood and finally, the involvement of multidisciplinary teams.

In this study the overall approach adopted is the life cycle analysis for estimating the environmental and social impacts of production of electricity from conventional coal based power generation systems. It is important to note that the external costs estimated in this chapter have mostly been based on collection and analysis of secondary data collected from varied literature. While the estimates cover the types of impacts at different stages of the life cycle of coal mining and coal based power generation highlighted in Chapter 2, the study does not attempt to actually value the total damages discussed there. That would require much more detailed assessment on the field, data, and more time. Key phases in the life cycle approach include:

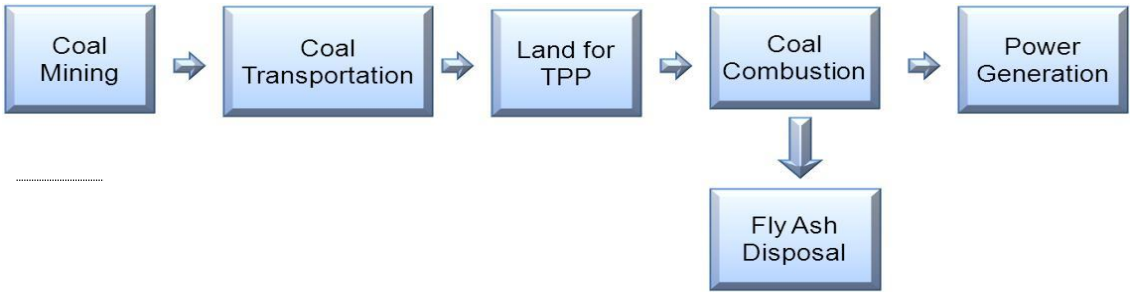


Figure 13 Life cycle from coal mining to power generation

With regard to valuation of the external costs, both top down and bottom up approaches have been used.

Externalities across the life cycle of coal mining and TPP

As presented in the previous chapter, there are various externalities linked to different stages in the life cycle of electricity generation from coal fired thermal stations. However it is evident that in most cases data related to the externalities is not available (Table 29 below). Even in situations where data is supposed to be available, accessing and using the data was not possible since it was not shared despite the repeated efforts of the project team.

Table 29 Externalities linked to stages of life cycle and corresponding data availability

Stage of life cycle	Externalities created during this stage	Negative externality type	Data availability
Exploration	Temporary disruption of wildlife and habitat	Environmental	Partially (forest land)
	Land degradation	Environmental	Partially in EMPs
	Destruction of forest	Environmental	Partially (forest land) in EMPs
Mine development and mining	Loss of Biodiversity	Environmental	Not available
	Land degradation	Environmental	Not available
	Water pollution	Environmental	With state pollution control boards (but not shared)
	Air pollution	Environmental	With state pollution control boards (but not shared)
	Displacement	Social	Possible estimates are sometimes provided in EIAs/EMPs. But there are risks of under reported estimates provided in EMPs
	Loss of livelihood	Socio-economic	Not available
	Land degradation	Environmental	Not available
Mine Closure	Loss of livelihood	Socio-economic	Not available

Stage of life cycle	Externalities created during this stage	Negative externality type	Data availability
	Air pollution	Environmental	Not available
Transportation of coal	Air pollution	Environmental	With state pollution control boards (but not shared)
Land development for coal based thermal power plant	Displacement	Social	Possible estimates are sometimes provided in EIAs. But numbers may not match with actual people displaced
	Loss of livelihood	Socio-economic	Not available
	Land degradation	Environmental	Partially in EMPs
	Air pollution	Environmental	With state pollution control boards (but not shared))
Coal combustion	Water pollution	Environmental	With state pollution control boards (but not shared)
Electricity generation and transmission	Fly Ash Generation	Environmental	Data with power stations (shared)

Hence, due to the unavailability as well as difficulty in obtaining data that is otherwise collected and maintained by designated agencies, a substantial part of the analysis had to depend on estimates from secondary literature. However, effort has been put in to ensure that such estimates are current and relevant to the Indian context.

Key externalities covered in the cost assessment

External cost estimation of coal based power generation through the life cycle approach should ideally contain the elements/stages outlined in Table 29. However, such a detailed cost estimation (at every stage of the life cycle), was not possible due to the unavailability/poor availability of detailed disaggregated data. The stages of the life cycle were consolidated depending on the availability of secondary data on external costs (as presented in Table 30 below). Moreover, as mentioned above, the approach (top down/bottom up) used to estimate the external costs are also mentioned against each head.

Table 30 Consolidated stages of the life cycle, the external costs and the approach

Sl. No	Consolidated stages of life cycle	External cost head	Approach towards estimation
1.	Exploration, mine development and mining	Dust emissions from mining operations	Top down
		Emission due to consumption of fuel by mining machineries	Top down
		External cost due to water pollution during mining operations	Top down
		External cost due to water pollution during coal washing	Top down
		Externality arising because of	Bottom up and top

Sl. No	Consolidated stages of life cycle	External cost head	Approach towards estimation
		displacement of project affected families	down
		External costs because of forest loss	Top down
		External cost because of land degradation	Top down
		Impact of PM10 release from thermal power stations on human health	Top down
		External cost of power generation on agricultural production	
		External cost of power generation on building materials	
		Externality due to fly ash	Bottom up

The following section identifies the key secondary data sources and the type of data thus collected for the external cost estimation.

Estimation of social costs

One of the major data sources for social externalities arising from coal mining is the environmental management plans (EMPs) of the different coal mining projects. Although 14 EMPs (all of them from Odisha) were shared with the TERI team by the state pollution control board, 10 EMPs actually reported the expected costs incurred due to resettlement and rehabilitation (R&R) of project affected families, while 11 EMPs reported the possible number of project affected families due to coal mining operations. Based on the mineable reserve as well as the R&R cost of each coal mining project, the R&R cost per tonne was estimated for each mine.

The comparison of R&R cost per tonne (using EMP data) across 10 mining projects reveals that the compensation ranged from as low as Rs 0.29/tonne of mineable reserve to as high as Rs 8.75/tonne. The simple average R&R compensation cost was Rs 2.11/tonne. Since the EMPs were prepared in different years, it may not be correct to compare the costs across these projects. While some of them were prepared in 2006 and 2007, the latest EMP that was available was from 2012. Hence, in order to make the data comparable, all the prices were converted to 2013 prices (using suitable price indices), based on which the average compensation of Rs.2.77/tonne of mineable reserve (at 2013 prices) was arrived at. The maximum R&R compensation offered (at 2013 prices) was Rs 11.75 /tonne.

Estimation of costs from dust emissions from mining operations

Most of the dust emissions are generated from the haul and transport roads in mining areas. Hence, abatement measures such as paving of haul roads, transport roads, public roads, and the use of dust suppression mechanisms at excavation and loading points, etc. can significantly minimize the same. The estimated cost of these abatement interventions was found to Rs. 76.5/tonne after suitable price revision (Mahapatra, 2012).

External cost due to water pollution

The external cost of water pollution was estimated based on the abatement expenditures for effluent treatment of discharged mine water. This was estimated to be Rs. 62/litre (Golder, 2012). With regard to water pollution in coal washeries, the external cost derived from the abatement cost was found to be Rs 32.6/tonne.

External cost due to forest cover lost and land degradation

The external cost due to forest cover loss and land degradation was estimated based on EMP data as well as consultation with different stakeholders. The external cost for forest cover loss (based on compensation received) was Rs 5.67/tonne while for land degradation it was found to be Rs 57.13/tonne (at 2013 prices).

Impact of PM_{10} release from thermal power stations on human health

Based on a study carried out by Mahapatra et.al. with PM_{10} dose of 25.2 mg/m3, after suitably factoring in the Indian standard permissible limit and the established relationship between air quality and mortality, the impact was estimated to be Rs 0.63/kWh (at 2013 prices). It is important to note that the above health damage cost was based on the discounted damage cost to an individual's lifespan due to exposure to thermal power generation pollution. However, if only treatment costs are taken into consideration, the value of health costs will be lower.

External cost of power generation on agricultural production and on building materials

Studies in the Indian context have found that emissions from thermal power stations reduce rate of crop yield as well as reduce life of buildings. The cost of the same is Rs 87.5/tonne and Rs 86.5/tonne respectively in 2013 prices. This is equivalent to Rs 0.06/kWh (using average specific coal consumption of 0.65 kg/kWh)

Externality due to fly ash

There are various papers that estimate the environmental cost of disposing ash per tonne of ash generation. According to Dhadse (Dhadse, 2007), disposal cost of fly-ash is Rs.50-100 per million tonne of ash generated. According to GSECL, India (2007), the cost of disposing ash is Rs.125 per tonne of ash produced[54]. TERI, in 2008, estimated the cost of fly-ash disposal using a case study of TPS with 1470 MW capacity. According to the study, the cost of disposal is Rs.150.1 per tonne of ash produced (TERI, 2008). While the Dhadse study gives a very conservative figure of the ash disposal cost, the result of other two studies are still comparable given the range of estimated cost between Rs.125 and Rs.150 per tonne.

Compensated and uncompensated costs

Some of the above costs are compensated while others are not. As per the state R&R policies, mining companies and thermal power generating companies are required to compensate the project affected people in case of any displacement. For forest cover loss, the

[54]As cited in http://flyash2012.missionenergy.org/files/Zaak_%20Mr%20Jagdish%20Shah.pdf, last accessed on July 15, 2013

states are compensated against this loss under the Guidelines on State Compensatory Afforestation Fund Management and Planning Authority of the Ministry of Environment and Forest Government of India. The environmental management plans (EMPs) of the mining companies identify the various causes of emissions during mining operations (including mine fires) and ways to mitigate such emissions along with the capital expenditures.

Power generating companies also take measures to minimize fly ash generation. Hence, to some extent, environmental costs are internalized. However, there are impacts on vegetation, infrastructure and health, irrespective of whether the power plants are complying with stack emission norms, which are not compensated. Table 31 presents in detail the external costs that are compensated and not compensated.

Estimation of external costs of coal based power plants based on life cycle effects

External costs estimation of coal mining from coal mine development to coal washing

The total external cost of coal mining (including coal washing) is estimated to be Rs 246 /tonne, assuming that PAFs receive the maximum compensation as estimated from the data of EMPs of select coalmines in Talcher coalfields (refer section on '*Estimation of Social Costs*'). Out of this total external cost arising from coal mining, an amount of is Rs 126.49/tonne is compensated, while the non-compensated component is Rs 119/tonne. The external damage due to coal mining, the compensated or non-compensated costs and the data sources are presented in Table 31.

Table 31 External costs due to coal mining (Rs/tonne) (compensated and non-compensated)

External damage	Damage cost/cost of internalization (Rs/tonne)#	Compensated/not compensated	Data source
External cost due to dust emissions (estimated based on abatement expenditures black topping of existing unpaved roads, sprinkler at loading and unloading points, purchase and maintenance of Road Dust Collecting System, etc.)	76.5	Compensated	Mahapatra et. al
External cost due to water pollution (estimated based on pollution abatement cost) due to mining operations	62	Non-compensated	Golder Associates, EMP of select open cast coal mining projects in Odisha
External cost due to water pollution (estimated based on pollution abatement cost) due to coal washing	32.6	Compensated	Interaction with subject matter experts

External damage	Damage cost/cost of internalization (Rs/tonne)#	Compensated/not compensated	Data source
Forest lost	5.67	Compensated	EMPs, interaction with various stakeholders
Land degradation	57.13	Non-compensated	EMPs, interaction with various stakeholders
Compensation to PAF based on the maximum R&R expenditure estimated from the EMPs	11.72	Compensated	EMPs, interaction with various stakeholders
Total external damage cost	246[55]	Compensated (Rs/t) 126.49 Non Compensated (Rs/t) = 119.13	

figures converted into 2013 prices using suitable price indices.

Total external cost of power generation from coal transportation to coal combustion

The total external cost of power generation from coal is estimated to be Rs 0.90/kWh. Out of this, the compensated external cost amounts to Rs 0.15/kWh, while the remaining Rs 0.75/kWh is not compensated. This does not include the cost of carbon emissions and the cost of rehabilitation. The results are presented in Table 32.

Table 32 External costs due to power generation from coal (Rs/kWh)

External damage	Damage cost/cost of internalization (Rs/kWh)##	Compensated /not compensated	Data source
Impact of PM10 release from thermal power stations on human health	0.63	Non-compensated	Mahapatra et.al. 2012;
External cost of power generation on agricultural production	0.06	Non-compensated	Mahapatra et.al. 2012;
External cost of power generation on building materials	0.06	Non-compensated	Mahapatra et.al. 2012;
Externality due to fly ash	0.056	Compensated	TERI analysis, http://flyash2012.missionenergy.org/files/Zaak_%20Mr%20Jagdish%20Shah.pdf

[55] This cost does not include the health cost arising from coal mining. This is because relevant data for health cost estimation could not be obtained.

External damage	Damage cost/cost of internalization (Rs/kWh)##	Compensated /not compensated	Data source
Externality borne by coal producing states in rendering washed coal to TPP	0.10	Compensated	Sharpe

figures converted into 2013 prices using suitable price indices.

External damage costs across life cycle

The total external damage costs of coal across *the life cycle* amounts to Rs 1544/tonne (i.e. Rs 1.07/kWh[56]) of coal mined when we consider the maximum R&R expenditure estimated from the EMPs. The total compensated and the uncompensated amounts are Rs 352/tonne (i.e. Rs 0.25/kWh) and Rs 1192/tonne (Rs 0.83/kWh). The results are presented in table below.

Table 33 Total external damage cost (using compensation to PAF based on EMP data)

	Total		Cost compensated		Cost uncompensated	
	Rs/tonne	Rs/kWh	Rs/tonne	Rs/kWh	Rs/tonne	Rs/kWh
External damage costs due to coal combustion in thermal power plants	1299	0.90	226	0.16	1072	0.75
External damage costs due to coal mining	245	0.17	126	0.09	119	0.08
Total external damage costs	1544	1.07	352	0.25	1192	0.83

Note: Some numbers may not tally in summation due to the rounding of decimal places

External cost estimates available in economic literature

Based on an extensive review of literature, it is evident that the external costs of life cycle of coal based power generation costs are significant. According to the National Research Council report (National Research Council, 2010) the total annual external damages from sulphur dioxide, nitrogen oxides, and particulate matter created by burning coal in more than 400 coal-fired power plants (which produce 95 percent of the US coal-generated electricity), was about US $62 billion. Jonathan Levy's (2009), study on coal pollution identifies the impact on health as one of the largest externality costs. The study presents a range of health-related damages of US $30,000 to US $500,000 for every tonne of PM2.5 emission. For each tonne of sulphur dioxide pollution, or SO_x, the health damage ranges from $6,000 to $50,000 per tonne, while for NO_x, the per-tonne rate ranges from $500 to $15,000.

[56]The specific coal consumption is assumed to be 0.69 kg per kWh of electricity and has been used for all the conversions

Epstein (2011) finds that the best estimate for the total economically quantifiable costs, based on a conservative weighting, amount to US $345.3 billion, or US cents 17.8/kWh of electricity generated from coal. The low estimate is US $175 billion, or over US 9 cents/kWh, while the upper limit would be US $523.3 billion, approximately US cents 27/kWh. Rafaj and Kypreos (2007) adjusted the Extern results to create a global estimate, resulting in an external cost estimate for pulverized coal combustion of US $ 58/MWh (in 2010 prices). In 2007, researchers at the Paul Scherrer Institute in Switzerland reported that the external costs of coal combustion was in the range of US cents 5.7 - 11.7/kWh (excluding CO_2). However, the estimates are in the range of US cents 7.5 - 13.6/ kWh if CO_2 emission is factored in. A study conducted in 2009 by the Australian Academy of Technological Sciences and Engineering (ATSE) valued the external costs from the combustion of brown coal at A$ 52/MWh and those from the combustion of black coal at A$A42/MWh. Table 34, presents the selected studies of external cost of coal fired electricity using different approaches.

Table 34 Selected studies of external cost of coal-fired electricity using different approaches

Authors	Year	Country	External cost USc/kWh	
			Min	Max
Schuman & Cavanagh	1982	United States	0.07	54.64
Hohmeyer	1988	Germany	12.42	28.33
Ottinger et al.	1991	United States	4.04	10.99
Pearce et al.	1992	UK	3.31	17.89
Faaij et al.	1998	Netherlands	4.93	
ORNL/RfF	1995	United States	0.14	0.6
EC	1995	UK/Germany	1.21	2.96
Rowe et al.	1994		0.38	
Bhattacharyya	1997	India	1.68	
EC	1999	European Union	1.04	89.8
Maddison	1999	UK/Germany	0.38	0.88
Klaassen & Riahi	2007	Global	4.84	
Dutkiewicz & De	1993	South Africa	0.48	1
Van Horen	1996	South Africa	1.03	5.771
Spalding-Fecher & Matibe	2003	Africa	0.4	2.681

Source: Thopil and Pouris (2010), presented in Riekert and Koch (2012), in Journal of Energy in Southern Africa, Vol 23, No 4

Limitations

The external costs estimation of coal based power generation proved to be extremely challenging because of the difficulties faced in gaining access to primary data as well as issues related to the actual availability of data. As a result a substantial component of the analysis had to depend on estimates from secondary (albeit peer reviewed literature). Many of the estimates used in the life cycle costing of coal based power generation have been

sourced from secondary literature whose findings are based on data collected for specific coal fired thermal power plants. Hence, one of the key limitations of the conclusions on external costs is that the assumptions made in those studies are being implicitly made here, possibly resulting in certain biases in the external costs. Moreover, since these studies where undertaken in the past, certain price indices were used in order to ensure that the costs are representative of the current levels; it is important to note that such indices are more in the nature of macro-level numbers and may not capture the true cost change over time, in the specific sectors being analysed, at every stage of the life cycle.

The external costs estimates are divided into compensated as well as uncompensated costs. As identified in the previous section of the chapter, such categorization was based on the discussion with experts concerned as well as provisions under the law. However, in reality, there may be under or over-compliance. In other words, the nature of pollution abatement/defensive expenditures incurred along the life cycle may fail to internalize the actual external damages caused, due to violation of norms or negligence. There can also be partial compensation of the external damages incurred in the normal compliance process that are otherwise not mandated to be internalized.

Nevertheless, the numbers derived using the life cycle analysis broadly provides indicative estimates of the external damage caused and what proportion of the cost is supposed to be compensated as per the law. Moreover, they also helped to highlight the issues related to availability of data and difficulty in accessing them. Such limitations call for not only revising periodically the external costs to capture change and the benefits of technological improvement to aid in minimizing environmental and social damages but also improves our understanding of how external costs can effectively be minimized through complying with environmental and social standards, thus nullifying the costs arising from mis-governance.

6. Demand for free power in coal rich states and its tariff implications

The demand of coal rich states is for free power from the coal based power generated in the states. This demand draws from the National Policy for Hydro Power Development, [57]which assures that twelve percent of the power generated by Central Sector as well as Joint Venture hydro power projects (between State Electricity Boards or Public Sector Units and private sector companies) will be provided free of cost to the State in which the project is located. The underlying rationale is that since the non-exhaustive use of a state's water resources cannot attract any royalty payment, an alternative compensatory paradigm is required.

The genesis of free power in the hydro sector can be traced back to 1982, when in addition to royalty at 1.5p/unit; the home state was being allocated 10% of the generation capacity. This provision was amended in 1985 with approval of the Cabinet Committee on Economic Affairs (CCEA), when the 'free power' (12% of power generated) provision was first introduced, replacing the previous royalty arrangement. A review was conducted in 1990 by the CCEA under which 12% 'free power' was to be provided to those states of the region (including the state where the project is located) where 'distress was caused by setting up the project at the specific site.' As per the policy guidelines, the revenues generated through free power was to be used for LAD and mitigation of hardship caused to PAPs.

Many coal bearing states are already demanding variable cost power or right of refusal to a certain amount of power generated by private developers in their states. The provision for concessional power has either been introduced as a policy by some states or has been introduced only in the MoUs signed with the IPPs in exchange for facilitating coal based thermal power projects.

This chapter examines these demands for free/concessional power from the perspective of different states and assesses their impact on tariffs and state government revenues.

Existing benefits/preferential treatment to host states from central plants and IPPs:

Based on ownership type, power Projects can be classified broadly into three categories: centrally owned (CPSU – NTPC in this case), State Owned and private (including UMPPS). In this section, the existing provisions of preferential treatment to host states for supply of power from power stations are discussed.

Case of centrally owned projects: (NTPC)

NTPC has about 40% of its total capacity housed in the identified states (13300 MW of 31355 MW[58]). The details of NTPC plants in these states are given in Table 35, below:

[57] Copy of the Policy available at bhttp://www.powermin.nic.in/whats_new/pdf/new_hydro_policy.pdf
58 As in April 2013

Table 35 Details of NTPC plants

State	Plants	Capacity (MW)
Chhattisgarh	Sipat	2980
	Korba	2600
Odisha	Talchar Kaniha	3000
	Talchar Thermal	460
Madhya Pradesh	Vindhachal	4260
Jharkhand	Nil	0
Total capacity in identified states		**13300**

Source: NTPC website (April, 2013)

As per the guidelines issued by Ministry of Power in 2000, allocation of power is made to the States/UTs in two parts, namely firm allocation of 85% and 15% unallocated power for allocation by the Government for meeting the urgent/overall requirement. As part of the firm allocation 10% power (not free) is given to host states in case of thermal and nuclear stations. The balance 75% of firm power is shared amongst all beneficiary states, including home state as per a prescribed formula. Therefore clearly in case of existing NTPC plants, host states do get greater share of power produced, though at full cost (the regulated tariff set by CERC[59]). NTPC plants in general offer much more competitive rates than those prevailing in the market.

In a more recent development the Central government in January 2011 has approved a proposal wherein for 13 new projects of NTPC (with an aggregate capacity of 31720 MW), the host state will be allocated 50% power. In the Central Government's view this preferential allocation 'will facilitate NTPC and 'home' state to work together in tying up necessary inputs i.e. land, water, fuel, environmental clearances'[60]. The central government continues to get 15% unallocated power and remaining 35% is allotted to other beneficiary states through the prescribed formula. As seen in Table 36, a number of these plants are located in the study states. Clearly while the host states will suffer coal related externalities, they will also have preferential access to the power produced from the same plants.

Table 36 Allocation of power to the 'Home' States from the NTPC projects

Sl No	Station	Total plant capacity (MW)	'Home' state
1.	Gadarwara	2640	Madhya Pradesh
2.	Lara	4000	Chhattisgarh
3.	Talcher Expansion	1320	Odisha
4.	Kudgi	4000	Karnataka
5.	Darlipalli	3200	Odisha
6.	Gajmara	3200	Odisha

[59]This provision is applicable for plants set up till 5th January 2011, after which power will be procured by discoms through competitive bidding.
[60]Ministry of Power, Letter No. 5/12/2009 dated 17.01.2011

Sl No	Station	Total plant capacity (MW)	'Home' state
7.	Gidderbaha	2640	Punjab
8.	Katwa	1600	West Bengal
9.	Dhuvran	1980	Gujarat
10.	Khargone	1320	Madhya Pradesh
11.	Pudimadka	4000	Andhra Pradesh
12.	Bilhaur	1320	Uttar Pradesh
13.	Kathua	500	Jammu & Kashmir

Source: MoP Notification, January 2011

Case of ultra-mega projects

In case of UMPPs, host states are provided certain benefits for their contribution in facilitation of the projects. Power from UMPPs is tied up with beneficiary states in consultation with the Ministry of Power. In case of all the four projects that have been tied out, home states clearly have a greater share (though power is not free but at the competitive bid price). The UMPPs' bid so far have offered power at very competitive prices and the coal bearing host states clearly get a larger share of this low cost power as compared to other beneficiary states amongst whom the remaining power is shared. (see Table 37)

Table 37 Details of UMPPs and beneficiary States

Host state	Name of project	Type of fuel	Capacity contracted to host state (MW)	% of power contracted to host state	other states (MW)	No of beneficiary states (incl host state)	Tariff (Rs/unit)
Gujarat	Mundra	Imported Coal	1805	47.50%	1995	5	2.26
Madhya Pradesh	Sasan	Domestic coal	1500	37.50%	2500	7	1.29
Jharkhand	Tilaiya	Domestic coal	1000	25.00%	3000	10	1.77
Andhra Pradesh	Krishna-patnam	Imported Coal	1600	40.00%	2400	4	2.33

Source: CERC tariff orders

Case of independent power projects:

As part of their policies, many state governments require private developers to sell part of the power at variable cost or offer right of first refusal to part of the power produced to the host state. These policies for a few states have been discussed herewith:

The **Chattisgarh Energy Policy** states that 'after meeting requirement of Chhattisgarh, surplus power from power producers could be sold to other States'. It further adds that 'the Sale of power to other States shall be through CSEB but the responsibility to identify buyer State shall rest with the power producer'.

Odisha's Energy Policy provides for certain percentage of power at variable cost from IPPs. In case of UMPPs, state government has right to purchase upto 50% of power from UMPPs at the bid price. Besides these, there are provisions for government to purchase infirm power at variable cost and also provision for a cess. The provisions are listed below:

Odisha state government (order no 8960/ E, dated -8-2008) makes the following provisions:

(i) For future IPPs: A nominated agency(s) authorized by the State Govt. will have the right to purchase 14% of the power sent out from the Thermal Power Plant at variable cost from the IPPs who have been allocated coal blocks within the State. Others will provide 12% power at variable cost. The tariff for such power will be determined by the OERC.

(ii) For existing IPPs: 7% power at variable cost will be made available to the state by the IPPs who have been allocated coal blocks within the State. Others will provide 5% power at variable cost. The variable cost will be determined by the OERC

(iii) UMPPS: A nominated agency(s) authorized by the State Govt. will have the right to purchase upto 50% of power from the UMPPs to be set up through competitive biddings, at the lowest bid price only.

(iv) Infirm power will be made available to the State at variable cost from all IPPs, barring UMPPs

(v) An annual contribution @6 paise per unit of the energy sent out, from the plant, but not sold in the State to be made by the developer towards Environment Management Fund. This applies to all IPPs but not UMPPs and CPSUs

(vi) UMPP and CPSU should contribute 5% from the profit for peripheral development fund.

Under the **Madhya Pradesh (Investment in Power Generation Projects) Policy 2012,** it is mandatory for the developer to sell 10% of the total power generated (ex-bus) to the state government at variable cost as determined by the regulatory commission. The policy also introduced a 'contribution of 6 paise per unit per unit for electricity sent outside the state'. Notable, this clause however was however rolled back through an amendment in October 2012.

The **Jharkhand Energy Policy** provides for supply of power to the State under first right of refusal limited to 25% of the installed capacity at price to be decided by Jharkhand State Regulatory Commission (JSERC). In practice, Jharkhand demands 12% power at variable cost and right of refusal for 13% power from IPPs. This is however a provision incorporated in the MoUs but not part of any policy of the state.

Emerging scenario in study states: power at variable cost/right of refusal and imposition of cess

This following section emerges from the discussion with the Energy Departments on free power with the states visited, i.e. Odisha and Jharkhand.

Odisha

Existing provisions for private projects, IPPs and centrally owned plants

A number of coal based power plants are set to come up in Odisha and are under various stages of progress. The state government has already negotiated with these IPPs to provide the state with 25% power at regulated rates (for IPPs where MoU was signed in 2006) and 12-14% variable cost power (as determined by OERC) where MoUs were signed in 2009 and beyond. In addition, the state charges Rs 6 paise per unit for power exported outside the state towards an environment management fund. The 6 paise cess is not directly linked to cost of externalities from coal based stations. It is rate negotiated with developers. The state is expected to benefit from 6141 MW concessional power cut of a total capacity of 37440 MW new plant capacity to come up in the state in the course of XII and XIII plan.

Till June 2013, two IPPs have started operations and the state is receiving power from Sterlite Energy (25% at regulated full rate determined by OERC, provisional fixed at Rs 2.75 per unit by OERC for 2013-14) and Aarti Steel (12% at variable cost determined by OERC, provisionally fixed at Rs 1.75 by OERC for 2013-14.). The state has collected about Rs 30 Crore towards the Environmental Management Fund (@6 paise per unit of power sold outside the state) but has yet to come up with clear guidelines on the administration of this fund.

From the centrally owned plants and the UMPPs, Odisha has not so far asked for power at variable cost but is asking to be given right to 50% of power produced from these plants at the tariff discovered through competitive bidding. There are three UMPPs planned in Odisha of which, the plant at Sundargarh has achieved some progress. Odisha state government and the Central government have agreed to provide a share of 1300 MW to the state from the Sundargarh 4000 MW project. From the other two UMPPs planned in Bhadrak and Kalahandi, the state is demanding 50% power. These plants are however at a conceptual stage and the power sharing agreement has to be worked out.

Similarly from the NTPC plants, the state is asking for 50% power at the regulated tariff determined by CERC. There are two NTPC plants of 3200 MW each coming up in Odisha. The Government of India has agreed to allow 50% of power from these stations to the host state[61]. In addition, an extension to TTPS, Talcher is expected to add another 660 MW to the state capacity. Odisha is not demanding any cess towards the Environment Management Fund from the UMPPs or the NTPC plants.

With this major capacity expansion planned in the state, it is likely that in the coming years, the state will become power surplus. As per the state's own estimate it will be power surplus by 2014-15. During the course of the discussion with the TERI team, the Energy Department stated that the state will utilize the free/variable power depending on the situation within

[61] Order No 5/12/2009 dated 17.01.2011 –'Allocation of Power from Fourteen Upcoming Power Projects of NTPC'

the state. In years, when hydro generation is lower due to lower rainfalls, it could use the free power for itself but in other years it will trade the power in the market to earn revenues. In the tariff order for GRIDCO for 2013-14, the OERC has also suggested that GRIDCO should 'procure maximum power from CGPs and IPPS of the state and trade the surplus after meeting the state need'. This additional income from trading is seen as a way for GRIDCO to make up for its deficits caused by late/non-payment by state Discoms.

Demand of state government from central government

From the field discussions, it emerged that Odisha would like the Centre to come up with a policy framework on preferential power so as to give the state legal right to demand power at concessional rates. At present, the state is apprehensive that the IPPs may not abide by the conditions for providing power at variable cost once the plant becomes operational. While, the state, links back the demand for free power to the provision made for host state in case of hydro power, the percentage of free power asked is greater at 25% as in the state's opinion externalities from coal are continuous rather than one time as in case of hydro.

From the Central government, Odisha's demand is as follows:

1. At least 25% of power generated by coal based plants should be allocated free of cost to the host state
2. For coal rejects based power plants a higher percentage of free power, i.e. 33% power and compulsory ash utilization mechanism
3. Electricity duty to be levied at the point of generation rather than point of consumption
4. States may be allowed to levy an environmental tax to mitigate/compensate the environmental impacts of coal mining.

Jharkhand

So far Jharkhand has been able to attract limited number private developers in the state. The three major players are Abhijeet Group 1080 MW (Corporate Power), Adhunik Power 540 MW and Essar Power 1200 MW. Jharkhand has not specifically incorporated provision in its energy policy for concessional power but in the MoUs that it has signed with these developers, it has demanded 12 % power at variable cost and a right of refusal for another 13% power at full price as determined by JSERC. So far, one unit of Abhijeet Group has come up but the JSERC is yet to determine its tariff. As of now it has provisionally allowed the tariff proposed by the Group – Rs 1.95 as variable charge and Rs 5.01 as total charge. The state has also included a clause providing 6 paise per unit on power sent out of the station towards an Environment Management Fund. It has however not enforced this condition on the developers.

The state is also host to the Tilaiya UMPP from which it would get 25% of the power, i.e. 1000 MW at the bid price of Rs 1.77 per unit. The state does not have any NTPC plants housed in the state does but gets a share from NTPC plants stationed in other states. It also gets power from the inter-state agency Damodar Valley Corporation Project (DVC) which has coal based stations in Jharkhand and West Bengal. However the tariffs from both these sources are very high at Rs 4.81 per unit from NTPC plants and Rs 4.66 per unit from DVC plants.

States demand from the central government

Jharkhand wants to be compensated not only for power produced in their state but also for the coal that is transported outside the state. Coal washing and coal transportation leads to severe environmental stress in the host state. Therefore, states want to levy a charge on coal being transported to other states. The department argued that in case of petroleum, Gujarat and Rajasthan gets far more revenue through the production sharing contracts than coal bearing states get from coal. In addition to variable cost, the State also wants to consider a levy on power generation.

The Energy Department has demanded policy provision for free power from the Centre. In its view, tariff as being determined by JSERC both fixed and variable (for the host state share), could be much higher than the tariff being determined through competitive bidding. For instance, through the cost plus approach power from the first unit of Abhijeet Group has provisionally been approved at over Rs 5 per unit. At the same time, the Essar Group (1200 MW plant in Jharkhand) has contracted 560 MW capacity from its plant based in Jharkhand to Bihar state electricity board at a levelled tariff of Rs 3.28 per unit through the competitive bidding process.

Impact of free/concessional power

Impact of free power can be studied at various levels:

1. Impact on developer: Free or concessional power would impact generation tariff for the remaining power and hence the competitiveness of the project. (A simple example for instance would be if 100 units of power are sold at Rs 1 per unit, the revenue would be Rs 100. If 10 units from this project are given free of cost then the revenue of Rs 100 would have to be recovered from the remaining 90 units raising the tariff to Rs 1.1 per unit). In a competitive market, how much the developer is able to recover from the remaining (90 units in this case) depends on the prevailing demand and supply scenario, which could decide what tariff he can command from long term and short term contracts. He may have to absorb some of the revenue loss himself on account of free power.
2. Impact on State government revenues: The host state gets additional revenue through:
    - Additional electricity duty if power free power is consumed within the state (electricity duty is levied on consumption and cannot be imposed on power sold outside the state)
    - Revenue by way of sale of electricity either to state's own utility or to other states

In case, the utility is state owned, it may be assumed that the state government would sell it at the price it buys from the project developer (for instance the variable cost) or the average cost of power purchase of the disco from coal based generation[62]. In case, the host state sells to other states, it could sell at a profit margin, through trading, and possibly earn more revenue than it would if it sold power to its discom.

[62]The tariff (variable for total) is determined by the SERCs in such cases

3. Impact on Distribution utility: State governments could sell it to their own discoms to meet the requirement within the state. In this scenario, and given that coal based generation is generally cheaper than other sources of power, this additional power would help the discom reduce its average cost of power purchase (by replacing power brought at the margin from more expensive sources such as gas and through short term contracts). Most of the coal- bearing states however already have access to cheaper power (most plants being either coal based or hydro and some which have already covered their depreciable life).
4. Impact on Consumer: consumers in the host state may benefit if the state decides to provide free or cheaper power to the state's own consumers. If this power is sold through short term contracts to other states, than consumers in other states may be required to pay higher tariff.

In the subsequent section, we examine the impact of free power on the generation cost of coal based power stations.

Impact on tariffs of agreeing to demands of states

To study the impact on tariff of supply of certain percentage of free power or variable cost power to the host state, levelled tariff (based on cost plus approach assuming plant life of 30 years) of a hypothetical coal based power plant was estimated considering various scenarios of free and variable cost power.

Box 4 Technical & fuel related parameters

Parameters	Unit	Value
Capacity	MW	500
PLF	%	85%
Auxiliary Consumption	%	8.5%
Landed Price of Coal (Coal India)	Rs/Tonne	1500
Calorific value of Coal	Kcal/kg	3500
Station Heat Rate	kcal/kWh	2425
Specific oil consumption	ml/Kwh	1
Secondary Fuel Calorific Value	Kcal/l	10000
Price of Secondary Oil	Rs/KL	50000
Escalation for Fuel Price	%	5%

A plant of 1X500 MW capacities was considered with PLF, auxiliary consumption, station heat rate, and specific oil consumption as per CERC norms. The price and related calorific value of coal (coal linkage from Coal India) and secondary fuel oil was assumed based on prevailing market prices and as allowed by various Commissions in their recent tariff orders for power plants in the coal bearing states of Jharkhand, Odisha and Chattisgarh. (Study of tariff orders for state Generating companies in Chattisgarh show that the landed price of coal ranges between Rs 1000-1200 for coal of approx. 3300 Kcal/kg. In case of Jharkhand, for the JSEB Patratu Plant, the latest price approved is Rs 1369 per tonne for coal of 4689 kcal/kg. In case of NTPC plants located in this region, the price per tonne is higher at Rs 1354 per

tonne and GCV of 3045 kcal/kg for 2000 MW Talcher Thermal Station and Rs 1707 per tonne and GCV of 3330 kg/kg for the Vindhyachal Thermal station. Based on these figures, the price of coal was assumed at Rs 1500 per tonne for GCV of 3500 kcal/kg. The price of Light Diesel was around Rs 48000- 50000 per Kl for calorific value of 9000 -10000 kcal/l in most cases and hence the price was assumed at Rs 50000 per KL). An escalation rate of 5% was considered for year to year increase in fuel prices over the 30 years period. (see Box 4).

Table 38 Financial parameters

Capital cost	Rs Crore/MW	6
Debt : Equity		70 : 30
RoE	% Annual	15.50
WACC	%	13.05
O&M	Rs. Lakh/MW	13.00
Escalation in O&M	%Annual	5.72
Interest	%	12.00
Repayment period	Years	12
Moratorium	Years	1
Interest on working capital	%	13.00
Value of assets (depreciable value)	%	90
Depreciation	%	5.28
Escalation of O&M Cost		5.72

While CERC norms suggest a capital cost norm of Rs 4.7 MW/Crore for a 500 MW unit, the actual average rate is around Rs 6 Crore/MW (as per project developers) and hence the same has been considered in arriving the total cost of project. Debt–equity ratio of 70.30 is assumed. Interest rate has been assumed at 12% per annum and interest on working capital is taken at 13% per annum. The loan tenure considered is 12 years with a moratorium period of 1 year. Depreciation is straight line method and deprecation rate has been assumed at uniform rate of 5.28% percent for the total project value. Assets are depreciated @12% per annum for the first twelve years after which the remaining value of the project minus the salvage value is depreciated uniformly over the remaining 18 years of the project life. O&M costs have been assumed at 13 Lakh/MW as prescribed by CERC and the annual escalation has been taken at 5.72% as prescribed by CERC. In the estimation of RoE, tax has been considered based on MAT for the first ten years and corporate tax for the remaining 20 years. Working capital requirement is calculated based on CERC. WACC (13% in this case) is considered as the discount factor to arrive at the net present value of Fixed and Variable cost and to estimate the NPV of government revenue from free/variable cost power over the 30 year period. The CERC current discount factor for bid evaluation is 13.1%. (see Table 38).

Sensitivity analysis is undertaken to understand the impact on tariff when free/variable cost is offered to state government.

1) If 12% free power is provided to state government for 30 years
2) If 12% power is provided to state government for 30 years at variable cost

3) If free power @ 20% is provided for last 18 years (free power commencing from 13th year once loan has been fully repaid)
4) If free power is provided @ 6% for the first 15 years and @18% for next 15 years

The NPV of the revenue stream available to the state government for each option is also estimated. The results are given in Table 39.

Table 39 NPV of the revenue stream available to the state government

	NPV of VC (Rs/kWh)	NPV of FC (Rs/kWh)	NPV of tariff (Rs/kWh)	% change in tariff from base case	NPV of government revenue (Rs. Cr)
Base Case	1.62	1.77	3.39		
12 %Free Power to state	1.87	2.05	3.92	15%	1242
12% power at Variable Cost to state	1.62	2.01	3.63	7%	613
12% free power staggered (i.e. 20% free power for 18 years)	1.72	1.83	3.55	5%	580
12% free power staggered (6% for first 15 years followed by 18% for subsequent 15 years)	1.74	1.90	3.64	7%	807

Considering a levelled base tariff of Rs 3.39, the demand for 12% free power will raise levelled tariff by 52 paise (15%). If 12% power is given to the state government at variable cost, the levelled tariff will rise by 24 paise (7%).

An alternative possibility is to provide the same amount of power, .i.e. 12% free power across the 30 years life span of a project, but bundled together towards the later years of the project when the financial commitments have been met by the developer. The state could be provided 20% free power from 13th year onwards for 18 years till the end of the project life. In this scenario the levelled tariff will rise by 16 paise, i.e. approximately 5%. Another staggered option would be to provide 6% free power for first 15 years followed by 18% free power for next 15 years. In this case levelled tariff will rise by 25 paise, i.e. approx. by 7%. In terms of revenues to the state (net present value), while the first option will generate Rs.1242 crores; the second will net Rs. 613; the third will net Rs. 580 crores and the last will net 807 crores.

Under the National Tariff Policy, 2006, all procurement of power will have to be done on competitive basis. In this scenario, it is not feasible to predict whether it will be the final consumer who will bear the burden of free power or the project developer. The sensitivity analysis undertaken above shows the impact on tariff (cost of generation plus a regulated rate of return) on account of free/variable cost power. Ultimately, under competitive bidding regime, it would be upto the developer as to how he controls his input costs (particularly cost of coal, and financing terms) and what price he is able to command in the market. The profit maximising developer would explore various options for selling power left with him in order to recover the cost of generation for the total generation capacity. The

options would include long term PPA with power deficit states, trading in the short term market (through the power exchange or through traders), etc.

In case of right of first refusal to host state, the appropriate electricity regulatory commission (generally the SERC) is required to determine the tariff at which the host state will buy power. The impact on the tariff of the remaining power will depend on this regulated tariff. If the tariff is equivalent to the cost of generation (as it should be under a cost plus approach), then the tariff for the remaining power will not be affected.

7. Legal and regulatory framework for compensation to resource bearing states

In order to understand the issues involved in equitable sharing of benefits arising from coal mining and power generation among resource rich states and in order to arrive at options for equitable sharing of benefits between resource rich host States and consuming States, it is imperative to review the Constitutional and legal regime for existing payments and other compensation for coal bearing States. This Chapter provides an overview of the competence of States to regulate and levy a charge on coal mining and electricity. It then provides a summary of laws and policies introduced by the host States for payments from electricity, coal mining and externalities. The chapter also discusses the legal position with respect to three main demands being made by the host states, that is, inter-state tax on generation, free power, and cess to address externalities.

Constitutional scheme

Ownership

With the commencement of the Constitution of India, ownership of all the property and assets vested in the Crown was transferred to the Union and State Governments along with all the existing rights, liabilities and obligations. The rights transferred to the Indian Union and States included the power of the Executive in holding and disposal of the property[63]. A combined reading of Articles 294-297 of the Constitution of India suggests that States own all the subsoil resources located within their territory in cases where they have proprietary rights over land[64]. Civil appeal no. 4549 OF 2000. SC order dated July 8th 2013. This ownership is subject to the legislation governing regulation and control of mining enacted by the Parliament[65].

The Mines and Mineral Development and Regulation (MMDR) Act, 1957 confers upon the State Governments the right to allow exploitation of minerals by way of granting licence and lease. However, any permission or lease is to be granted in accordance with the MMDR Act and its Rules as enacted and notified by the Central Government. Therefore, although a state may be an owner of minerals, effective control over these minerals lies with the Centre.

Legislative competence for regulation

The constitution of India assigns functions, legislative competence, and fiscal powers for different subject to both the Centre and the States. Schedule VII, read with Article 246, assigns powers through three Lists: List I, the Union List, covers subjects that serve at a national level; List II, the State List, sets out those areas which are a State's exclusive jurisdiction, subject to other clauses; List III, the Concurrent List, identifies areas where both the Parliament and a State legislature can make laws, subject to central laws prevailing in

[63] Article 298, Constitution of India

[64] See Threesiamma Jacob & others Versus Geologist, Department of Mining & Geology & others

[65] Regulation and development of minerals is a state subject also but it has to be in conformity with the central legislation

case of a conflict where there is no scope for a harmonious reading of the provisions. Only Parliament has the residuary power to make laws on matters not included in the three lists.

Coal resources

The Centre has jurisdiction over regulation of mines and mineral development, oil fields and mineral oil resources.[66] At the same time States are also empowered to legislate on regulation and development of mines and mineral development, but subject to the powers of the Union under List I.[67] Hence, even though the states may own the mineral resources, effectively the legislative control over minerals lies with the Union as declared by the Mines and Minerals Development and Regulation Act. (TERI, 2007)

With respect to major minerals, states have little powers except possession, receiving royalty and few other payments for major minerals. A mining lease is granted by the state but in doing so the state is governed by the conditions and procedure as laid down by the MMDR Act and Mineral Concession Rules (MCR) 1960. States' rights are even more limited in the case of coal, where the Ministry of Coal (MoC) allocates coal blocks and the States assess mining lease applications based on the criteria established by, and approvals granted by the Ministry of Coal, Government of India.

Electricity

Electricity is a concurrent subject under the Constitution of India. Therefore, both the Centre and the States have the jurisdiction to legislate on electricity. However, as with other concurrent matters in the Indian model of federalism, in case of any overlap or conflict between central and state legislation the law passed by the Parliament would prevail.

Externalities

Environmental externalities in the nature of loss of ecology and pollution of environment have been discussed in Chapter 3. Environment does not feature in the Indian Constitution as a separate entry under the Schedule demarcating legislative rights. However, environment protection is clearly provided for in the Indian Constitution as a directive principle of state policy and judicial interpretation over the years has further strengthened this mandate. Although environment is not a distinct item for legislative and administrative purposes, different components of the environment with a direct or indirect implication for the environment, such as forest, wildlife, water, fisheries and land are distributed between the Centre and the States. Since residuary power vests with the Centre, any environmental subject not listed in schedule VII, is Centre's prerogative. Therefore, land and water are state subjects, forests and wildlife are concurrent and environment in general is a residuary subject and any externality related to these would fall under the respective domains of the Centre or states.

Fiscal competence

The Seventh Schedule which demarcates the domains of legislation between the Union and the States deals with powers of taxation separately as a power to tax cannot be deduced from a general legislative entry. The relevant taxation related entries include non-agricultural income tax, insurance, taxes on interstate trade and commerce, and excise duties

[66] Item 53 & 54, List I, Schedule VII, Constitution of India
[67] Item 23, List II, Schedule VII, Constitution of India

for the Union and land revenue, taxes on mineral rights, tax on sale and consumption of electricity for the States. Union and States have the power to levy a fee on matters of their general competence.

Power of 'regulation and control' is separate and distinct from the power of taxation and so are the two fields for purposes of legislation. A charge can be levied both in exercise of a State's power to regulate as well as tax. Cooley on Taxation has stated that 'if the primary purpose of the legislative body in imposing the charge is to regulate, the charge is not a tax even if it produces revenue for the public' (Cooley 1924). In such a case, the charge would become a fee. There is no generic difference between tax and fees as both are compulsory exertion of money by public authorities. However, a tax is imposed for public purposes and is not, and need not be supported by any consideration of service rendered in return; on the other hand, a fee is levied essentially for purposes rendered and as such there is an element of quid pro quo between the person who pays the fee and the public authority which imposes it.[68]

Coal resources

One of the most direct entries with respect to mining is taxation on mineral rights vested in the States.[69]However, this power with the States is not absolute and is subject to any limitations imposed by any law enacted by the Parliament. Hence, when mineral rights are taxed, they have to be in Conformity with the Mines and Mineral Development and Regulation Act legislated by the Centre. Under Entry 84 of the Union List, duties of excise on goods manufactured or produced in India are under the competence of the Central government.

Environmental externalities

Under the Constitution, there is no specific entry on fiscal matters related to environment or its key components. Therefore it does not provide for levying a tax on environmental externalities by either the Centre or States. Centre can however, relying on residuary powers, impose such a tax. Another important entry in the Constitution is with respect to fees. Fees on any of the matters specified in the Union, State or Concurrent Lists are within the respective jurisdictions of Centre, States or both. Most of the environment related levies, either introduced by the Centre or States are in the nature of fees.

Electricity

Along with the general concurrent powers on electricity, States have the explicit power to levy a tax on sale or consumption of electricity[70]. However, the arrangement of fiscal powers with respect to electricity is a little complex. While the States can legislate on sale or consumption of electricity, they do not have the competence to impose any tax on generation of electricity, as generation amounting to production falls under the Union List I[71]and hence under the purview of the Centre.

[68] State of West Bengal v Kesoram Industries ***AIR*** 2005 SC 1646
[69] Entry 50, List II
[70] Entry 53 list II
[71] Entry 84, List I

Inter-State trade and commerce is the legislative prerogative of Union.[72] Since a general entry does not imply taxation powers, a new entry for taxes on the sale or purchase of goods in the course of inter-State trade or commerce[73] was added vide the sixth amendment to the Constitution in 1956. The two most important provisions vis-à-vis export of electricity to other consuming states are Article 286 and entry 92A of List I. The former prohibits States from levying taxes on purchase or sale of goods outside their territory and the latter declares taxation on inter-state sale of goods as a subject matter for the Union. Thus, States are only allowed to tax consumption or sale of electricity which is completed within the boundaries of the State.

Central legislation, subordinate legislation and policies for various payments

Coal mining

Further to its Constitutional prerogative, the Union has enacted the Mines and Minerals Development and Regulation Act. The MMDR Act (MMDRA) 1957, read with the Mineral Concession Rules, regulate the exploration and exploitation of all the major minerals in the country.

Besides laying down the procedure for granting of licences and lease, the Act also provides for the various charges that are payable to the governments, both Central and State, at different stages of exploration and exploitation. These include a security deposit, a permit fee for reconnaissance and prospecting fee[74], surface rent[75], dead rent[76], royalties[77]. Several of these payments are received by the States. However, they are imposed and affixed by the Centre. In 1974, Coal Mines (Conservation and Development) Act was enacted to provide for conservation of coal and development of coalmines. The Act provides for imposition of excise duties on all coal raised and dispatched. The excise duty levied and collected is disbursed by the Central Government to the owners, agents or managers of the coalmines.

Electricity

Electricity Act, 2003 is the primary legislation for regulation of electricity in India. The Act consolidates all the laws of electricity relating to generation, transmission, distribution and trading of electricity. It replaced the existing laws for electricity supply industry, setting up of State Electricity Boards and Regulatory Commissions. The central Act deals with generation, lays down the procedure for licensing entities to transmit, distribute and trade in electricity. The Central Transmission Utilities and the State Transmission Utilities are

[72] Entry 42, List I
[73] Entry 92A, List I
[74] 7 & 14 of Mineral Concession Rules, 1960
[75] When land is acquired by the Central government under the Coal Bearing Areas (Acquisition and Development Act, States do not receive surface rent as the rights over land are acquired by the Centre for coal mining.
[76] Section 9A MMDRA
[77] Section 9 MMDRA

enjoined with a responsibility to facilitate inter-state and intra state transmission respectively on payment of transmission charge.

Further to the powers of Central government under the Electricity Act, the Tariff Policy has been formulated by the Centre. The *Tariff Policy of 2006* aims at ensuring availability of electricity at competitive rates, promote competition and efficiency in the sector, and 'promote transparency, consistency and predictability in regulatory approaches across jurisdictions.' Inter alia, it lays down a framework for arriving at performance based cost of service regulation in respect of generation, transmission and distribution.[78] In the deductions for arriving at the total saleable design energy, the Policy recognizes 13% of free power to the State Government, and Energy corresponding to 100 units of electricity to be provided free of cost every month to every Project Affected Family notified by the State Government in the designated resettlement area/ projects area for a period of ten years.[79]

Environmental externality

As mentioned above, there is no entry with respect to taxation of components of environment. Most levies are in the nature of fees meant to provide a service. Following are the main charges that have been imposed by the laws enacted by the Centre in relation to getting environmental approvals or management of externalities associated with coal mining and other development projects. A list of charges paid to the government is also given in Table 25.

The *Water Pollution Act 1974* vests the authority in Central and State Pollution Control Boards to establish and enforce effluent standards in mines and processing plants. For obtaining consent to establish a unit prescribed amount of consent charge is to be paid to the State Pollution Control Boards.

The *Water (Prevention & Control of Pollution) Cess Act, 1977* provides for levy and collection of a cess on water consumed by industries.

Forest Conservation Act of 1980 and the rules, executive orders and Supreme Court rulings relating to the Act provide for compensation in monetary terms for any diversion of forest land for non-forest activities, including mining. Mining entities have to provide money for compensatory afforestation and the net present value of the forest lost due to the mining activity.

A *Clean Energy Cess* has been introduced by the Government of India in 2010. Under the new notification, a Clean Energy Cess at the rate of Rs.100 per tonne is levied as a duty of excise on raw coal, lignite or peat raised and dispatched from a coal mine.[80]

Social externality

Although not a part of the terms of reference of this study initially, social externalities have emerged as an important issue in our research and consultations with the stakeholders in coal bearing states. Figure 1 depicts how of all the different kinds of compensation, the compensation for social externalities is least adequate. Many of these costs are not met

[78] No.23/2/2005-R&R(Vol.III)
[79] Para 5.1 (e) (iii); Amended vide Ministry of Power Resolution, dated 31st March, 2008
[80] Notification No. 3/2010-CEC dated 22.06.2010

directly by the state but are met by the project affected people. However, these externalities do put a burden on the state machinery.

The Land Acquisition Act, Coal Bearing Land (Acquisition and Development) Act, the National Resettlement and Rehabilitation Policy, State R&R Policies together comprise the framework for addressing social externalities arising out of a coal mining project. Since land acquisition and R&R is a complex, albeit often ignored, issue it needs to be looked at in greater detail. There is merit in delving into details of different laws and policies relating to land acquisition and R & R. Since Coal India Limited is the main entity operating in the coal extraction sector, it is useful to review the company policy of CIL towards addressing social externalities associated with coal mining. The study also analyses R&R Policy of National Thermal Power Corporation (NTPC) in detail.

The main cause of social externalities in mining is rooted in acquisition of land. The legislation for land acquisition is based on the principle of eminent domain and pays little attention to mitigation of losses resulting out of mining. Successive R&R Policies have tried to move closer towards addressing the different kinds of losses caused by the acquisition of land. Broadly speaking, all policies now try to categorize into compensation for -

- Land as property,
- Land as livelihood
- Livelihood deprivation of landless individuals
- Destruction of tribal lands

Land as property

Land-for-land

On the face of it, the most comprehensive compensation for land acquired is to allot land to the owner elsewhere. The monetary compensation can then be directed toward making up for differences in the quality of the land and availability of surrounding resources. This approach is recommended, to some extent, in the NRRP 2007. The NRRP, in paragraph 7.4.1, provides that when agricultural land has been acquired, land may be allotted up to a maximum of 1 hectare or irrigated, or 2 hectares of un-irrigated land. This is, however, subject to the availability of land to allot. Non-availability of land is often an impediment in ensuring land for land compensation. As reported by the Ministry of Coal in the context of rehabilitation and resettlement by Coal India limited, 'land acquisition for both mining and associated infrastructure development purposes is very difficult' owing to scarcity of land. (StandingCommittee, 2010) Accordingly, the 2012 CIL Policy bears no reference to land-for-land compensation.

The NTPC policy for R&R suffers from the same infirmities as the NRRP since it conditions land-for-land compensation on the availability of land. However, on a positive note, the NTPC policy also briefly outlines a process to facilitate land purchase in surrounding areas on a consensual basis. It also provides that the amount payable under the LAA 1894 will be adjusted against such purchase. This adjustment excludes the amount awarded as solatium, the calculation for which is (in contrast to the CIL policy) not explicitly provided for. In cases where land-for-land is not possible either through Government land or facilitating private

deals, employment (under para. 2.3.2.) or a Rehabilitation Grant (under para. 2.3.3.) is to be provided.

Monetary compensation

Monetary compensation for land is a legal requirement under the LA Act and the CBA Act. These acts allow for compensation to be adjusted against the amount of land allotted as compensation. Where some part of land-for-land compensation is awarded, therefore, the amount of monetary compensation legally due would be accordingly reduced. Since it is a requirement under the law, monetary compensation does not find a place in most policies. The CIL Policy of 2012 is an exception. It deals explicitly with monetary compensation for land. In paragraph 8.1. (i).A, the policy states that compensation for land will be paid in accordance with the relevant legislation or State Government notification. In addition, the CIL Policy contemplates solatium and escalation to be paid on and in excess of the compensation amount. The solatium and the escalation, therefore, is the only amount that CIL is paying out in excess of its legal obligation under the land acquisition legislation.

There is a fundamental problem with monetary compensation for land under the existing law. The 'market value' of the land is ascertained at the time at which the Government notifies the public of its intention to acquire the land. In most cases, entire years lapse between this notification and actual acquisition of the land.[81] In this time, the price of land around the area of proposed acquisition appreciates significantly. Thus, the compensation is completely inadequate for the erstwhile land-owner to acquire a similar plot of land in this inflated market (Fernandes W. , 2005).

This is added to the fact that the formula for calculating the 'market value' is based on averaging out the value of land transactions in that area in the past three years. It is a well-documented problem that the values of land transactions are routinely misrepresented in order to reduce the stamp duty payable on the purchase. (Fernandes W. , 2005) This discrepancy was exposed, for example, in our meeting with the Jharkhand Department of Revenue where it was acknowledged that the 'registration rate' of land was determined by the State Government at around Rs. 20,000/- per acre, but actual compensation went as high as Rs. 4-5 lakh per acre (Rastogi, 2013).

Therefore, monetary compensation for land-as-property under the existing legislations suffers from a flawed formula for its calculation. Monetary compensation needs to be based on the *replacement* value of land and not its out-dated, misrepresented market value.

There is an additional burden imposed upon the state machinery when the Collector has to talk to the local population and convince them to move. From our meeting with the Odisha Energy Department, the Collector spends 10-12 hours in trying to achieve this result. Moreover, companies are often unwilling to pay the sums demanded by the land owners (P K Jena & Ors., 2013). Planning for this process is difficult since the time required varies across locations and communities (Vishal Dev & Ors., 2013).

Compensation for homestead and homestead land

There is significant variance across policies in the way homestead and homestead land is compensated for. The NRRP 2007 compensates for acquiring homestead land by allotment

[81] One study puts the figure at 7-8 years for the entire land acquisition process to be completed.

of alternate land, subject to a cap. It offers nothing, however, for the cost of the homestead itself, except in the case of families below the poverty line. The CIL Policy of 2012, on the other hand, offers only a uniform lump sum monetary compensation to buy an alternate home-site, to shift, and to construct sheds. It compensates the cost of the homestead itself based on the requirements of the Land Acquisition Act.

The NTPC policy encourages 'self-resettlement' by providing for enhancement of homestead compensation by 500% over the amount calculated under the LAA, 1894. Where self-resettlement is not preferred by the displaced, the policy provides for the setting up of a Resettlement Colony where homestead land shall be allotted. It makes a somewhat crude distinction, guaranteeing 200 square metres of land to those who lose up to that amount but only 250 sqm for anything above that amount.

The section of the NTPC Policy dealing with RGs displays nuances not found in other RRPs. While the minimum amount is fixed (depending on status as land owner or non-landed affected person), it recognises that the RG to be based on a variety of factors – per acre, on the basis of slabs etc. It also allows for the RG to be paid out as an annuity. It goes a step further to state that a PAP must refuse an annuity and show an affidavit confirming the intention to purchase assets before a one-time lumpsum payment can be authorized. This potentially addresses, to a great extent, the documented problems of PAPs who are do not manage large one time payouts well.

Land as livelihood

The effect of converting a large amount of rural land into industrial projects without adequate land compensation is to create a large pool of former land-owners and agricultural labour whose skills are no longer usable. The lack of integration of this workforce into a new economic paradigm is one of the harshest legacies of coal mining displacement.

Mandatory employment or compensation in lieu of employment

In the 1990s, R&R policies like that of CIL followed the TN Singh formula which required one person to be employed per displaced family. This norm has fallen into almost complete disuse, especially by CIL, since it now finds itself with a highly bloated workforce. The latest CIL Policy ties employment to size of land holding, allowing for families to club their land holdings in order to claim one job. This leads to a situation in which multiple families are supposed to benefit from one individual's income.

Most policies, in one way or the other, speak of preference to be given to displaced individuals for employment in the project. However, this preference in employment is almost always limited (as in the case of NRRP 2007 and Odisha RRP 2006) to the one nominated member per displaced family. The latest CIL policy does not contemplate preference in employment at all.

The NTPC Policy's section on employment opportunities is one of the strongest among R&R policies in India. It recognises a variety of areas in which PAPs may be gainfully employed. The terms in which this commitment is framed are more mandatory than discretionary. Hence, for example, "All unskilled jobs ***will*** be generally reserved for PAPs subject to reservation policies of GOI…" and "…NTPC Project *will reserve* 50% of the shops and 100% kiosks for allotment to PAPs / land oustees…. rent charged *will be* 10% of that charged to non-PAPs" [emphasis added] The policy also makes reasonably strong commitment to

include clauses in contracts with sub-contractors to employ 80% of their unskilled labour requirement from the PAPs. The NTPC frames employment as an *alternative* to land for land, rather than a complementary rehabilitation measure.

Land-less individuals

This category comprises two types of individuals – rural service providers such as artisans and non-landed agricultural labour such as share-croppers. Under the NTPC Policy, landless individuals are compensated against employment at a lower rate than landed PAPs. There is no distinction made in the policy between land losers and landless PAPs in terms of access to employment opportunities and CSR measures under the NTPC's Community Development Initiatives. For PAPs who were previously self-employed, a one-time cash assistance of Rs. 31,000/- is provided.

Most RRPs provide for a one-time cash grant to establish a new workshop. They also provide for the institution of self-employment schemes and vocational training schemes. These schemes have historically had underwhelming results. The earliest CIL Policies projected that the displaced individuals would be accommodated in the dairy and poultry sectors. In 1996, the Jharkahand Janadhikar Manch in its critique of the then R&R policies clearly identified that this was not feasible since the sectors themselves could not accommodate such a load and because the displaced much preferred stable salaried employment (Benghara, 1996). Observations of this poor response continue to this day even as CIL has to induce displaced individuals to even attend its vocational training. (Bhattacharya, 2004).

Conclusion

R&R Policies suffer from two fundamental flaws – they lack cohesion and are not legally binding. To have a legal instrument for land acquisition and merely policy instruments for R&R priorities is unsustainable. Hence, the 2011 Bill passed into an Act in 2013 (Box 5).

Box 5 The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (LARR), 2013

This Act takes what it believes is an extremely generous approach to R&R. It requires the consent of 80% of the affected population for a project to go ahead and completely prohibits the acquisition of irrigated multi-cropped land. In addition, it lays out compensation for land and livelihood with generous multipliers applied to the 'market value'. It combines various other forms of compensation such as annuities, subsistence allowance, homestead compensation and the sharing of appreciation in land value. It also guarantees employment per family or compensation in lieu of employment.

The LARR 2013 has, effectively, taken the best of the R&R policies and laid out an R&R package that far exceeds any of them. As a result, therefore, it suffers from many of the same flaws. This is particularly true in the case of coal mining.

The most important advancement made by the Bill – the 80% consent required from the affected families – does not affect coal mining at all. It is only required when land is acquired for private companies. Since the major acquirer here is CIL, a public sector undertaking, prior informed consent is still not required. Social Impact Assessment is required only when more than a 100 families are displaced. Even when it does need to be conducted, the Gram Sabha is merely to be consulted.

The issue of compensation for land has been decided in the most arbitrary of ways – by applying a multiplier to a slightly modified version of an already discredited formula. Naturally, land-for-land compensation is still unavailable other than for irrigation projects.

The definition regarding project affected persons still requires three years' residence. The issue of tribal mobility, hence, will continue to place them beyond the eligibility for these benefits.

Finally, the effect of the definitions of 'public purpose' and urgency means that the Government can continue to acquire land indiscriminately. Worse, while the Bill requires that unused land be returned after five years, this requirement is circumvented by transferring the land for another public purpose. Potentially, this could simply create a circulation of land ownership among Government departments/instrumentalities.

In sum, the LARR Bill suffers from the same inadequacies as its policy predecessors. It assumes that the best way to further public interest is in the unilateral assertion of 'eminent domain'. It is positive, however, that the issue of resettlement and rehabilitation are finally being addressed through legislative proposals rather than simply policies.

State legislation, subordinate legislation and policies for various payments

Electricity

As discussed in the preceding sections, generation of electricity amounts to production and any tax on that would amount to excise. Hence, it is outside the purview of the states. Electricity as a general entry is a concurrent subject shared between Centre and States. Tax on consumption and sale of electricity is however explicitly under the purview of states. Following is an overview of the legal and regulatory framework for imposition of different

kinds of levy on electricity, resource (coal), environment and social externalities at the level of States.

Electricity duty

Since taxation on sale and consumption of electricity is clearly in the domain of States, the States levy a duty on certain sales and consumption of electricity by various consumers. Most states have classified consumers of electricity into different categories and fixed the rates of duty accordingly.

Andhra Pradesh Electricity Duty Act, 1939 provides for levy of duty on certain classes of sales and consumption of electricity by licensees in the State of Andhra Pradesh.[82] Under the said Act, every licensee in the State of Andhra Pradesh is liable to pay to the State Government a duty on and in respect of all sales of energy. There are some exemptions however. For example, sale to government, railways etc. are excluded in most states. All agricultural consumers are exempted from this electricity duty. [83]

Madhya Pradesh Electricity Duty Act, 1949 requires every distributor and producer of electrical energy to pay a duty to the State Government based on the units of electrical energy sold or supplied to a consumer or consumed by himself for his own purposes.

After its creation, the State of Jharkhand adopted the *Bihar Electricity Duty Act* of1948 in 2000.[84] According to the Act, an electricity duty is levied on any person who is supplied with electricity for his own consumption by a licensee or a government agency. This duty is affixed periodically by State Government. The Bihar Act provided for an additional duty at the rate of two paise per unit consumed or sold. However, this provision was deleted by Jharkhand through an amendment in 2011.[85]

Under the *Odisha Electricity (Duty) Act*, 1961, any consumer who is supplied with energy by a licensee, a Board or the government, is charged with an electricity duty payable to the State government. A licensee or the state board is required to collect duty from the consumers and paid to the State government.[86]

Different categories of consumption are charged at different rates revised from time to time in the respective states. For instance, in Odisha, the main classes of consumption for the purposes of levying an electricity duty are (i) rate charged on a monthly basis, (ii) minimum rate charged, (iii) rate charged on the basis of maximum demand, (iv) in case of unmetered supply, and (v) in case of two part tariff. The electricity duty is payable even by those consumers who generate energy for their own consumption. [87]

Cess and other charges

Under the *Madhya Pradesh Upkar Adhiniyam*, 1981 (as amended upto 2001), one paise per unit Energy Development Cess is levied on the total units of electrical energy consumed, or sold or supplied to a consumer.[88] It must be noted that initially the Act sought to impose a cess on

[82] Madras Act 5 of 1939 made applicable to the State of Andhra Pradesh
[83] Department of Energy (Power) Government of Andhra Pradesh, G.O.Ms.No.82, Dated 7 July 2003.
[84] vide S.O. Number 117 dated 15 December 2000
[85] vide Jharkhand Duty (Amendment) Act, 2011 dated 24 June 2011
[86] Section 5, Odisha Electricity (Duty) Act 1961
[87] Section 3, Odisha Electricity (Duty) Act 1961
[88] Section 3 (1) Madhya Pradesh Upkar Adhiniyam, 1981 (Act no. 1 OF 1982) as amended upto 2001

mineral bearing land too. However, the cess on mineral bearing lands was struck down as ultra vires in M.P. Lime Manufactures Association v. State of M.P.[89]As per the Madhya Pradesh Act, the cess is first credited to the Consolidated Fund of the State, which then transfers the amount to a dedicated Energy Development Fund.[90]The Fund is meant to be utilized for purposes such as research and development; improving the efficiency of generation, transmission and distribution; energy conservation programmes; improving capacity and infrastructure; and transfer of technology.[91]

Besides the Act, *Madhya Pradesh (investment in Power Generation Projects) Policy*, 2012 enjoins a responsibility on the developer to pay 6 paise on per unit of energy sent out of the State from any thermal power plant situated within MP.[92]

The Madhya Pradesh Act was extended to the State of Chhattisgarh and amended in 2004. *Chhattisgarh Upkar (Sanshodhan) Adhiniyam 2004* levies a cess of five paise per unit on the total units of electrical energy sold or supplied to a consumer in the State of Chhattisgarh.

Although Jharkhand does not have a law as yet for any additional cess on power being sold outside the state, the State has entered into MoUs with developers that require them to pay a 6 paise cess from power plants per unit of energy sold outside the state.

Concessional power and first right of refusal

Requirement to sell power at variable cost to the host states is another form in which the States seek benefits out of thermal power plants situated in their states. Although contractual in nature, some state policies have incorporated this as a condition for signing MOUs between the developers and States.

Odisha State Energy Policy states that "…[a] nominated agency authorized by the State Government will have the right to purchase 14% of the power sent out from the Thermal Power Plant at variable cost from the IPPs who have been allocated coal blocks within the State."

Chhattisgarh Energy Policy is in line with Chhattisgarh's aim of becoming India's 'power hub'. It aims at encouraging investments by other State Governments, Public Undertakings and private sector to set-up power projects. According to the policy, 'after meeting requirement of Chhattisgarh, surplus power from power producers could be sold to other States'.

Jharkhand Energy Policy, 2012 also contains similar provisions whereby it envisages that 'After meeting the requirement of the State, the surplus power could also be sold to other States and State Government shall extend all possible support in this regard.'

Madhya Pradesh (investment in Power Generation Projects) Policy, 2012 makes it binding on the IPP developers to sell up to 10 per cent of power generated to the state of MP at a variable cost approved by MP Electricity Regulatory Commission. The 2010 version of the policy also reserved the government's first right to refuse for up to 30 per cent of power generated, in addition to the 10 per cent power at variable cost.[93] However, the 2012 version of the policy

[89] AIR 1989 MP 264
[90] Section 3 (2) Madhya Pradesh Upkar Adhiniyam, 1981 (Act no. 1 OF 1982) as amended upto 2001
[91] Section 3 (3) Madhya Pradesh Upkar Adhiniyam, 1981 (Act no. 1 OF 1982) as amended upto 2001
[92] Para 4.2012 Policy No. F – 1- 01/09/XIII
[93] Para 3, 2010 Policy No. F- 1- 01/ 09 / XIII

dropped the right to refusal provision and added a responsibility on the developer to pay a 6 paisa per unit of energy sent out of the State from the Thermal Power plant.[94]

Mining activities

States' right to regulate mines and mineral development is subject to the Union's powers, hence, the MMDR Act. Owing to their ownership of the mineral resources, States receive the royalty and other rents accruing from mining but on a rate and in a manner fixed by the Union under the MMDR Act. However, they cannot levy a tax on coal produced as that would impinge upon the Centre's jurisdiction.

Time and again states have tried to levy charges on mining since they have the right to legislate on taxation of mineral rights. However, on most occasions they have been challenged and struck down by the courts. The exception is in case a cess is levied in a manner that it does not impinge upon the regulation by the Centre under MMDR Act.

In 1952, Odisha enacted the Odisha Mining Areas Development Fund Act. Section 3 of the Act empowered the State Government to designate 'mining areas' which required particular attention in development. Section 4 dealt with the imposition and collection of cess at a rate not exceeding 5 per centum of the valuation of the minerals at the pit's mouth. The proceeds of the cess were to be collected in the Odisha Mining Areas Development Fund. In 1960, the Act was challenged before the Supreme Court in *Hingir Rampur Coal Company Ltd. v. State of Odisha*.[95]The Supreme Court held that the State legislation operated within a field already occupied by the Central Government. However, the Court held that the declaration in the Preamble to the Act (which was not technically made by Parliament since it was a pre-Independence Act) was not sufficient to constitute a declaration for the purposes of Entry 54. As a result, the State Act was allowed to stand on a ground that, from a policy standpoint, seems a technicality. The same Act, inevitably was challenged again before the Supreme Court in 1963, in the case of *J.M. Tulloch v. State of Odisha*[96]. The difference was that the Minerals and Mining Development and Regulation Act, 1957 had come into force by this time. It contained a clear declaration by Parliament as to the necessity of Central control of coal mining and conferred even wider powers upon Parliament than the 1948 Act. The Supreme Court thus held the impugned legislation to be outside the legislative power of the State.

In 1989, in *India Cements v. State of Tamil Nadu*[97], the Madras Panchayats Act, 1958 was in the Supreme Court's crosshairs. The Act levied a local cess at the rate of 45 paise on every rupee of land revenue payable in every Panchayat development block. An explanation to the offending section included royalty paid on minerals as "land revenue", on which cess was payable. The cess was thus sought to be justified under Entry 49 of List II which authorises the State to levy cesses on land revenue. Alternatively, it was sought to be justified under Entry 50 of List II, which authorises the State to levy taxes on mineral rights.

The Supreme Court insisted that first, there is a distinction between land revenue and royalty and hence, the conflation of the two in the Act could not justify the taxation under

[94]Para 4.2012 Policy No. F – 1- 01/09/XIII
[95]1961 AIR 459.
[96]1964 AIR 1284.
[97]1989 SCR Supl. (1) 692

Entry 49. Thus, the taxation was essentially one on minerals under either Entry 23 or Entry 50 of List II. Both those Entries, however, are subject to the Centre not exercising its competence under Entry 54 of List I. Since the Centre had exercised its competence through enactment of the MMDR Act, 1957, the State legislation was ultra vires. An interesting side note here is Justice Oza's observation that if the State merely had the sense to draft the explanation to cover dead rent instead of royalty, all the trouble could have been avoided. This helpful suggestion ignores the fact, of course, that the massive difference in revenue between taxing rent on land and taxing royalty on actual mineral produce is what drives the States to such innovative solutions in the first place.

In 1991, the Supreme Court was called upon again to decide on the issue of coal taxation at the State level. The legislations of three States were challenged in *Odisha Cement Ltd. v. State Of Odisha*[98] - the Bengal Cess Act, 1880 (as applicable to the State of Bihar), the Odisha Cess Act, 1962 and the Madhya Pradesh Upkar Adhiniyam, 1982. Under Section 4 of the Odisha Act, all lands are made liable to the payment of cess to be determined and payable as provided in the Act. A 1976 amendment clarified that mineral-bearing lands were not exempt. While the original act simply provided for a levy of twenty five percent on the annual value of the land, by 1989, amendments to the Act had brought it to the point where it defined precisely how the value of mineral bearing land particularly was to be calculated. The calculation was based on royalties. Section 7 of the Act defined annual value of the land as "the rent payable by [the lessee] to the land-lord immediately under whom he holds the land."

The State sought to contend that the cess was being imposed on land generally, not just on mineral-bearing land and that royalty was merely the basis for calculation of value in the case of mineral-bearing land. The Court, however, read right through the contention, posing the question – "... what is it that is really being taxed by the Legislature?" In the opinion of the Court, the change in the scheme of taxation in 1976, the importance and magnitude of the revenue by way of royalties received by the State, the charge of the cess as a percentage of royalty and the collection of the cess along with and as a part of the royalties were circumstances which go to show that the legislation in this regard is with respect to royalty rather than with respect to land. The royalty had ceased to be a mere measure or yardstick of the tax and had become the very subject matter.

In Bihar, the Bengal Cess Act, in section 5 stated that all immovable property would be liable to a local cess. Section 6 provided for the levy to be based on the annual value of lands and sale value of other immovable properties, and based the cess on royalty from mines and quarries. Again, the Supreme Court opined that "[i]n other words, the cess are levied directly on royalties from mines and quarries..." and considered it to be indistinguishable from India Cement.

In Madhya Pradesh, Part IV of the Madhya Pradesh Upkar Adhiniyam, 1981 (as amended in 1987) levied a cess only on land held in connection with mineral rights. Under section 9 the proceeds were to be utilised for the general development of mineral - bearing areas. The Court agreed with the Madhya Pradesh High Court's opinion on the same Act i.e. since under the Act, value of the land or of the minerals produced does not play any part in the levy of cess, the levy could not be held to be a tax on land within the competence of the State

[98] 1991 AIR 1617.

under Entry 49 of the State List. The Madhya Pradesh Act, unlike its Odisha and Bihar counterparts, calculated cess based on tonnage, not on royalty. Hence, the Court's opinion on all three legislations, taken cumulatively, suggests that whether a cess is on tonnage or royalties, it is likely to be interpreted as a tax on mining rather than land.

This decision, though, exhibited the increased refinement in the attempts of States to tax coal mining. By presenting "mineral-bearing land" as a mere subset of a larger scheme to tax all land, the States were able to change the Court's position on mining cesses. From declaring royalty-based taxation to be outside the State's power, the Court was also led to refine its position – royalty could be used as a basis for determining the land's value, but could not be the basis for taxation itself.

The distinction was to prove important in the 2004 decision of the Supreme Court in *State of West Bengal v. Kesoram Industries*.[99] West Bengal had chosen to levy multiples cesses which were variously calculated based on production of coal as well as annual value of land based on the sale value of coal from mineral bearing lands. Again, the issue of conflict between Entries 23 and 50 of the State List and Entry 54 of the Union List was in question. The Court, however, reached a new conclusion. It began with the observation that a definition of a regulatory field did not automatically grant the power to tax. Only entries which specifically conferred a power to tax could do so. When a broad regulatory field was defined, however, it was for the Government to legislate in the field. The extent to which the Centre legislated was occupied; the rest was still available for the State to operate in. The Court then drew what it saw as a crucial distinction between the 1948 and the 1957 MMRD Acts. While the former, in section 9, specifically listed the power to levy taxes and fees as one aspect of the regulatory field that was covered by the Union, the 1957 Act has no such provision. Hence, the State was free to levy fees and taxes on mineral bearing lands. The Court still set store by the prohibition on States taxing royalties since that, in its opinion, would constitute a tax on income, which is simply not allowed to the States. This is why the Court was comfortable upholding its decisions in Odisha Cement and India Cement, which prohibited cesses on royalties. The logic in those cases, however, could not be extended to taxes on annual value of mineral-bearing land which were not in essence taxes on royalties.

TERI, 2007 summarizes the position as,

"Ownership right in minerals of States is a qualified and conditional one. While the States have a right to the share of revenues from mining in the form of royalties and dead rents to reflect ownership, it (a) has no right to decide on the method of fixation of royalty its rate or its periodic revision (b) has no right to decide on the granting of mining leases in cases of Schedule I minerals without prior clearances from the Central Government and (c) is unable to tax minerals in any way they see fit."

Environmental externality

Land and water are state subjects, forests and wildlife are concurrent and environment in general is a residuary subject. Therefore, States' power for levying a tax, duty or cess relating to environment is limited. They do receive proceeds from compensatory mechanisms levied by the Centre, for example the proceeds of the CAMPA fund. Thus the States do not have an explicit power to tax environmental matters in general. They can however levy in other

[99] Judgment of 15th January 2004. Retrieved from http://indiankanoon.org/doc/879535/.

forms, such as cess in the nature of fees, on subject matters that are within their domain, such as land, forest, eater, electricity. It must be noted that irrespective of the valuation of a tax or a cess, the subject matter must not infringe upon the domains of the Union. Here are some examples of state level cess applicable on electricity or coal bearing lands.

The *Chhattisgarh (Adhosanrachna Vikas Evam Paryavaran) Upkar Adhiniyam*, 2005 provides for an environment cess to provide for additional resources for improvement of environment in the State. The environment cess is be levied and collected at the rate of five per cent on land on which the land revenue or land rent is to be collected. For land under coal mining lease, the cess is calculated at the rate of Rupees 5 per tonne of coal dispatched.[100]Proceeds of the Cess are to be credited into an Environment Fund, which would then be utilised by the state government on environmental projects.[101]

As per the policy of Government of Odisha on Energy, under any MOU signed with a power producer, an annual contribution at the rate of 6 paise per unit is leviable on the energy sent out to other states and not sold within the host state. This amount goes towards an *Environment Management Fund*. The Fund has been created as a registered trust and collected around 30 crores of rupees. However, the money has not yet been utilized as the operation of this Fund is yet to be finalized. Two areas being considered for utilizing this fund are environmental regeneration and livelihood regeneration. In 2011, the State of Odisha also proposed to levy a forest development tax on minerals extracted from forest areas.[102]However that proposal did not materialise.

The procedure for granting of approvals for coal mining, in the form of lease or prospecting lease, is governed by the MMDR Act. However, states can impose certain additional conditions with respect to compensation for damage to the land, felling of trees and restrictions of surface operations.[103]

Social externality

Land, being a State subject, is even a bigger issue at the level of States. Even though payment for land is paid to the owners of the land or people displaced or affected, state's role is crucial in land acquisition and associated R&R.

Several states, such as Andhra Pradesh, Odisha, Jharkhand, have their own policies for resettlement and rehabilitation. As mentioned in the section on Central legislation and policies for social externalities, successive R&R Policies have tried to move closer towards addressing the different kinds of losses caused by the acquisition of land. Some policies incorporate provisions for including project affected people in the project benefit stream. For example, the Odisha Resettlement & Rehabilitation Policy, 2006gives families affected or displaced by mining projects the option of getting upto 50 per cent of the one-time cash assistance in the form of convertible preference shares. Similarly, the Jharkhand Rehabilitation and Resettlement Policy allow affected families entitled to get compensation to take 50 per cent of the compensation in the form of shares or debentures.

[100] Section 4, read with Schedule II, Chhattisgarh (Adhosanrachna Vikas Evam Paryavaran) Upkar Adhiniyam
[101] Section 6
[102] : http://www.indianexpress.com/news/Odisha-plans-to-levy-forest-development-tax-on-minerals/892044/#sthash.NkFoisXp.dpuf
[103] 27(2) Mineral Concession Rules 1960

Land as property

When land is treated as a property one of the simplest forms of compensating loss of land is providing alternate land. Provisions for providing land in lieu of land acquired exist in the R&R policies of Odisha, Jharkhand, and Andhra Pradesh. Similar to the National Policy, land for land compensation is highly dependent on availability of land. As noticed in the case of Coal India projects, evidence from Odisha indicates that the land-for-land norm cannot be fulfilled in most cases. (Mohanty, 2011)

The Jharkhand Rehabilitation and Resettlement Policy, 2008also provides for allotment of homestead land subject to a cap of 10 decimals in rural areas. This, however, has been criticized as far too little compared to the requirement of a rural household (Barla, 2009).

Land as livelihood

Land acquisition does not result in mere loss of habitat but has several other implications, including loss of livelihood. Besides providing habitat, land often performs the important function of providing livelihood. In the study team's meeting with the Jharkhand Department of Energy, it was recognized that the entire topography of Jharkhand has changed due to mining and that overall agricultural production has reduced because the area under cultivation has reduced. (Gaur & Ors., 2013) An official at the Odisha Department of Revenue observed that '*land itself may not have much value but sometimes it is the only source of income and security for people. It provides them employment round the year… If you are educated, you can adjust anywhere, but if you are not educated or don't have skills than it is difficult after you get uprooted. Without education there are very little opportunities for the displaced.*' (Taradutt, 2013)

The Andhra Pradesh Policy on the Resettlement & Rehabilitation of Project Affected Families, Odisha Resettlement and Rehabilitation Policy, 2006, Jharkhand Rehabilitation and Resettlement Policy, 2008, NRRP 2007, and CIL RRP 2012 all envisage monetary compensation in lieu of employment. However, there is a lack of standardization across policies. In some cases, this compensation is framed in terms of minimum agricultural wages for a prescribed number of days - 750 days in the case of the NRRP 2007. In others, it is framed as an annuity – the Jharkhand Policy contemplates a monthly payment of not less than R. 1000/- per acre of acquired land for a period of thirty years.

One policy that takes a particularly convoluted approach to compensation in lieu of employment is the Odisha R& R Policy. It places families in five categories in order of the percentage of agricultural land and homestead land they have lost. These categories then get a graded amount of lump sum payment, the maximum possible being five lakhs. This creates gross false equivalencies between agricultural land and homestead land as well as between different sizes of land holdings.

In terms of preferential employment to displaced people, the Jharkhand policy is the only encouraging one, which mandates preference in employment for displaced people in the project as a general principle.

Land in tribal areas

Tribal populations ostensibly benefit from a high level of Constitutional protection. The Fifth Schedule to the Constitution of India empowers the President of India to declare certain

areas as Scheduled Areas. The Governor of a State is empowered to declare that certain laws will not apply to these areas and can also promulgate Regulations to govern these areas. These Regulations can regulate, even prohibit, certain types of land transfers.

The Fifth Schedule has been used to declare several tracts of forest land as Scheduled Areas, in order to protect the local tribal populations. Although tribes arguably have the strongest historic claims over these forest lands, they possess *pattas* (legally recognised land ownership documents) for a minuscule amount of these lands. In tribal-dominated districts in Odisha, for example, the Government owns 84% of the land (United Nations Development Programme, 2008). Despite the protection of the Fifth Schedule, however, land transfers to non-tribes were and are occurring with impunity.

The Supreme Court's 1997 judgment in *Samatha v. State of Andhra Pradesh*[104]is considered to be a land mark in the protection of tribal rights. The Court was dealing with State Government transfers of scheduled forest land to private miners. The three judge Bench concluded that such transfers were null and void since they violated the Andhra Pradesh Scheduled Areas Land Transfer Regulation, 1959, promulgated under the authority of the 5th Schedule to the Constitution of India. However, two characteristics of the judgment render it ineffective in the case of coal mining. Firstly, the Andhra Pradesh regulation was framed in such a manner as to prohibit transfers by *any* person - not just a member of a Scheduled Tribe - to a non-member. The Court interpreted "any person" to include the State Government. Not every State regulation shares this language. The Odisha Scheduled Areas Transfer of Immovable Property Regulation, 1956, for example, simply prohibits transfers by a member of a Scheduled Tribe, leaving room for the Government to make such transfers. Even the Supreme Court came across this problem subsequently in *BALCO Employees Union v. Union of India*[105], where, on a seemingly similar point of scheduled land transfer, it had to disregard the *Samatha* judgment because the Andhra Pradesh regulation was not in *pari matria* with the Madhya Pradesh regulation. The pervasive Government ownership of Scheduled Area lands is thus placed in context here – where the state-specific regulation only curtails the ability of a Scheduled Tribe member to transfer land, it is ignoring the much larger problem of Scheduled Land available to the Government to indiscriminately transfer.

The decision does not result in a prohibition on the Government transferring land to one of its own instrumentalities –

"It is seen that in one case, the transfer was claimed to have been made in favour of the State instrumentalities, i.e., A.P.S.M.D. Corporation Ltd. It has already been held that transfer of the Government land in favour of its instrumentalities, in the eye of law, is not a transfer but one of entrustment of its property for public purpose. Since, admittedly, a public Corporation acts in public interest and not for private gain, such transfer stands excluded from the prohibition under para. 5(2) (b) of the Fifth Schedule and Section 3(1) (a) of the Regulation. Such transfer or lease, therefore, stands."(Samatha judgment, para. 117) [Emphasis added.]

Thus, since CIL is a public sector undertaking, the *Samatha* judgment does not operate to prohibit transfer of Government land to CIL.

[104]AIR 1997 SC 3297
[105]2002 (2) SCC 333.

The issue of transfer of Scheduled Lands to private parties is only the latter part of a larger problem. Acquisition does not fall under the definition of 'transfer' for the purposes of these Fifth Schedule-based Regulations. Therefore, land acquisition by the Government of lands in Scheduled Areas is still an available option. This is limited only by the procedure prescribed in the Panchayats (Extension to Scheduled Areas) Act, 1996. The Act requires that the Gram Sabha of a Scheduled Area be consulted whenever land is proposed to be acquired in the area. 'Consult', however, does not necessarily require 'consent', meaning that the local population's views can be ignored (Sethi, 2011).

As a result of these glaring loop-holes in seemingly strong protections, the issue of tribal lands - such as Santhal lands in Jharkhand - is one that even the state's Revenue Department recognizes as having no easy answers (Rastogi, 2013). Despite the attempt to keep tribal lands beyond the reach of extractive industrialisation, they are still the worst impacted by coal mining displacement. Hence, there is a need to protect tribal populations under the R&R policies.

On paper, tribal populations are entitled to preferential terms under the various R&R policies. Across different plans, they are entitled to land-for-land compensation, 25% higher R&R benefits, resettlement in a compact area and compensation for loss of access to forest produce. In reality, though, several impediments lie in the way of rehabilitation for tribal populations. To begin with, because of their mobile nature, they often fall outside the definition of Project Affected Persons. These definitions require proof of residence for a certain period of time preceding notification of the project. Moreover, considering their cultivation of land under traditional rights, it is difficult for any tribal family to prove land ownership, hence depriving them of the benefits of land compensation as well.

Demands made by states for improved compensation

Tax on interstate trade of electricity

Entry 92-A of List I places all taxes on inter-state sale of goods within the competence of the Union. However, Article 269 provides for certain kinds of taxes that can be levied and collected by the Union but assigned to the States. This includes taxes on the sale or purchase of goods taken place in the course of inter-state trade or commerce. Proceeds of any tax levied under this Article can be assigned to the States within which that duty or tax is leviable instead of being credited to the Consolidated Fund of India.

A State Legislature cannot pass a law imposing a tax on the sale or purchase of goods taken place outside its own territory.[106] Either the Centre or the State has the power to make a law giving preference to one State over another, or discriminating between two states in exercise of power on trade and commerce.[107] However, a State legislature may enact a law imposing reasonable restrictions on the freedom of trade, commerce or intercourse with that State in public interest.[108] Such reasonable restriction has to be in 'public interest'. The Supreme Court has held that an imposition of a tax which is purely fiscal in its object is not a reasonable restriction.[109] Public interest should be the object of such a levy. Mere increase in

[106] Article 286, Constitution of India
[107] Article 303, Constitution of India
[108] Article 304 (b), Constitution of India
[109] Kalyani Stores v. State of Odisha

'revenue of a State and its utilisation for the public' was not regarded as adequate for public interest.[110]

Thus inter-state tax on electricity to address the externalities in host States can be explored in a scenario where the Centre levies such a tax and assigns it to coal bearing States directly (not via Consolidated Fund of India).

Free and variable cost power

Free Power has its roots in the benefit sharing mechanism for hydro power. Free power is a share of the produce – hydroelectricity- and is a share that has been agreed to by the Centre on the output, i.e. electricity. Over the years, the states started using it as a revenue source instead of using it exclusively for the specified purpose of local area development. In 2008, the National Hydro Power Policy added another 1 per cent to the existing 12 per cent free power, specifically earmarked for local area development and matched by an additional 1 per cent by the host state.[111]

Recently, the demand for free power has been made with respect to coal based thermal power generation too. Coal rich States like Odisha have been asking for free power from coal based thermal power stations since 2010. Recently, the State of Chhattisgarh has also made a similar demand in tune of 12 per cent free power for coal producing states.[112] The state of Odisha has however been demanding a much higher share of free power at the rate of 25 per cent from coal based projects and 33 per cent from thermal power plants based on coal washeries rejects.[113]Recent State level energy or power policies also include provisions that could result in an obligation to sell power at variable costs too.

At present, the demand for free power from thermal power stations does not emanate from a statute. These are provisions that have found their way in the policy documents of the States. In some states, free power or power at variable cost is one of the conditions in the Memorandum of Understanding (MOU) signed with the power developers. Thus, it is being introduced as not a statutory obligation or a fiscal measure, but a contractual provision. Moreover, it must be noted that at this stage only MOUs have been signed. Legally, MOUs are usually treated as letters of intent and do not create any rights or obligations for parties as such and precedes a more definitive agreement. There are, however, instances where MOUs can be seen as definitive agreements as well[114]. Nevertheless, these MOUs will still be a contractual arrangement between the parties' involved – State government and the power developer.

[110]Shri Digvijay Cement Co. v. State of Rajasthan (1997) 5SCC 406
[111] 2008 National Hydro Policy, para 8.3.5
[112] "Chhattisgarh Demands 100 % Per Cent From Nearby Mines for Coal-Bearing States" (July 17, 2012). http://dprcg.gov.in/delhinews-17.07.12.
[113] http://www.indianexpress.com/news/Odisha-s-plan-to-use-coal-rejectbased-power-put-on-hold/922503/
[114] Old World Hospitality v. Indian Habitat Center, 73 (1998) DLT 374; Kollipara Sriramulu v. T. Aswatha Narayana, AIR 1968 SC 102

8. Conclusions and recommendations

This study involved two sectors– coal and coal based electricity. Coal producing states have been arguing that they bear the burden of coal and power development, do not get a share in benefits that accrue to consuming states that have no burdens from coal but benefit from this tax on sales. The central issue here is not about augmenting of revenues from electricity consumed, but about being compensated for the externalities caused by coal and power production. In other words, it is a demand for sharing of the burdens of coal and power production. And as the Odisha Chief Minister said, and we quoted earlier, the impacts are not just on the state but also on people's lives, livelihoods, and ecosystems. This larger understanding going beyond the state to people of the states and their environs means that the recommendations need to be not just about sharing the burden of states, but also that of people affected within the states. Different stakeholder groups – the Centre, the coal rich States, the power producing and consuming States and the people of these States – have a share in the various benefits from developing coal – the revenues, the power produced, the jobs created.

The study sought to do a realistic assessment of selected impacts of coal mining, examine the extent to which the states are already compensated for these externalities through existing rules and regulations, both national and state specific and identify the aspects of externalities that are not addressed. It also sought to identify the additional administrative costs incurred by the state in terms of approvals and addressing the negative impacts. Given that there is a demand for free power to compensate the states for the impacts of coal mining and coal based generation, the study sought to examine free power as an instrument of benefit sharing and/or compensation, and also examined the impacts of various scenarios of shares of free power or variable cost power on tariffs[115]. Further it also analysed the legislative and fiscal framework that lays down the sharing of powers between the Centre and the states for coal and electricity.

In this concluding chapter, we pull out our key observations on these issues and then make some recommendations.

Key observations

Sharing of legislative and fiscal powers in coal and electricity between the centre and the states

Even though the states may own the mineral resources, effectively the legislative control over them lies with the Union as declared by the Mines and Minerals Development and Regulation Act (MMDR) (TERI, 2007). States' rights are even more limited in terms of coal, where the Ministry of Coal (MoC) allocates coal blocks and the States assess mining lease applications based on the criteria established by and approvals granted by the Ministry of Coal, Government of India. When mineral rights are taxed, they have to be in Conformity with the Mines and Mineral Development and Regulation Act legislated by the Centre.

[115] Tariff here refers to the generation tariff i.e. the cost of power generated and not retail tariffs

Under Entry 84 of the Union List, duties of excise on goods manufactured or produced in India are under the competence of the Central government.

Since electricity is a concurrent subject under the Constitution of India, both the Centre and the States have the jurisdiction to legislate on electricity. Along with the general concurrent powers on electricity, States have the explicit power to levy a tax on sale or consumption of electricity. However, they do not have the competence to impose any tax on generation of electricity, as generation amounting to production falls under the purview of the Centre.

Land, being a State subject, is a bigger issue at the level of States. Even though payment for land is paid to the owners of the land or people displaced or affected, state's role is crucial in land acquisition and associated R&R. Several states, such as Andhra Pradesh, Odisha, Jharkhand, have their own policies for resettlement and rehabilitation. Successive R&R Policies have tried to move closer towards addressing the different kinds of losses caused by the acquisition of land. Some policies incorporate provisions for including project affected people in the project benefit stream. The Land Acquisition Act, Coal Bearing Land (Acquisition and Development) Act, the National Resettlement and Rehabilitation Policy, State R&R Policies together comprise the framework for addressing social externalities arising out of a coal mining project. Since land acquisition and R&R is a complex, albeit often ignored, this was analysed in great detail in this study. R&R Policies the study observed suffer from two fundamental flaws – they lack cohesion and are not legally binding. To have a legal instrument to address land acquisition and R&R priorities was the logic behind the Land acquisition, Rehabilitation and Resettlement Act (LARR), 2013.

Externalities and compensation payments

The study found that there are considerable negative externalities around coal mining beyond the positive ones of wealth creation for the states, a source of revenues, jobs and input for power generation and for other industry. The study has tried to cost these impacts from the public perspective with a view to arrive at what the polluter needs to pay.

The extent and costs of impacts derived using the life cycle analysis broadly provide indicative estimates of the external damage caused and what proportion of the cost is supposed to be compensated as per the law. It is clear that some of the damage is due to practices that are not regulated. In other cases, compensation exists but is either inadequate or not paid. Payments in cash cannot compensate fully or even in substantial part for loss of life or ill health or morbidity; neither can, as we have seen payments made for forest diverted, actually compensate for valuable ecosystems goods and services lost either because the funds so collected are not used as required, or the implementation creates other externalities (as in the case of people using common lands losing such lands).

Similarly, R & R policies do not capture well the various dimensions of the value of land. They treat land simply as transactable property, which is a fallacy. Firstly, land serves as a source of livelihood and the centre of the social existence of the family. Second, the location of land in relation to non-privately-owned common property resources such as forests, pastures and water sources imbues it with value. Third, the re-location of a large number of land-owners affects a significant number of lands-less individuals, especially those who provide services to the populations displaced. The amount of compensation legally due to a land-owner under eminent domain legislation, therefore, simply addresses the beginning of the loss caused by the involuntary acquisition of land.

Compensation payments for the impacts of development are but a way of recognizing that the costs of such production are not just the direct costs of machinery used, labour and the resource, but also the unaccounted costs that comprise the loss to the environment and to people's lives and livelihoods. They represent a lower limit to share the burden of development between those whose lives are affected by development and those who benefit from it.

Figure 1 in Chapter 1 summarized our findings about what revenue sharing arrangements and compensation payments exist for coal development, identified the basis for the payments, and indicated to whom or where the funds are supposed to go. In 2007, when we first developed this figure we had highlighted areas of compensation that needed to be addressed. These related to depletion in the case of coal resources, and dealing with socio-cultural impacts from resource development. Since 2012, the increased rate of royalty and the movement to *ad valorem* rates suggest that this fact of depletion is being taken care of.

For states to be compensated for these costs, we have to also consider the responsibility and accountability of the coal rich state in monitoring environmental and social externalities and in enforcing the law. Many of these costs could have been avoided, and have emerged as a result of regulatory failure and the inability of the state to ensure that impacts are kept to a minimum.

Administrative costs

The administrative costs of environmental approvals and oversight of coal mining is difficult to estimate. From our limited exercise, it amounts to Rs. 1/tonne of coal mined. Better data would no doubt improve our estimates. Coal mining involves considerable expense on security and is shared between CIL, CISF and the state police. Discussions with Coal India suggest the security cost for the company alone are around Rs 40 per tonne. The center and state government need to address this issue frontally as environmental and social governance failures are part of the reasons for security problems in coal rich states.

Demands for free power by coal rich states

At present, state's demand for free power or power at variable cost from thermal power stations has no statutory basis. These are provisions that have found their way in the policy documents of states. Thus, it is being introduced as not a statutory obligation or a fiscal measure, but a contractual provision. As long as states seek variable cost or free power from all the power plants, it may not be questioned. However any policy that mandates free power from only those plants that are selling/exporting power to other states can be challenged in the court of law as imposing restrictions on freedom of trade, commerce or intercourse among states.

In recent years, we have seen the demand for power go down at the energy exchanges, with financially stressed discoms preferring load shedding to purchasing power. As a result prices of power have fluctuated and power surplus states are finding it difficult to sell power. Chhattisgarh, for instance, has reportedly refused to buy power from a number of IPPs with which it had recently signed PPAs for first right to refusal for proportion of the power. Apparently the state planned to sell this power in the market at a profit but with

increased coal prices, it is not finding this viable[116]. Similarly, Himachal Pradesh, which receives 12% free power from hydel projects in the states, is finding it difficult to sell this power. It is reportedly selling some of this power to West Bengal and Punjab at rates lower than what the board itself buy free or concessional power may therefore be an unpredictable source of revenue.

We did however; undertake analysis of the impact of free power/variable costs power on tariffs and revenues. States can decide, depending on their circumstances and negotiating positions on what arrangement to have with the power producer. Shares in power produced in the state by the host state could be increased in a staggered manner based on milestones in a typical project cash flow. The increase in free power in such cases would allow the state government to capture part of the higher revenue share in the later years. Our study on impact of various shares of free power suggest that from a multiple stakeholder view point, a 12% staggered free power arrangement that has 6% free power in the first 15 years, and a 18% after the 15 year will be the best from the consumer, government, and the developer's view point.

Compensation and Benefit sharing

Different people mean different things by the term benefit sharing and compensation. The most easily understood is that benefit sharing refers to mechanisms by which a portion of profits and other benefits from coal and power produced are shared with others who have a legal, ethical, political or economic claim to it (TERI, 2007).

Both the centre and States collect revenue from coal through different taxes and levies imposed on minerals under different legislations. As we saw in Chapter 4, States collect revenue through royalty, dead rent, cess, sales tax, environmental protection fees, prospecting and mining lease fees and so on. The Centre collects revenue in the form of excise duty, forest conservation charges, corporate taxes, and so on. Apart from the taxes, we have noted several cesses already being levied by States on coal bearing land for various purposes. Electricity is a concurrent subject. States cannot impose any taxes on generation, but can on sales or consumption.

So far the low price of coal was an implicit transfer from the Centre to power consuming states. (Chawla Committee, 2011) But this transfer posed a double burden to coal rich states and its people. Low coal prices meant low royalty and hence low income from a depleting asset. It also implies less funds to address environmental and social externalities from coal mining, since costs of impacts are not reflected in coal prices. When such burdens to coal states and their people are not compensated for and reflected in the revenue streams as costs, the profit shares to the Centre from centrally owned generation companies and coal companies' rise at the expense of the coal states. The consuming states pay a lower price for power which does not reflect these externalities.

Compensation has two connotations: (i) remuneration and other benefits received in return for services rendered and (ii) payment of damages by a person who has caused an injury. This meaning thus involves the prerequisite of either a service or an injury or a loss. (TERI, 2007).The prime basis for any payment for the use of resources could be that due to exploitation, the resources become exhausted and its owners must be compensated for either

[116] 16/news/41417764_1_db-power-power-purchase-agreements-power-producers

the actual loss or the opportunity cost or both. Certain externalities vis-à-vis environmental degradation, loss of forest cover, adverse public health, large scale displacement, loss of livelihood are created as a result of development or exploitation of resources.

A key issue to note, thus, is that compensation for environmental and social impacts is not part of sharing in resource wealth or benefits and should not be considered as such. This tendency to conflate the two is responsible for a considerable amount of lack of clarity on this issue. Negative environmental and social impacts are part of costs of the economic activity and need to be reflected as such. Compensation for such impacts is important for economic, ethical, fiscal and political reasons. Inattention to some of these concerns that relate to a "using of the resources for the benefit of the other" or "cost-shifting which is not reflected in prices" create a sense of environmental and social injustice[117], and could result in a conflict of interests between the local, state , and national levels, also between the people of the states.(TERI 2007). Negative externalities associated with coal development suggest that compensation arrangements need to address both horizontal and vertical inequities.

To compensate for externalities arising out of coal mining and coal based thermal power generation, the study has examined different options – tax, cess and free power.

Cesses, broadly speaking, are useful when the proceeds from them are a) clearly distinct from general revenue, b) designated for a clearly defined purpose and applied exclusively for their stated purpose and c) fully fund the purpose without over-funding it. Cesses ensure a stabilization of revenue for a particular government priority, thus insulating it from the vagaries of budget allocation and facilitating long term planning. They offer a guarantee to the public of accountability in government expenditure. Politically, they signal the government's emphasis on a particular issue. There are criticisms too on the use of cesses. One criticism is that the conversion of taxation to cesses holds public spending hostage to narrow political interests and removes the room for government to address problems at the macro level. It has also been argued that a continual increase in 'soft' earmarked taxation (i.e. earmarks which do not impose defined boundaries on intended expenditure and do not fully fund their purpose) leads to less accountability in and planning of general tax expenditure and a misrepresentation to the public of the true cost of what they are paying for.

Notwithstanding these criticisms, we still feel that in this particular case, legally and administratively, the most feasible route to addressing inequity in burden and benefit sharing is through impositions of cesses rather than taxes. Free power, if imposed uniformly, is not in contravention of any law or rights of the States. However, in comparison to a cess, it is a more complex arrangement for the purposes of valuation, levy, collection and utilisation. Given the fluctuations in pricing and differing needs of additional power amongst states, free or concessional power will be an unpredictable source of revenue and may or may not be able to fully make up for environmental externalities created. Therefore, the most attractive legal and administrative route is to have a Union imposed, but state collected cess associated with damage costs of impacts of coal mining or per unit electricity

[117] By 'environmental injustice' is meant the disproportionate burden of environmental degradation and disruption faced by the more marginalized sections of society - the poor, the socially disadvantaged, and women - who do not fight back due to lack of economic, political and social voice.

generated. The proceeds from this cess need to be earmarked for environmental and social remediation as detailed subsequently in order recommendations.

Regulatory deficits and accountability

While the regulatory framework describes the actions of the government through various legal provisions, the fact that externalities have been created in the process of coal mining which have not been addressed or compensated adequately, directs our attention to the existence of regulatory failures in the governance of this sector. For the externalities that have been described in the sections above, each has been addressed completely or at least in parts in our legal framework. Beyond these it is clear that the coal sector suffers from an overlap and discrepancy in the roles and responsibilities of the institutions involved which ultimately results in a lack of regulatory efficiency. In the case of resettlement and rehabilitation for people affected by coal mining, there is a proliferation of policies in the absence of a national legal framework that has provided a pretext for the planning of R&R to be ambiguous thus creating numerous social externalities that are either inadequately compensated or not addressed at all.

In Chapters 4 and 5, the study did highlight both the regulatory deficits and the unsatisfactory compensation for environmental externalities; land acquisition, health and displacement impacts. It attempted to arrive at an estimate of how much per tonne of this impact is actually uncompensated. The study team acknowledges that these figures can be improved on and have their limitations. However, in such costing of externalities, we need to make a start. In case of social issues such as land acquisition, displacement and R & R, the new Act is far more progressive as discussed earlier and will improve the stakes for those who contribute to the project through their land. However, its relevance to coal mining is still not clear.

There are many questions being raised, for example, with respect to utilization of the CAMPA funds, which are supposed to address forest and biodiversity losses. Stakeholder consultations in states of Odisha and Jharkhand have revealed that the biggest challenge for states to undertake compensatory afforestation is the non-availability of land to afforest especially in the vicinity of existing forest areas (which is the stipulation by the FCA) and even in other districts where afforestation could be possible. This raises questions as to whether CAMPA is serving the purpose for which it was set up, i.e. restoring some of the lost forests in area extent at least, since replacement of ecological integrity and biodiversity value would not be possible.

Discussions with different experts and state officials highlighted the fact that managing displacement is one of the biggest challenges in the case of coal mining. Tribal people are more heavily impacted in coal regions and face several impediments in rehabilitation. Apart from free, prior and informed consent prior to displacement, those who are displaced need to be significantly better off as a result of the project.

Recommendations

The study has the following recommendations to make with regard to the sharing of benefits and burdens based on the findings, but also to improve outcomes in the coal rich states

Recommendation 1: On shares of the power produced through free or preferential power

- We do not recommend the use of free power to cover negative externalities. Demand for free power can have different implications for power deficit and power surplus states. Current developments in the power sector suggest that payment in kind, i.e. free power, may become an unpredictable source of revenue. The dynamics of the power market creates uncertainty about revenues from the sale of this power and so is not suitable as a funding source to address environmental damage.
- The demand for free power from thermal power stations does not emanate from a statute and are more in the nature of contractual arrangements to be negotiated between the power producer and the host state for facilitation of such projects
- As long as the States seek power at variable cost or free of cost from all the power plants, it is justifiable. However, any policy that mandates free power from only those plants that are selling power to other states can be challenged in the court of law as imposing restrictions on freedom of trade, commerce or intercourse among states.

Recommendation 2: More equitable benefit sharing

- We suggest that the proceeds from the sale of free or concessional power, where agreed upon, should be used for general purposes as a means of sharing benefits with host states. We also suggest that this benefit sharing should flow down to the local community. Local community should be able to enjoy the benefits from these projects at least as much as any other region. Prayas, 2012 suggests that around 4-5% of the power produced should be set aside for local communities. There should be a similar process of benefit sharing with local community in case of coal production. The Mines and Minerals (Development and Regulation) Bill2011 addresses this concern. It provides for 26% of profits of coal mines to go to a District Mineral Foundation[118], part of which would be used to make recurring payments to affected people. We suggest that this provision should be enacted at the earliest.
- States need to ensure that part of the enhanced royalty collected is earmarked for development of human capital in the mineral area. The case for the earmarking funds for development of human capital in the mining region is to convert natural capital that is used up in the form of minerals to human capital, thereby operationalizing the weak sustainability principle.
- There is need for setting up an intergenerational fund to share the benefits of this depleting resource with future generations (TERI, 2007)
- As recommended in TERI 2007 and Prayas 2012 all efforts should be made to ensure that local people and communities whose lives are disrupted by the coal mining at various phases of their life cycle should be prime beneficiaries of resource development. Where local people have no access to electricity, this can involve

[118] There are now discussions to provide amount equivalent to royalty for the Foundation as is the case for other minerals.

provision of cheap or free power to the local community from the electricity produced.

Recommendation 3: Burden sharing from coal mining and power production

Payments to resource rich states and to people in the region should serve three primary goals, viz, compensation for externalities, correction for distributional injustice, and deterrence or incentives for improved environmental behaviour (Kathleen, 2002).

The most attractive legal and administrative route to address existing impacts is to have a Union imposed, but state collected cess associated with damage costs of impacts of coal mining or per unit electricity generated. Box 6 discusses cess in the Indian context.

- We suggest a two part cess linked to (i) uncompensated environmental and social impacts of coal mining levied by the Central government on coal produced in states and (ii) an environmental and social cess levied by the Centre on electricity generation in a state for uncompensated impacts of coal power generation based in states. In our estimates the cess on coal mining to be imposed on coal comes to Rs 119 per tonne of coal and cess on coal based power generation to be imposed on TPP comes to Rs 0.75 per unit of electricity. If a single cess is levied linked to total damages, then this will amount to Rs 0.83 /kWh (see Box 7).
- This cess would replace any other existing similar cesses imposed on coal or coal based power production for mitigating environmental impacts
- The proceeds from this cess need to be earmarked for environmental and social remediation as detailed in the subsequent sections.
- We recognize that to avoid future impacts, stricter environmental standards and even stricter monitoring and compliance is required. The objective ultimately is a lower environmental and social footprint of coal mining and power generation. Any levy cannot be a substitute for a strong enforcement of the laws and rules.
- In order to incentivise improved environmental and social performance, a rebate on cess can be announced after a period of 2 years from the introduction of the cess for those whose environmental and social performance show improvement, and who go beyond compliance.
- We also recognize that a
    - Cess should not be seen a means for companies to avoid being more environmental and social responsible.
    - A Cess is suggested only as a short term means to compensate for the existing impacts and to work towards a stricter regime and to drive research in cleaner technologies and practices.
    - The Cess can be withdrawn when the situation improves or a rebate on cess can be allowed to incentivise companies that are going beyond compliance.
    - Companies impose different levels of stress as a result of their activities and should, therefore, be treated differently. Rebates can be imposed for lesser polluting companies once a baseline is established on the current levels of emissions, etc. or those producers that use cleaner technologies.

The cess on coal and power generation will have fiscal and equity implications. The cess levied by the Centre may:

- Be passed on in full to the consumers, i.e. the power sector and hence to the state/s where power is consumed (cess on coal will also ultimately get passed on to electricity consumers). Cost of power generated will increase across the country.
- Be passed on in part to the consumer. For example, the cess on coal mining can be absorbed by CIL and thus by the Centre. The balance of the incidence of cess may be borne either by (i) The centre as it also benefits from profits of the centrally owned coal and power companies. Or (ii) The state governments may reduce the rates of electricity duty on consumption of electricity in order to reduce the burden on the end consumers, .
- In a cost plus scenario, it is easier to keep a check on the extent to which the cess is passed on to the consumer. In a competitive bidding scenario, it is more difficult to ensure that thermal power producers do not pass on the entire cess amount to the consumers.

Since richer states and richer consumers in all states also consume more power than the poorer states and poor people in general, there is also an element of interstate and interpersonal inequity in all of this, as the coal rich states are poorer than most states and also many of the districts where the coal is located are particularly poor and without access to basic amenities and services. The people impacted most by coal mining and power generation are also those living in these districts. A cess that is imposed, collected and utilized to address these inequities will result in a greater fairness across states and their people.

Box 6 Cess as an instrument to address externalities

The term 'cess', in the Indian context, is used to refer to

a) a tax, the proceeds from which are ear-marked for a particular purpose or

b) a 'fee' which is imposed by the Government for provision of a particular public service.

For our purposes, we deal with the term in the first sense - the concept is known elsewhere as an 'ear-marked tax'. Cesses are already extensively used in India. For example, the Water Cess Act, 1977 imposes a tax on water consumption which, although credited to the Consolidated Fund of India, must be utilized for purposes under the Water (Prevention and Control of Pollution) Act, 1974. The Education Cess levied by the Finance Act, 2004 is to be used to provide and finance quality universalized basic education. Since the earmarked tax is being collected for a particular purpose, once that purpose is fulfilled, the rationale for the tax will also cease to exist. In this sense, it is 'temporary' taxation.

The Government's power to impose an ear-marked tax arises out of its legislative power recognized by Article 246 of the Constitution of India. It is limited by the scheme of distribution of powers in Schedule VII of the Constitution; i.e. the Central Government can only impose an ear-marked tax if such power is recognized as falling within its legislative area (List I or List III in Schedule VII). There are no other Constitutional limitations per se on the concept of ear-marked taxation. In the case of minerals, the power of taxation of mineral rights falls within the State List (Entry 23, List II); however, it is explicitly limited by the power of the Centre to regulate mines and mineral development (Entry 54, List I).

The concept itself does not dictate any particular form or design that a law is supposed to follow. Thus, the water cess is imposed as a percentage on the value of water consumed, whereas the education cess takes the form of a percentage levy on the amount paid as income tax (and a basket of other taxes); in other words, a tax calculated on a tax. There are also a variety of theories on whom to impose an ear-marked tax (or indeed any taxation) on – the 'benefit' principle states that tax should be collected proportionately from the beneficiaries of public expenditure whereas in a welfare economy such as India's, taxation plays an important role as a tool of re-distribution.

Box 7 Two part cess on coal mining and on coal based power generation

A cess for environmental and social impacts of coal mining

Purpose

To compensate for environmental and social externalities that is caused by coal mining and power generation to the extent not accounted for or compensated in the existing regime

Subject matter and valuation

The cess will be levied on coal produced all over the country. The value of the cess would cover uncompensated environmental and social costs of coal mining (air and water pollution) in the region

Amount

Based on our estimates of externalities for coal mining, uncompensated externalities amount to Rs. 119 per tonne. Hence Cess should be Rs 119/tonne. The uncompensated elements included the external cost due to water pollution from mining operations (Rs 62/tonne) and external cost due to land degradation (Rs 57/tonne)

Levy and basis

Such a Cess should be levied by the Central government, and collected from coal companies by Coal producing State governments.

Entry 54, List I (Regulation of mines and mineral development) and the Residuary Powers (to include environmental protection) of the Centre would form the basis of this Cess.

Proceeds of the Cess

The proceeds of the cess should be credited into a Coal Environment and Social Impacts Mitigation Fund) (CESIM Fund). The Amount collected in this Fund would go back to coal bearing states for addressing the externalities.

Plus

A cess for environmental and social impacts of coal based power generation

Purpose

To compensate for environmental and social externalities that is caused by power generation to the extent not accounted for or compensated in the existing regime

Subject matter and valuation

The cess will be levied on electricity generated from coal based thermal power plants across the country. The value of the cess would cover uncompensated environmental, health and social costs (excluding carbon cost)

Amount

Our estimates of uncompensated externalities for coal based thermal power plant, works out to Rs.0.75/kWh

The uncompensated elements included the external cost due to impact of PM10 release from thermal power stations on human health (Rs 0.6/kWh), external cost of power generation on agricultural production (Rs 0.06/kWh), external cost of power generation on building materials (Rs 0.06/kWh)

Levy and basis

Such a Cess should be levied by the Central government, and collected from coal based TPP by States in which the thermal power plant is situated.

Entry 84 (excise), List I, Entry 38 (electricity), List III and the Residuary Powers (to include environmental protection) of the Centre would form the basis of this Cess.

Proceeds of the Cess

The proceeds of the cess should be credited into a Thermal Power Plant Environment and Social Impacts Mitigation Fund. The Amount collected in this Fund would go back to States in which coal based thermal power plants are situated for addressing environmental and social externalities.

Recommendation 4: setting up a Coal Environmental and Social remediation Fund/ Thermal Power Plant Environment and Social Impacts Mitigation Fund

Our policy suggestions call for an approach to burden sharing that goes beyond interstate transactions, but which also includes local communities and areas. To do this we suggest the setting up of Funds to address the needs of impacted people

We recommend the setting up of Fund/Funds with clear allocation rules or guidelines for the use of funds obtained from cess imposed on coal and power production. The money from the cess collected should go into a state level Fund/Funds. The design of the Fund should reflect objectives and the purpose for which it is being set up. The key objective of this Fund will be the redressal of past environmental problems and social displacement arising from coal mining activity, and to assist future mining to be conducted in an environmentally safe and socially acceptable manner even as it contributes to economic growth, job generation and local development in the state. It is important to be clear what the cess money can be used for and what it should not be used for.

The Fund money should not be used for the following:

- Afforestation, as CAMPA already covers that
- In preventive and remedial activities of coal and power companies that they are legally expected to address
- Activities covered under the Clean Energy Cess on Coal

Fund utilization

"Because suffering is localized, compensation also needs to be localized" this was the message from the coal rich states. The amount collected in the proposed Funds has to be used to address uncompensated environmental and social externalities arising out of coal mining and coal based power generation. It aims at improving the lives of local people affected by impacts of coal mining and power production. The cess is not a substitute for enforcement of existing rules and compliance with the norms in place. The cess would complement the current regime of approvals, monitoring and compliance. It would support activities to mitigate externalities associated with coal mining and coal based thermal power generation, and distributes the burden and benefits more equitably. More specifically, the fund can/should support the following:

- Remediate cumulative environmental damages in the coal mining regions.
- Support efforts to reduce the coal dust problem
- Support efforts to improve quality of water bodies
- Support efforts at dump management
- Support programmes for the rehabilitation of abandoned mine sites. Creative models exist internationally to convert closed mines to productive economic assets or some other appropriate after mine use options. This should be standard procedure for all mines
- Clean up of all critically polluted areas. This can be done with research institutes, NGOs, etc. in the region

- Encourage continual monitoring and improvement in environmental management and reduced social footprint through creation of platforms involving developer, states and local people
- Promote research, education, training and the exchange of information on environmental management, science and technology issues related to coal mining and power production
- Promote exchange of best practices in mining and thermal power generation
- Recognise environmental excellence through awards, both at an individual and corporate level, but also of well-run coal districts.
- Provide directly or support expertise to the mining industry to carry out competent EIAs
- Set up a cell in each taluk of the coal mining region to address R & R issues and also monitor PAP in all but specially R & R hot spots
    - Set up ways to assist rehabilitated families to manage the compensation money received
    - Develop educational initiatives, support balwadis, women's education
    - Support local initiatives at enhancing local capacity and skills, training centres
    - Support/ contribute to other programmes that promote community development in the locality or region
- A special concern in all coal mining areas which is often not sufficiently addressed is the health of communities (other than coal mine workers) living in the region. While clearly improved oversight and enforcement of environmental laws and rules is necessary, there should be mechanisms in place to ensure that mining communities have access to medical insurance and well-functioning facilities for treatment in case they are affected. Companies and the state government can jointly support the medical care.
- Strengthen institutions of oversight such as SPCBs, departments of mines, environment, land revenues, etc., though investment in human capacity locally to monitor environmental and social issues

Staffing

The Fund should have Core staff consisting of:

- A paid Director; two senior professionals with environmental and social backgrounds; a research associate, administrative support
- The oversight should be provided by a Board or Committee with multi stakeholder governance, comprising 8 members:
    - 2 State Government Representatives; 2 Local community Representatives; CIL representative; Representative of Publicly owned TPPS (NTPC/ DVC/ state generation companies); Representative of IPP; Representative of key research institute in the state

Recommendation 5: Improved environmental and coal governance is a must to reduce ecological and social stress in coal rich states

- The MOEF, the MOC and the State bodies need to strengthen institutional coordination before giving mining and environmental clearances.
    - Government departments should also give clearances in time wherever such applications have been filed in compliance with all laws etc. Delays in obtaining genuine clearances also mask the regular v/s irregular operators.
    - The Government should make available all the documents pertaining to the proposed coal mining to concerned stakeholders and villagers affected by the mining operation well in advance.
    - Free, prior and informed consent is key to improving social acceptability of projects
- Proactive disclosure of information in connection with RTI;
    - Spatial data bases should be created.
    - The websites of the all concerned government departments that regulate coal mining and power production in the States should be uploaded regularly, at least once in 6 months.
- Effective implementation of EPA, FCA, PESA and other acts that will improve actual functioning on the ground
- Clearly there is a need for far stricter monitoring of power plants and mines for emissions and other environmental impacts.
    - A multi-stakeholder committee, such as suggested by Prayas, 2012 could be set up including independent experts, representatives of the SPCB, local self-government institutions and citizens.
    - Need of capacity and resources for monitoring impacts;
    - Strengthen local panchayat capacity in environmental governance; Empower local panchayats in mining regions financially by sharing royalty with them
    - No mine or power producer should be allowed to continue operations if environmental rules and social obligations are flouted;
    - Recognize and incentivise good corporate behaviour
    - Local people should be involved in monitoring and reporting any illegalities so as to correct in time.
    - Social audits & participatory monitoring of impacts should be encouraged
    - Natural resource and environmental accounts for the coal sector should be developed

Recommendation 6: Reduce social and ecological stress by keeping within carrying capacity of the region

- Cumulative impact studies and carrying capacity studies need to be carried out given the large volume of mining and planned power capacity expansion
    - Such studies are especially required in ecologically sensitive river basins
    - The existing conditions found in particular areas as obtained through the CEIP should be paramount in decision making for opening new mines or locating new plants
- Reduce environmental footprint through use of green technologies and improved practices
- Pricing of water and land right to ensure more efficient resource use in coal development and power generation
- There is need of a detailed study to examine the impacts of coal mining on surface water and ground water in the region.

Recommendation 7: Improving health in coal mining regions

- Improve surveillance and monitoring of diseases and disorders in the mining regions in the states
- Get coal mining and power industry to partner with Panchayats and primary health centres to provide both diagnostics and treatments that are industry linked
- Reduce air pollution in road and freight corridors. Greater control of sulphur dioxide as a pollutant is required.
- More careful assessment of health risks of arsenic and radioactivity in fly ash is required to ensure more informed decisions on fly ash utilization.
- Set up hospitals with speciality facilities on coal related diseases and mechanisms in place to ensure that local communities have access to medical insurance and well-functioning facilities for treatment in case of ill health due to degraded environment

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10. Annexures

Annexure A - Detailed report of the consultations at the state level

Stakeholder consultations were conducted with various departments in Odisha and Jharkhand in June 2013 to understand externalities arising from coal mining, the costs incurred by state departments to address these and the demands for compensation made by the states. Following is a summary of the discussion and main findings from the stakeholder consultations conducted in Odisha and Jharkhand. (All figures/numbers quoted are as provided by stakeholders).

Odisha

ToR 1:– Realistic assessment of the negative impact of coal mining on land acquisition, land re-use, rehabilitation & resettlement, environmental and ecological degradation, physical infrastructure in the resource rich host state.

Coal is site specific, limited to a few states and mining has to take place only in these states while power plants can be located here or outside the state. The question usually asked is that since there is a royalty for a national resource, what else needs to be compensated. Two locations in Odisha contain 27% of the country's coal – Talcher and Brahmani river region. CIL extracts 100 million tonnes from these locations and in future with increased efficiency there is scope of mining up to 500 million tonnes. Besides the extraction of resource, there are numerous externalities that are created as a result of coal mining in Odisha. On discussing specific externalities caused by coal mining, the representatives of the various departments highlighted numerous issues which are summarized as follows –

"The effects of externalities differ from person to person and area to area."

Fly ash and washing of coal

The Government of India has notified that that coal containing more than 34 per cent of ash needs to be washed. The notification stipulates that unwashed coal cannot be transported beyond 1000 km and so the burden of washing of coal and the consequent environmental damage is for the coal bearing state to bear. The other states, on the other hand, will have low smoke and low ash content coal to burn. The coal available in Odisha has very high ash content (40% implying 40 tonnes out of 100 tonnes coal mined is ash) and is suitable only for power plants. Whether the coal is transported to other states or combusted in the host state, the host states have to deal with the problem of fly ash.

It is the responsibility of the developer to utilize the fly ash. There are varying figures made available on the utilization of fly ash ranging from 50 per cent to 2 percent. Even for usage in the construction industry the requirement is of dry ash and there is a requirement of trucks, trains or pipelines to transport the ash. About 4 mine wards have been approved for storing fly ash but increasingly environmental clearance for utilizing fly ash by storing it in mine seams of closed mines is a problem – clearances have not been obtained due to risks of ground water contamination. There are attempts to use fly ash to fill up mine bores by

NALCO (in Bharatpur area), 1 plant of Bhushan steel and power and 2 NTPC sites in Talcher. Only one of the NTPC sites has actually started doing it using high density slurry. There are a few abandoned mines in Odisha and some of them are being re-filled with fly ash.

There was a directive to assign 1.5 acres of land for dumping ash for every 1 MW produced. This requirement has been reduced to 0.25 acres. At the moment the state produces 8000 MW per year which results in 18 million tonnes of fly ash per year which then requires almost 10,000 acres of land only for fly ash disposal; and this production capacity is expected to grow up to 45,000 MW and expected to produce 100 million tonnes of fly ash per year.

Since there is so much of ash content there is a need for washeries. Though the rejects left back from the washeries contains up to 30% of coal content, there is even greater fly ash generation on power production. Around 70 tonne of ash is generated from 100 tonne of coal. The resource producing state is left to bear the effects of pollution either from washeries or from producing power from the rejected coal. Coal washing also results in depletion of ground water and pollution from ash. Unfortunately, the government so far has not conducted any organized study regarding the impact of various air pollution caused by coal mining, transport and washing.

"If coal is a national resource, why are these 4-5 states left to bear the burden of all the ash? Let us distribute the pollution also equitably."

Forests and land degradation

Coal mining has resulted in loss of forest cover for Odisha. Forests are lost in developing hydro power as well but in those projects, the loss of forest cover is one time and then compensatory afforestation can take place after the project is developed. In coal mining, forests are lost during the development stage of the mine and throughout the life of the mine the dust settlement degrades forests and other agricultural lands. There is a lot of accumulation of dust on crops, fields, trees etc. which results in substantial loss of agricultural production.

There is the provision of CAMPA for compensatory afforestation for coal mining but experience shows that it is a time consuming process; the afforestation may not be done in the same district; and CAMPA funds at times are unutilized due to the unavailability of land to afforest. The compensation of royalty does not compensate the loss of forests from coal extraction. Also, CAMPA has numerous other objectives to fulfil and it is not possible to recreate the positive externalities of forests through afforestation.

"Let's distribute the pollution also equitably"

Air pollution

Along with the problem of dust settlement on various surfaces adjoining the coal mines, the transportation of coal in open trucks and trains spreads the problem of dust settlement to larger area. Keonjhar district is particularly affected by this problem. Transportation of coal has externalities that are difficult to attribute directly to it and these environmental issues in mining are dynamic. Coal mining has also led to rise in ambient temperature of areas such as Talcher. Noise pollution is not much of a problem in coal mining and neither are SO_x and NO_x; the main problematic issue is of suspended particulate matter.

Water pollution

Power plants use substantial quantity of water, around 36 cusecs for 1000MW. In the future coal washeries will require even larger quantities of water. Coal mines are prohibited from using ground water and are required to source from the nearby surface water, but mine water is allowed to be used for sprinkling purposes to settle dust. Due to the notification regarding transportation of washed coal, other states where Odisha's coal is transported get washed coal and Odisha is left with rejects and ash. Currently 6 out of 314 blocks are critical because of saline water intrusion.

Health related impacts

Health related problems due to high suspended particulate matter in air are common though no comprehensive studies have been conducted to assess health impacts due to air pollution. It is extremely important to consider the cumulative health related impacts but also very difficult to ascribe health problems to pollution from coal mines.

Displacement and associated costs of R&R

Land acquisition for coal mining results in displacement of people and there are high associated costs of resettlement and rehabilitation. Unlike other industries, coal is site specific and hence displacement cannot be avoided.

Usually if government land is acquired there is little displacement of people, but in the case of land acquisition from private owners there can be a lot of difference in the return on the land versus the compensation awarded. For instance, the POSCO land was valued at 50,000 – 2 lakhs/acre but was eventually acquired for 19 lakh/acre.

In terms of productivity, a farmer can grow approximately 15 quintal of rice/acre; if the MSP for rice is assumed at around Rs. 1600-2000/quintal then the farmer earns 24,000-30,000 for his produce. Rice cultivation has a lot of inputs and needs approximately 200-220 man days of labour (RS. 22,000) and he will also spend up to 8000/- on inputs which on adding up comes to almost the same as what he earns. So in these terms, land acquisition is good economics for the land loser. But there are numerous issues beyond economics that creates challenges to rehabilitate displaced people.

Past experiences of displacement have demonstrated that there is a lot of resistance from people because displacing people from these areas debars them from pursuing their natural livelihood options. The land itself may not have much value but sometimes it is the only source of income and security of employment round the year. If the person displaced is educated she/he might adjust anywhere but if the affected person/family is not educated or does not have necessary skills than it is difficult to make a living uprooted from traditional livelihood options. Without education there are very little opportunities for the displaced. Displacement particularly affects women and children harder as compared to men who are more mobile and manage to get employment elsewhere. Also, the compensation made to the land owner is one time and the persons are not able to hold on their savings or reinvest for future needs.

At the moment, much of mining takes place in Talcher district and out of the 25 blocks allocated it is expected that about 1.7 lakh people will be displaced from upcoming projects. In fact, displacement also happens in phases so at any point of time one may not get to know

the total number of people that actually get displaced due to a project. Coal mining also results in serious law and order problem. It is estimated that 12-14 hours of district DC's time every week goes into coal activities. A lot of time is required for talking to people and convincing them to relocate.

Maintenance of infrastructure

Resettlement of displaced population requires a lot of land and supporting infrastructure like roads, sanitations, water etc. which is the state's responsibility. Maintenance of infrastructure is another big challenge. Roads in the mining regions suffer from intense wear and tear and require constant repair. IDCO undertakes the building of multipurpose infrastructure in common corridors, though any infrastructure built on the allotted land is done by the company itself.

ToR 2:– Expenditure on Administrative machinery of the host state to process the approvals and address the negative impacts of coal mining

To assess the expenditure on the administrative machinery associated with coal mining, the stakeholders were asked about the approvals and clearances required for coal mining, the processes involved in these clearances, the number of personnel involved in their respective institutions, an estimation of time consumed as a proxy of the efforts needed for these clearances along with cost figures associated with these clearances that could provide an estimation of the expenditures on administrative machinery.

The various departments provided details on the roles they perform in the administrative clearances for coal mining along with an overview of the processes involved in the clearances; though all departments were of the opinion that expenditures on the administrative machinery for coal mining would be difficult to chalk out from their overall administrative expenditures. Except the Steel and Mines department that has a dedicated coal cell, personnel involved in clearances in other departments do not spend all their time on coal mining clearances and it was difficult to estimate the time invested in coal related clearances as a ratio of total time spent on administrative procedures. In terms of costs directly incurred for coal related procedures again it was noted that since the departments are funded directly from state revenues, there is no differentiation in allocated budget towards specific sectors rather it is towards specific functions. This factor again made it impossible to estimate the costs that the department incurs towards administrative clearances for coal mining. However, some qualitative estimation for these costs was discussed with stakeholders and these have been summarized below.

There are numerous approvals and clearances that are required before a coal mine project can commence such as forest and environment clearance from respective departments; approval of mine closure plan and approval from Directorate General of Mine Safety; development and approval of resettlement and rehabilitation plans by the Revenue Department with assistance from IDCO; approvals and consent from State Pollution Control Board to establish and operate; clearances from Water resources department for water provision and diversion of water streams. After the various clearances are obtained, mining companies organize an application and mining lease is granted by the department of Steel and Mines after ensuring that all other clearances have been provided and the respective

departments have no objections to the mining activity. Overall the stakeholders opined that this expenditure on clearances is one time and minuscule in comparison to the costs incurred by enforcement and mitigation agencies in managing the externalities during the implementation phase (this includes police, district administration, urban development department, PDD etc.)

In terms of time spent for clearances, projects that may require water diversion need more time, otherwise water allocation approvals for coal mining are not much time consuming. Time is also spent in periodic monitoring of water meters.

Roles of institutions

The following table summarizes the roles of various institutions within the administrative machinery for supporting coal mining –

Table 40 Roles of various institutions within the administrative machinery for supporting coal mining

Institution	Role
Odisha Industrial Infrastructure Development Corporation (IDCO)	IDCO acts as a mediator between company and community in the process of land acquisition as well as overseeing the hand over and land utilization after allotment of the land. It is empowered to acquire land for industrialization and is responsible for dialogue with people and to inform them about R&R process, etc. This includes conducting briefings on R&R packages, compensation and special packages; working with the district officers, tehsildars and land acquisition officers at the district levels; and also looking at proper utilization of land allotted. In case the allocated land remains unutilized after hand over, IDCO is responsible to issue a show cause notice. IDCO is not directly involved in actual clearances. Industrial Investment Promotion Corporation of Odisha Limited (IPICOL) facilitates obtaining various consents and clearances required for the projects. It also facilitates in building of infrastructure that is needed to support projects such as coal mining and power generation. With regard to coal related displacement also IDCO looks after land acquisition and supports district authorities in administering R&R. If government departments were to handle these things directly, the process would be very long drawn and therefore all land acquisition on behalf of private companies is undertaken by IDCO. The District Collector can allot up to 5 acres directly on application while through IDCO, there is no limit on land acquisition.
Odisha State Pollution Control Board (OSPCB)	The OSPCB functions as a regulator and stipulates conditions on industry operations. Their main role in coal mining is giving consent to establish, consent to operate, authorization for hazardous waste, and all new consents in case of expansion of project, any change in technology or capacity. It lays out the standards for air and water pollution and operators are required to take measures to stay within prescribed limits. The SPCB then requires to routinely monitor compliance with standards. Expenses on monitoring are met out of the SPCB's general budget. MOEF clearance gives conditions for half yearly compliance reports and OSPCB conducts monitoring at least once in a quarter. Once a notice is issued to an operator, there is a personal hearing with

Institution	Role
	them.
Department of Steel and Mines	The role of this department is to ensure that all other clearances are in order based on the state checklist document for prospecting or mining lease and that there is synchronization between plant commissioning and mine block allocation. The actual coal block allocation is done by the Centre through a screening committee or through auction. After allocation, the department of steel and mines gives an initial approval for land acquisition and all other clearances are then provided by other departments. The clearance for mining plan for coal is given to and approved by Ministry of Coal directly. A recent development is the requirement for geo-referencing data in the applications. The remote sensing data is obtained from Odisha Space Application Centre. For these tasks, the department of Steel and Mines has a separate coal cell.
Department of Water Resources	The main role of the Department of Water Resources with respect to coal mining is water allocation for mining and IPP and provide clearances for diversion of water streams in the allocated areas based on the eco-sensitivity. The main coal producing areas - the Brahmani basin and Mahanadi basin are very eco sensitive areas which restricts the number and extent of clearances that can be provided in the region. The water allocation to industries is done by the water allocation committee within the department as per the state water policy.
Department of Revenue	The Department of Revenue is responsible for approvals related to the land acquisition process for coal mining. This process involves mostly the District DC who conducts detailed assessment and valuation of the land which is to be acquired based on the land schedule. This department works closely with IDCO to facilitate land acquisition and R&R. Particularly for R&R, there is a committee known as the Rehabilitation and Periphery Development Advisory Committee (RPDAC) headed by the head of the revenue division applicable. The Department of Revenue has a Director and a deputy director for R&R and Land acquisition each. For costs incurred in the process of land acquisition and R&R, the department charges a contingency charge (10%) to the promoter and IDCO charges a facilitation charge (10%) based on the market value of land required. The process of land acquisition and award of R&R packages has been described in detail in Annexure B.

Costs incurred

The following table provides a summary of the various costs incurred for administrative processes for coal mining by the different departments consulted –

Table 41 Various costs incurred for administrative processes for coal mining by the different departments

Institution	Descriptions of costs Incurred
Odisha Industrial Infrastructure Development	The dialogue and convincing process is a long, time consuming and unavoidable process. And the effort and time for land acquisition varies from place to place. For instance the time and effort for L.A. in Keojhar

Institution	Descriptions of costs Incurred
Corporation (IDCO)	would be different from what it would take for Niyamgiri. As an estimate, mining projects need approximately 10-15% more effort than other projects involving manpower costs and infrastructure being built. IDCO charges administrative charges to private developers, infrastructure maintenance charges for PPPs, SEZs and IT parks and 10% of land cost to cover their costs. There are costs on infrastructure like existing roads, rails, highways for movement within coalfield. A common railroad corridor is being planned in Talcher for PSUs by IDCO; later on movement will be on payment basis and railways will operate it. There is contribution from private developers as well. IDCO has been provided loan for this by Odisha Mining Corporation.
Odisha State Pollution Control Board (OSPCB)	The OSPCB has 1 board Headquarter and 9 regional officers out of which 3 regional offices of Angul, Sambalpur and Rourkela deal majorly with coal mining. Almost 25-35% of time and budget of the Talcher regional office can say to be spent on coal mining. The total manpower of the OSPCB is about 200 with 60-65 technical personnel. Talcher regional office has 12-13 personnel. In terms of budget the OSPCB spends 20-30% of their total budget of 10-12 crores on pollution analysing equipment which is common for all mining and industrial sectors.
Department of Steel and Mines	In terms of human resources dedicated to coal mining clearances, there is a coal cell that has 2 consultants, 1 section officer, 1 data entry operator and 1 person in the directorate of mines. There are also mineral administration costs which are not only during the life of a mine but also include post mining processes like monitoring after approvals and mine starts operating, satellite mapping, gate checks, IT systems, police enforcement, patrols of forest department, PCB, environment department and others. There are 3 circles for coal mining each of which has a deputy director and 30-40 employees who may be dedicated to coal. A "mineral enforcement force" of 1000 dedicated personnel has been proposed. Currently any expense incurred on mineral protection is not directly charged to developers with 3 enforcement squads each for iron, manganese and chromium. All these requirements are expected to go up as soon as private mining lessees increase. Total department budget is 35 crore and 3 out of 10 deputy directors deal with coal mining (Talcher, Sambalpur, Rourkela).
Department of Water Resources	Mostly manpower costs and establishment costs are incurred in clearance processes.
Department of Revenue	The R&R compensation packages do not cover additional costs that are spent on rehabilitating the population mostly roads and amenities. Only physical aspects are compensated in compensation packages to the project affected people. Other infrastructure also has to be created – drinking water provision, electricity, roads are all borne by the state, the proponent does not pay for example for a new substation or other requirements that needs to set up for the new settlement and are beyond R&R.

In other costs, whenever urban areas are affected by mining, effluent treatment plants may be set up by municipalities; and there are health costs that are borne by the state public

health system. Major cost heads include transport (rail and road), pollution abatement, health and land acquisition and R&R.

Other issues

- Respondents felt that there is multiplicity of agencies which leads to lack of coordination and there is little cohesion between central and the state government. Especially in allocation –
    - There is joint allocation of coal for state and private end users. While the coal producing states are 3-4, there is a lack of synergy in allocation. For instance, Odisha's coal is transported as far away as Kerala and UP and even Chattisgarh that is a coal producing state itself.
    - There may be up to 6 private sector companies allotted in 1 block at different stages which creates challenges in processing mining lease applications.
- There are directives for the rehabilitation of mines after the resources are exploited but the enforcement of law is weak.
- The use of Information Technology has helped in facilitating processes - land records are being digitized currently, systems are being put in place for real time monitoring of rivers – but these are expenses incurred for the department as a whole and not only coal related processes.
- Compensation for land is a long drawn process and even circle rates change before compensation is awarded.

ToR: 3&4 Impact of agreeing to the states proposal for either certain percentage of free power from the coal based power plant located in host state. Impact of agreeing to the states demand for first right of refusal for supply of certain percentage of electricity from such plants

Odisha does not have the high grade of coal, but coal with a very high ash content and low calorific value, making it suitable only for power plants. Hence, the state has attracted a large number of coal based thermal plants. As of now power tariff in Odisha is very low, because of two factors: first, good hydro capacity (the average hydropower plant tariff is 69 paisa/unit in the state), and access to cheaper coal based thermal stations, both state owned and those owned by NTPC (the average plant tariff from coal based station is Rs 1.86 paisa/unit in the state). However the private plants now coming up in the state are asking for much higher tariffs.

The state may require some of the power from the new stations for its own consumption particularly at times when hydro generation is lower (due to variation in rainfall). It however expects to sell power to other states from the new stations at a margin through short term trading. The state hopes to get earn some revenue through this sale which it can use for additional spending on state's own infrastructure and social development.

From the Central government, Odisha's demand is as follows:

1. At least 25% of power generated by coal based plants should be allocated free of cost to the host state

2. For Coal rejects based power plants a higher percentage of free power, i.e. 33% power and compulsory ash utilization mechanism
3. Electricity duty to be levied at the point of generation rather than point of consumption
4. States may be allowed to levy an environmental tax to mitigate/compensate the environmental impacts of coal mining.

The state has already negotiated with a large number of IPPs to provide them 25% power at regulated rates (for IPPs where MoU was signed in 2006) and 12-14% variable cost power (as determined by OERC) where MoUs were signed in 2009 and beyond. In addition, the state charges Rs 6 paise per unit for power exported outside the state towards an environment management fund. Till June 2013, two IPPs have started operations and the state is receiving power from Sterlite Energy (25% at regulated full rate determined by OERC) and Aarti Steel (12% at variable cost determined by OERC). The state has collected about Rs 30 Crore towards the Environmental Management Fund but has yet to come up with clear guidelines on the administration of this fund. From the new power stations, owned by NTPC, the state is not demanding variable power but has negotiated to get 50% of power at the regulated rate as determined by CERC. The state is also not demanding contribution from NTPC plants towards environmental management fund.

While the state has signed MoUs for power at variable cost, it would like the central to come out with a policy on free power. This will provide the state, necessary legal powers to demand free power. At present, the state is apprehensive that the IPPs may not abide by these conditions once there is plant is set up and running.

ToR – 5 & 6: Present legal and regulatory framework to impose tax or duties on mining activities beside royalty by the Central Government for mitigation measures to address the environmental degradation in the resource rich states.

Present legal and regulatory framework for imposition of tax or duties for the electricity generated in host state primarily for export to consuming states

According to the policy of the State of Odisha, any power produced by an IPP and exported to another state is subject to a levy of cess at the rate of 6 paisa per unit. The collections are meant to be credited into an Environment Fund. A trust has been registered and independent fund has been created to this effect.

As of now, rupees 30 crores have been collected as cess for the Environment Fund. The money has not yet been utilized as the operation of this Fund is yet to be finalized. So far there seems to be no clarity on how to use this money. Recently a top level meeting was held in the State to discuss on how to utilize the cess accumulated in the Fund. Although yet to be finalized, the Fund is most likely to be administered by the Department of Forests and Environment.

Two areas being considered for utilizing the Fund are environmental regeneration and livelihood regeneration. It has also been proposed that public health aspects could be covered and a good chest disease hospital be established. Since, health issues due to

particulate matters in the air are rampant in this region, a hospital is needed which can provide access to so as to treatment for free or at a reasonable cost.

Currently, in the power sector, there is no tax on electricity being exported to other states and this is one of Odisha's demands. Beside the 6 paisa cess, Odisha has also been demanding 25 per cent free power from coal based thermal power plants and 33 per cent free power from plants that are based on coal washeries rejects. There does not seem to be any basis for either the 6 paisa or the 25 per cent free power figure. It was however mentioned that according to the NTPC norms one unit of power average cost about Rs 2.75 paise and 6 paise is a miniscule amount of that. The cess of 6 paise was determined through negotiations with IPPs based on how much they seemed willing to pay. For free power, they have taken 12 per cent free power in hydro as a starting point, but are demanding more than that as externalities from hydro power are not there on a continued basis and for long term, as in the case of coal.

The department officials acknowledged that the fact that the developers would resist this figure. As of now the state has not received any form of formal or informal resistance from either the central government or other departments regarding the power at variable cost requirement. Right now it is only a condition for MOU. In order to make it binding, these requirements have to be incorporated in the electricity tariff policy.

Considering other means of compensation, State feels that variable cost or free power is the most suited form as a cess on royalty has faced problems in the past. The provisions of CAMPA and those proposed by new MMDR would help to some extent but are not sufficient. Table 42 gives the list of organisations with which the TERI team interacted in June 2013.

Table 42 Departments/organizations visited in Odisha

Department of Energy
Odisha Industrial Infrastructure Development Corporation (IDCO)
Department of Steel and Mines
Water Resources Department
Odisha Mining Corporation Limited
Odisha Forest Development Corporation
Odisha State Pollution Control Board
CMPDI Regional Office, Bhubaneswar
Department of Revenue

Jharkhand

ToR 1:– Realistic assessment of the negative impact of coal mining on land acquisition, land re-use, rehabilitation & resettlement, environmental and ecological degradation, physical infrastructure in the resource rich host state.

The main coal producing districts in Jharkhand are Palam, Latehar, Ranchi, Chatra, Hazaribagh, Ramgarh, Bokaro, Dhanbad, Giridih and some new developments are being made in Devghar, Dumka, pakud and Godda. It is estimated that almost 90% of coal reserves are in the divisions of Ramgarh, Bokaro, and Dhanbad. The main companies mining coal are CCL, BCCL and ECL. Besides these, there are some private mines.

Environmental and social externalities

Like Odisha, there are numerous externalities caused by coal mining in the state of Jharkhand. Some of these externalities were highlighted by the stakeholders consulted in the various departments of the state. These have been summarized here –

- It was noted that there are several mines in Jharkhand that are operating without proper environmental clearances – under CCL, only 35 out of 60 mines have environmental clearance and under ECL only 4 out of 17 mines have environmental clearance. Beyond this, there are several mines for which EIA have not been conducted.
- The stakeholders highlighted that there has been no proper practice of disposing fly ash. In many locations, the fly ash has been dumped indiscriminately into the Damodar River as a result of which the river ecology has been affected.
- It was pointed out that till today, no coal mine in Jharkhand has been closed which is problematic for the state. Land needs to be reclaimed because it is a fixed asset for the state. The entire topography of Jharkhand has changed due to mining - agricultural production has reduced in the state in the last few years because area under cultivation has reduced as a result of diversion.
- There is very little soil management especially of the top soil and overburden resulting in loss of the original nature of land. Dhanbad and Jharia action plans have been devised for these districts that especially focus on land subsidence issues. These plans are focused specifically on regions with coal mine fires that require relocation of people into new townships.
- The central government has declared complete districts under the Coal Bearing Areas Acquisition and Development Act that includes all kinds of land. Relocation also requires creation of a lot of infrastructure. Building of new infrastructure and other activities are usually done on non-coal bearing lands which puts extra demands on the state. Another challenge is the issue of non-transferable land which cannot be traded especially in Santhal region where only residential land is transferable.
- Most coal blocks are in plateau areas and most of the hilly areas are forest land. Since coal seams are continuous, it results in distorting drainage systems which impacts downstream regions and barren areas also increase because of loss of the drainage system, therefore the area that gets affected is much more than the mine area.

Currently, 29.6% of area of Jharkhand is forest area, 21% is wasteland and around 30% is agricultural land.

- There is water pollution from washeries when there is no proper disposal of the rejects. The Damodar River is polluted with coal slurry resulting in a rise in the river bed due to deposits. This has resulted in reduction of water retention in the river. Forest loss has also resulted in a reduction in the water table. Once water streams are disturbed, the natural catchment loses its properties and downstream villages and areas get affected most due to a decrease in the total run off of water.
- Mine water is not usable in any sector though it is diverted to sectors like agriculture. It can only be used to suppress dust. Groundwater is a problem in the state and there are 12 critical blocks currently.
- Some coal producing districts have visible health impacts as well. In Dhanbad district, people eat jaggery every evening to clear congestion. A lot of health impacts are difficult to assess because people make out of pocket expenses. At the same time, health infrastructure is a major issue in coal mining regions.
- There are numerous issues arising from displacement of people. Displaced people lose their identity which is connected to their land. While for the displaced, this can be emotionally challenging, the state departments have to deal with challenges in providing them with certificates of income, domiciles, proof of address, APL, BPL cards, insurance schemes.
- The Jharkhand R&R policy was introduced in 2008 and before that the CIL R&R policy was applicable. Every revenue village has a unique identification and a definite boundary; to resettle somewhere else or create a new locality is difficult. The R&R policy in its present form, deals with involuntary land acquisition. It should be applicable to voluntary acquisition as well.

Other than these stakeholder views, there were several other contradicting views regarding creation of externalities when stakeholders stated that 'coal mining is not damaging the environment and is in fact creating environmental resources.' Land degradation is the prima facie problem because forests are lost and there is a lot of dust created. The dust hazard can be minimized by limiting the movement of trucks. The Office of Coal Controller (CCO) maintains a mine closure fund where the mining companies deposit money for the closure of the mine. CIL has taken some measures to reduce the impacts of externalities such as planting of 78 million trees which is more than the stipulated requirement which has resulted in an increase in forest cover in the last 2 years. Excess mine water meets 70% of water demand in CIL and its subordinates. The sulphur content in all Indian coal mines (except 1 or 2) is very minimal and hence the problems of acid mine water is reduced. Mine water is used for irrigation and let out in water ways. Coal washeries should be closed circuit processes but that has not been the case of washeries in the country so far. All demands under the R&& packages developed by the states are met by the PSUs and CIL has also developed infrastructure in the land allotted to them. A significant amount of money is provided by mining companies for mining closure and there is no dearth of funds to restore ecological systems. There is a thumb rule for mine closure costs which are 6 lakhs per hectare for opencast mines and 1 lakh per hectare for underground mines.

ToR 2:- Expenditure on Administrative machinery of the host state to process the approvals and address the negative impacts of coal mining as stated in point (1).

The roles of and process followed by the various departments with regard to coal mining are similar to those outlined for Odisha. While there are several departments involved in aspects of coal mining, including the Pollution Control Board, Mining Department, Forest Department, Department of Revenue and Department of Water Resources, following is the description of responsibilities of select institutions with which the team was able to interact on their role in the mining lifecycle.

Table 43 Description of responsibilities of select institutions

Institution	Role and costs incurred
Department of Water Resources	The water resources department has a facilitation role under 2 heads – a. If there are any natural resources (water) in the coal block that get disturbed due to the mining activity, the proponent gives a proposal for diversion of waterway and on certain conditions defined by the MOEF the department gives clearance for water diversion. b. Provision of water for mining in the preliminary stage or for drinking purpose. After the mining starts, the operators get ground water from the mines so demand for water reduces. This ground water cannot be used for industrial purposes. The Central Ground Water Board gives a permit or NOC for the usage of this water. The water department does not levy any charges from the proponent for the approval or clearance process. It only charges a water tariff based on usage that goes to state revenues. In terms of costs borne by the department, the only costs are establishment costs and manpower costs. Establishment costs are huge for the water department because the secondary data generated by the department takes up a lot of resources and this has to be done annually funded from plan budget and sometimes from non-plan budget.
Department of Revenue	The role of the department includes land identification, verification and making of compensation award. The award for land includes value of land + 30% soletium + 12% per annum simple interest for 2-3 years + valuation of other immovable property such as constructed structures, tress etc. The land can also be acquired on mutually agreeable terms and the rates for that cannot be less than the circle rates. In terms of the registration rate, the price determined by the state government is around 20,000/- per acre but actual compensation can be as high as 4-5 lakh/acre. The time period set aside for land acquisition is 290 days but the process generally does not get completed in that time. The most time consuming activity is verification of ownership of land. Land tracts have been divided into many pieces since the 1931-32 records. It takes a minimum of 600-700 days to clear 1 coal mine acquisition because the areas that need to be acquired are large. The department charges 5% of total land acquisition cost as admin expenses. Jharkhand also had an industrial development corporation entity called JIDCO (similar to IDCO of Odisha) but it was not successful.

ToR 3 & 4:- Impact of agreeing to the states proposal for either certain percentage of free power from the coal based power plant located in host state similar to the benefits given for hydro power plant or supply of certain percentage of electricity at variable cost. Impact of agreeing to the states demand for first right of refusal for supply of certain percentage of electricity from such plants

While the state provides coal and other resources for power production and houses many power plants, the state still buys power at very expensive rates. This is also partly because the state has not gone in for purchase of power through competitive rates.

Jharkhand has signed a series of MoUs with private players in which it has demanded 12 % power at variable cost and a right of refusal for another 13% power at full price as determined by JSERC. So far, one plant of Abhijeet Group has come up but the JSERC is yet to determine its tariff. As of now it has provisionally allowed the tariff proposed by the Group – Rs 1.95 as variable charge and Rs 5.01 as total charge. The state has also included a clause providing 6 paise per unit on power sent out of the station towards an Environment Management Fund. It has however not enforced this condition on the developers.

The State of Jharkhand wants to be compensated not only for power produced in their state but also for the coal that is transported outside the state. Coal being transported to other states, and the associated washing, leads to severe environmental stress in the host state. Therefore, states want to levy a charge on coal being transported to other states. The department argued that in case of petroleum, Gujarat and Rajasthan claim a lot of revenue from resource extracted. The same is not the case of coal. If the calorific value of each source was to be compared, the compensation in case of coal is not adequate In addition to variable cost; the State also wants to consider a levy on power generation.

ToR 5 & 6:- Present legal and regulatory framework to impose tax or duties on mining activities beside royalty by the Central Government for mitigation measures to address the environmental degradation in the resource rich states.

The state does not have any legal provision (policy or notification/government order) allowing for concessionary power from the IPPs. The state has built this provision only in the MoUs with the IPPs. The state is of the view that at the MoU stage, IPPs may agree to the state's demand for free power as during the preparatory stage, IPPs require government support. The IPPs may however at a later date, not abide with the MoU. The state therefore wants the Centre to incorporate the provision of free power the National Electricity Policy/National Tariff Policy.

The State wants to use the free power or variable cost power in a way it deems fit. It wants to be left with the option to decide whether this power is to be used for State's own consumption or as additional revenue. The Department of Energy does not seem agreeable that this source of revenue goes to another department which actually handles the externality (forest department for instance).

The State of Jharkhand showed discontent over the way Coal Bearing Areas (Acquisition and Development) Act is being administered. The State felt that they are not getting adequately compensated as the Centre is declaring entire district as coal bearing land for acquisition.

The State tried to charge royalty on washed coal but it was challenged and was struck down by the High Court. Table 44 gives the list of organisations with which the TERI team interacted in June 2013.

Table 44 Departments/organizations visited in Jharkhand

Department of Energy
Jharkhand State Pollution Control Board
Water Resources Department
Department of Mines
Department of Revenue
Department of Forests
CMPDI

Annexure B – Assessment of environmental administrative costs

In order to overcome the challenge of attributing costs for coal mining particularly, some estimations of costs incurred towards coal related environmental clearances have been made on the basis of revenue expenditures of the states being studied. The administrative services expenditure incurred towards the environment was calculated (by taking the ratio of revenue expenditures under the heads of 'Forestry& Wildlife' and 'Science, Technology & Environment' to the total Revenue Expenditure for that year; and multiplying that ratio with the total revenue expenditure on Administrative Services) and from this expenditure it was assumed that some amount can be attributed to coal related environmental clearances. The ratio of number of environmental clearances for coal to total environmental clearances given in a state in a year was taken as a proxy to estimate the extent of expenses that could be attributed to coal (the MOEF environmental clearances portal was used for this data) and multiplied with the administrative services expenditure incurred towards the environment. Based on these administrative services expenditure incurred towards coal related environmental clearances, a per tonne cost of administrative expenses for coal mining was calculated (by dividing with the total production of coal in the state for the year). Table 45 to Table 48 below).

This methodology has some shortcomings. Firstly, the assumption that all expenditure towards the environment is covered under the two heads taken from the Revenue Expenditure statements of the state may or not may be applicable to all states. These expenditures are aggregated on the basis of departmental statements and the scope of these departments may differ in states. In fact it is possible that some quintessential environment related expenditure is not accounted for in these heads. A similar drawback exists in taking the ratio of these expenditures to total revenue expenditure as representative of all environment related costs. Secondly, the assumption that the ratio of revenue expenditure on environment can be used to ascertain the administrative services expenditure on environment may not hold in all the states. This has an underlying supposition that all departments and public policy activities incur administrative expenditure proportional to their scope of work which may not be the case in reality. Thirdly and lastly, while taking the proxy for attributing expenditure to coal related environmental clearances, ratio of number of environmental clearances for coal to total environmental clearances given in a state in a year only takes into account the clearances that have been given in a year and not those that are under processing. Administrative costs for coal clearances could be incurred on a continuous basis, and it would be more effective to take the number of applications for coal related environmental clearances as a ratio of total applications for environmental clearances, though the data were not available to take this approach.

Table 45 Expenditure of environmental administrative machinery for coal mining - Chattisgarh

Particulars	2010-11	2009-10	2008-09	2007-08
Total state revenue expenditure (In lakh rupees)	1935575	1726544	1379370	1083985
Total revenue expenditure on:				
Forestry and wildlife	72436	63953	55269	45468
Science, technology and environment	442	574	734	722
Ratio of amount spent on environment	0.037651861	0.037373505	0.040600419	0.042611291
Revenue expenditure on Administrative services	162508	140811	102991	73900
Administrative costs incurred on environment	6118.728556	5262.600546	4181.477757	3148.974386
Total number of environmental clearances	26	28	51	40
Number of environmental clearances for coal mining projects	5	5	13	4
Ratio of coal in total environmental clearances	0.192307692	0.178571429	0.254901961	0.1
Administrative costs incurred on addressing coal clearances	1176.678568	939.7500975	1065.866879	314.8974386
Average administrative costs incurred on addressing coal clearances (in lakh rupees)	874.2982459			
Coal production in state (in million tonnes)	113.661	109.803	101.776	90.013
Average coal production in last 4 years	103.81325			
Administrative costs incurred per tonne (in rupees)	0.842183677			

Table 46 Expenditure of environmental administrative machinery for coal mining- Jharkhand

Particulars	2010-11	2009-10	2008-09	2007-08
Total state revenue expenditure (In lakh rupees)	2024258	1722721	1547921	1309568
Total revenue expenditure on:				
Forestry and wildlife	28214	22963	23636	20048
Science, technology and environment	0	0	0	0
Ratio of amount spent on environment	0.013937947	0.013329494	0.015269513	0.01530887

Particulars	2010-11	2009-10	2008-09	2007-08
Revenue expenditure on administrative services	231872	203327	187403	185251
Administrative costs incurred on environment	3231.819565	2710.246117	2861.552565	2835.98259
Total number of environmental clearances	16	24	28	27
Number of environmental clearances for coal mining projects	0	8	11	8
Ratio of coal in total environmental clearances	0	0.333333333	0.392857143	0.2962963
Administrative costs incurred on addressing coal clearances	0	903.4153723	1124.181365	840.291138
Average administrative costs incurred on addressing coal clearances (in lakh rupees)	716.9719687			
Coal production in state (in million tonnes)	60.004	62.251	62.395	57.329
Average coal production in last 4 years	60.49475			
Administrative costs incurred per tonne (in rupees)	1.18518048			

Table 47 Expenditure of environmental administrative machinery for coal mining- Madhya Pradesh

Particulars	2010-11	2009-10	2008-09	2007-08
Total state revenue expenditure (In lakh Rupees)	4501159	3589690	2957388	2560111
Total revenue expenditure on:				
Forestry and wildlife	113565	91173	89554	82425
Science, technology and environment	4539	44560	5064	4253
Ratio of amount spent on environment	0.026238575	0.0378119	0.031993773	0.033857126
Revenue expenditure on administrative services	310612	251050	204530	175680
Administrative costs incurred on environment	8150.016395	9492.677543	6543.686368	5948.019848
Total number of environmental clearances	19	11	34	53
Number of environmental clearances for coal mining projects	2	2	7	14

Particulars	2010-11	2009-10	2008-09	2007-08
Ratio of coal in total environmental clearances	0.105263158	0.181818182	0.205882353	0.264150943
Administrative costs incurred on addressing coal clearances	857.8964627	1725.941371	1347.229546	1571.175054
Average administrative costs incurred on addressing coal clearances (in lakh rupees)	1375.560609			
Coal production in state (in million tonnes)	70.701	73.529	70.595	67.165
Average coal production in last 4 years	70.4975			
Administrative costs incurred per tonne (in rupees)	1.951218992			

Table 48 Expenditure of environmental administrative machinery for coal mining- Odisha

Particulars	2010-11	2009-10	2008-09	2007-08
Total State revenue expenditure (In lakh rupees)	2936794	2529159	2119012	1772327
Total revenue expenditure on:				
Forestry and wildlife	34572	30770	29253	21484
Science, technology and environment	3168	2994	3272	1844
Ratio of amount spent on environment	0.012850748	0.013349892	0.015349134	0.013162357
Revenue expenditure on administrative services	211812	180079	147588	111212
Administrative costs incurred on environment	2721.942663	2404.035237	2265.348049	1463.812003
Total number of environmental clearances	21	37	57	68
Number of environmental clearances for coal mining projects	2	0	2	3
Ratio of coal in total environmental clearances	0.095238095	0	0.035087719	0.044117647
Administrative costs incurred on addressing coal clearances	259.2326345	0	79.48589646	64.57994131
Average administrative costs incurred on addressing coal clearances (in lakhs)	100.8246181			
Coal production in state (in million tonnes)	102.565	106.409	98.402	89.482
Average coal production in last 4 years	99.2145			
Administrative costs incurred per tonne (in rupees)	0.101622866			

Annexure C - Analysis of water quality

Table 49 Analysis of coal mine discharge water in Chirmiri, Bhatgaon, & Korba areas (Chattisgarh)

Parameters in mg/l except pH and conductivity	pH	Cond.	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Chirmiri & Bhatgaon area- SECL- Chattisgarh											
Jindal coal mine O/L	6.14	249	17.6	20	432	0.06	4	97.1	0.1	0.054	0.37
Monet Coal mine I/L	7.64	136	32.4	238	388	0.03	15	33	0.06	0.03	BDL
Monnat coal mine O/L	7.29	171	18.8	29	174	0.06	7	16	0.02	0.031	BDL
NecoJayswalmine O/L	7.56	199	4.5	75	288	0.06	10	19	0.04	BDL	BDL
NecoJayswal mine I/L	7.19	221	12.3	137	324	0.04	23	35	0.09	0.037	BDL
Balrampur mine I/L	6.15	537	8.4	6	412	0.08	17	171	0.04	0.04	BDL
Balrampur mine O/L	7.03	508	7.8	10	480	0.08	12	166	0.04	0.082	BDL
Bhatgaon mine O/L	6.58	420	9.7	11	390	0.29	11	166	0.22	0.141	0.982
NCDH Chirmiri O/L	6.99	463	5.8	13	436	0.32	14	165	0.12	0.027	BDL
Rani Atari mine O/L	7.05	213	10.4	12	182	0.3	8	17.98	0.05	0.074	BDL
Prakash Coal mine O/L	6.6	436	7.8	6	236	0.16	18	9.9	0.07	0.014	BDL
Korba area- SECL- Chattisgarh											
Rajgamar UG O/L	6.41	245	6	13	294	0.1	15	86	0.1	0.068	1.156
Surakachhar UG O/L	5.92	238	21	54	295	0.15	21	14	0.15	0.014	BDL
Dipka OC mine O/L	7.08	572	20	35	598	0.32	47	150	0.32	0.019	BDL
Gerva Mine O/L	5.92	334	7	35	383	0.2	23	141	0.2	0.088	0.45
Gerva workshop O/L	5.02	273	8	44	329	0.32	9	94	0.32	0.03	BDL
Kusmunda mine O/L	6.63	296	30	44	383	0.26	22	75	0.26	BDL	BDL
Kusmunda workshop O/L	6.03	246	11	47	280	0.38	19	75	0.38	0.074	BDL
Limits	5.5-9.0		250	100	1500	2	600	400	10	5	2

Source: (CPCB, 2011)

Table 50 Analysis report of ground water in Chirmiri and Bhatgaon area- SECL (Chattisgarh)

Parameters are in mg/l except pH and conductivity	pH	Cond	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
G.W. Balrampur	6.37	207.00	5.10	23.00	234.00	0.22	4.00	13.78	0.00	BDL	BDL
G.W. Chirmiri	6.92	406.00	4.30	16.00	230.00	0.49	10.00	5.99	0.08	0.31	BDL
G.W. Chotia	6.20	296.00	12.10	38.00	266.00	1.09	12.00	10.98	BDL	--	
Limits as per IS-10500	5.5-9.0	---	---	---	---	1.5	250	250	45	5	0.1

Source: CPCB 2011

Table 51 Analysis of drain water in Chirmiri, Bhatgaon, and Korba areas (Chattisgarh)

Parameters are in mg/l except pH and conductivity	pH	Cond	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Chirmiri & Bhatgaon area- SECL- Chattisgarh											
Passang drain	6.24	338	13.9	99	458	0.26	23	10.44	0.16	0.13	0.73
West Chirmiri Drain	7.21	616	5.8	78	582	0.91	9	255	0.63	--	--
Prakash drain B/C Parla Nalla	6.35	985	14.9	8	468	0.24	30	318	0.5	BDL	BDL
Parla Drain at Kasawadi village	6.82	942	17.8	15	860	0.41	48	384	0.91	--	--
Korba area- SECL- Chhattisgarh											
Dengur Nalla	6.06	255	16	353	652	--	32	17	--	0.02	BDL
Limits	5.5-9.0	--	250	100	---	2	---	---	--	5	2

Source: CPCB, 2011

Table 52 Analysis of river water in Chirmiri, Bhatgaon, and Korba areas (Chattisgarh)

Parameters are in mg/l except pH and conductivity	pH	COND	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Chirmiri & Bhatgaon area- SECL- Chattisgarh											
River Kelo D/S	7.16	266	16.6	12	240	0.07	14	57.94	0.07	BDL	BDL
River Rehar A/C passang drain	6.7	269	12.5	97	288	0.26	3	78.52	0.83	0.067	0.43
River Mahan A/C massan drain	7.27	146	5.8	19	152	0.2	5	6.59	0.07	BDL	BDL
River Hasdeo Near Korbi bridge	7.76	268	13.9	5	224	0.12	9	32.56	0.02	--	--
River Hasdeo near	7.04	969	15.8	11	120	0.1	4	7.39	0.04	--	--

Parameters are in mg/l except pH and conductivity	pH	CO ND	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Kasawadi village											
Korba area- SECL- Chhattisgarh											
Hasdeo River at rail Bridge Korba	6.44	194	3	146	343	--	17	20	0.09	0.021	BDL
Limits	5.5-9.0		250	100	1500	2	600	400	10	5	2

Source: CPCB, 2011

Table 53 Analysis of coal mine discharge water in Pathakheda, Pench & Kanahn area of Madhya Pradesh

Parameters in mg/l except pH and conductivity	pH	Cond.	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Pathakheda, Pench & Kanahn area –WCL-Madhya Pradesh											
Sarni mine UG O/L	7.74	388	22	7	530	1.364	16	87	--	BDL	BDL
Sarni UG coal mine I/L	7.58	719	24	6	501	1.598	16	98	--	0.015	BDL
Chhattarpur–IIUG O/L	7.98	1020	24	2	616	1.19	59	136	--	0.018	BDL
Chhattarpur–II UG-I/L	8.05	1020	25	5	528	1.016	58	197	--	0.016	BDL
Nandan Washery O/L	8.17	2000	32	18	546	1.937	13	82	--	0.013	BDL
Jharna UG Mine I/L	8.24	1330	25	5	1510	2.05	74	314	--	0.011	BDL
Jharna UG Mine O/L	8.06	1330	23	2	814	1.746	67	304	--	0.016	BDL
16/17Ghorawari I/L	7.09	1338	20	2	763	2.042	20	546	--	0.032	1.487
16/17Ghorawari I/L	7.09	1338	20	2	763	2.042	20	546	--	0.032	1.487
16/17Ghorawari O/L	7.86	1320	22	2	1023	2.05	13	508	--	0.058	BDL
Shivpuri OC Mine-I/L	7.13	1560	19	5	962	1.642	14	747	--	0.118	0.397
Shivpuri OC Mine O/L	7.58	1570	24	7	1097	0.477	16	617	--	0.13	0.396
Mahadeopuri UG I/L	8.07	867	23	6	1123	1.242	24	207	--	0.047	BDL
Mahadeopuri UG O/L	8.03	821	22	5	632	1.459	17	188	--	0.149	BDL
Rawanwara UG O/L	6.96	1830	26	8	1187	0.625	40	749	--	0.126	3.671
Limits	5.5-9.0		250	100	1500	2	600	400	10	5	2

Source: (CPCB, 2011)

Table 54 Analysis of coal mine discharge water in Sohagpur area of Madhya Pradesh

Parameters in mg/l except pH and conductivity	pH	Cond.	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Sohagpur area- SECL-Madhya Pradesh											
New Amlai UG O/L	6.89	1670	15	39	1250	0.54	--	75	0.039	0.5	3.835
Dhanpuri UG mine O/L	7.42	828	6	12	700	0.44	--	35	0.051	0.013	0.706
Dhanpuri UG O/L	7.01	356	9	21	265	0.32	--	5	0.044	0.058	BDL
Amlai OC Mine O/L	7.07	1550	8	78	1150	0.58	--	65	0.047	1.533	12.93
Kanchan OC Mine O/L	8.46	752	9	15	681	1.19	-	20	0.045	BDL	BDL
Vindhya OC Mine OF/L	6.78	1390	5	9	1264	0.76	--	33	0.035	BDL	BDL
Limits	5.5-9.0		250	100	1500	2	600	400	10	5	2

Source: (CPCB, 2011)

Note: Limits are as per MOEF Gazette Notification No. GSR 742 (E) dt. 25.09.2000. Pb, Cr, Cu, Ni and Cd were also analysed but found below detection limit

Table 55 Analysis of ground water in Sohagpur area of SECL (Madhya Pradesh)

Parameters are in mg/l except pH and conductivity	pH	Cond	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Johila Area Tube well (G.W)	7.35	591	2	22	554	1.1	22	5	0.09	0.44	BDL
Limits	5.5-9.0	---	---	---	---	1.5	250	250	45	5	0.1

Source: CPCB, 2011

Note: Limits are as per IS-10500. Pb, Cr, Cu, Ni and Cd were also analysed but found below detection limit

Table 56 Analysis of drain water in Pathakheda, Pench, Kanahn, & Sohagpur area (Madhya Pradesh)

Parameters are in mg/l except pH and conductivity	pH	Cond	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
Pathakheda, Pench, & Kanahn area- WECL											
Takiya Nalla	7.89	802	30	6	185	1.251	82	268	0.19	0.035	BDL
Sonhagpur area- SECL											
Umaria Nalla (Johila area)	8.24	457	6	31	464	--	42	2	0.85	BDL	BDL
Gndehhat Nalla	8.25	363	3	35	390	--	26	1	0.72	BDL	BDL
Limits	5.5-9.0	--	250	100	---	2	---	---	--	5	2

Source: CPCB, 2011

Note: Standards are as per guidelines for discharge in drain. Pb, Cr, Cu, Ni and Cd were also analysed but found below detection limit

Table 57 Analysis report of river water in Pathakheda, Pench, & Kanahn area (Madhya Pradesh)

Parameters are in mg/l except pH and conductivity	pH	Cond	COD	TSS	TS	F	Cl	SO_4	NO_3-N	Zn	Mn
D/S Tawa River	7.97	245	19	8	54	0.269	10	4	--	0.019	BDL
U/S Tawa River	7.85	195	21	6	86	1.607	7	3	--	BDL	BDL
U/S Kanhan River	8.6	224	20	2	36	0.947	10	15	--	BDL	BDL
D/S Kanhan River	7.81	402	22	9	162	1.485	14	17	--	BDL	BDL
D/S Pench River	8.03	427	20	9	237	1.485	7	22	--	0.022	BDL
U/S Pench River	8.32	472	19	17	321	0.295	8	56	--	0.025	BDL
Limits	5.5-9.0		250	100	1500	2	600	400	10	5	2

Source: CPCB, 2011

Pb, Cr, Cu, Ni and Cd were also analysed but found below detection limit

Table 58 Waste water (Mine drainage water) quality from different mines in Talcher area (Odisha)

SI. No.	Name of the mine	Date of sampling	Sampling point	Mine drainage water quality		
				pH	SS (in mg/I)	Oil & Grease (in mg/l)
1.	Chhendipada OCP	29.01.2013	Outlet of settling pit	7.9	108	-
2.	Lingaraj OCP	30.01.2013	Overflow of Mine drainage water treatment plant	6.7	16	-
3.	Hingula OCP	31.01.2013	Outlet of sump	7.9	30	-
4.	Jagannath Colliery	01.02.2013	Outlet of Mine drainage water treatment plant	7.3	24	-
		PRESCRIBED STANDARD		5.5-9.0	100	10

Table 59 Waste water (Mine drainage water) quality from different mines in Ib Valley area (Odisha)

SI. No.	Name of the mine	Date of sampling	Sampling point	Mine drainage water quality		
				pH	SS (in mg/I)	Oil & Grease (in mg/I)
1.	Talabira OCP of M/s. Hindalco	28.02.2013	Outlet of Sedimentation tank	7.32	42	ND
2.	Orient Colliery NO.3	09.03.2013	Outlet of sedimentation tank	7.86	12	-
3.	Orient Colliery No.1 & 2	09.03.2013	Outlet of sedimentation tank	7.82	10	-
4.	Hirakhand Bundia	09.03.2013	Outlet of sedimentation tank	7.8	12	ND
5.	Orient Colliery No 4	09.03.2013	Outlet of sedimentation tank	7.5	14	ND
6.	Himgir-Rampur Colliery	09.03.2013	Outlet of sedimentation tank	7.82	10	ND
7.	Belpahar OCP	12.03.2013	Outlet of sedimentation tank	7.82	88	ND
8.	Lilari OCP	12.03.2013	Outlet of sedimentation tank	7.66	52	ND
		PRESCRIBED STANDARD		5.5-9.0	100	10

Annexure D - Estimates of emissions from coal based power plants

Table 60 Emissions from coal based generation (Scenario 1: Emission factors based on Sharma, 2008

Year	Chattisgarh	Jharkhand	Madhya Pradesh	Odisha	Total India	CO_2 Emission factor	SO_2 Emission factor	NO Emission factor	Chhattisgarh			Jharkhand			Madhya Pradesh			Odisha			Total India		
	gWh	gWh	gWh	gWh	gWh	tCO_2/gWh	tSO_2/gWh	tNO/gWh	Million tonnes			Million tonnes			Million tonnes			Million tonnes			Million tonnes		
									CO_2	SO_2	NO	CO_2	SO_2	NO	CO_2	SO_2	NO	CO_2	SO_2	NO	CO_2	SO_2	NO
2007	26401	10656	10656	29340	417029	1040	8.65	2.41	27.5	0.2	0.0636	11.1	0.1	0.0257	11.1	0.1	0.0257	30.5	0.3	0.0707	433.7	3.6	1.0050
2008	38532	11159	11159	27524	441337				40.1	0.3	0.0929	11.6	0.1	0.0269	11.6	0.1	0.0269	28.6	0.2	0.0663	459.0	3.8	1.0636
2009	48053	10656	10656	28319	465983				50.0	0.4	0.1158	11.1	0.1	0.0257	11.1	0.1	0.0257	29.5	0.2	0.0682	484.6	4.0	1.1230
2010	51866	11082	11082	27454	486448				53.9	0.4	0.1250	11.5	0.1	0.0267	11.5	0.1	0.0267	28.6	0.2	0.0662	505.9	4.2	1.1723
2011	54209	12631	12631	26516	531028				56.4	0.5	0.1306	13.1	0.1	0.0304	13.1	0.1	0.0304	27.6	0.2	0.0639	552.3	4.6	1.2798

Source: TERI estimates

Table 61 Emissions from coal based generation (Scenario 2: Emission factors based on CPCB, 1994

Year	Chattisgarh	Jharkhand	Madhya Pradesh	Odisha	Total India	CO_2 Emission factor	SO_2 Emission factor	NO Emission factor	Chhattisgarh			Jharkhand			Madhya Pradesh			Odisha			Total India		
	gWh	gWh	gWh	gWh	gWh	tCO_2/gWh	tSO_2/gWh	tNO/gWh	Million tonnes			Million tonnes			Million tonnes			Million tonnes			Million tonnes		
									CO_2	SO_2	NO	CO_2	SO_2	NO	CO_2	SO_2	NO	CO_2	SO_2	NO	CO_2	SO_2	NO
2007	26401	10656	10656	29340	417029	1040	12.45	5.63	27.5	0.33	0.15	11.1	0.13	0.06	11.1	0.13	0.06	30.5	0.37	0.17	433.7	5.19	2.35
2008	38532	11159	11159	27524	441337				40.1	0.48	0.22	11.6	0.14	0.06	11.6	0.14	0.06	28.6	0.34	0.15	459.0	5.49	2.48
2009	48053	10656	10656	28319	465983				50.0	0.60	0.27	11.1	0.13	0.06	11.1	0.13	0.06	29.5	0.35	0.16	484.6	5.80	2.62
2010	51866	11082	11082	27454	486448				53.9	0.65	0.29	11.5	0.14	0.06	11.5	0.14	0.06	28.6	0.34	0.15	505.9	6.06	2.74
2011	54209	12631	12631	26516	531028				56.4	0.67	0.30	13.1	0.16	0.07	13.1	0.16	0.07	27.6	0.33	0.15	552.3	6.61	2.99

Source TERI estimates

The Energy and Resources Institute
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