

Role of Thermal Power Plants and Coal Mining in Local Area Development and Addressing Regional Imbalance: Conditions and Processes

Presentation based on Note Submitted to Government of Maharashtra's
Committee to study
"Alternative Approaches to Balance Regional Development in Maharashtra
State"

(For more details and references kindly refer the note of same title submitted to committee)

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Prayas Energy Group, Pune

Outline of Presentation

1. Background and Context
2. An Irony
3. Coal and Thermal Power Development in Vidarbha
4. Regional Developmental Imbalance
5. Experience of Existing Plants and Coal Mines
6. Suggested Approach to Thermal Power Plants and Coal Mines
 - i. Clean up of Existing Impacts
 - ii. Carrying Capacity & River Basin Studies to determine New Capacity
 - iii. Enshrining Benefit Sharing Mechanisms
7. Conclusions



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2

1. Background and Context

- Vidarbha has significant coal deposits
- Number of existing Thermal Power Plants (TPP) and coal mines in Vidarbha
- Massive thermal power capacity and coal mines in pipeline
- Justification of “use of local resources for local development”
- Experience of existing TPPs and coal mines belies this
 - Local area and communities suffer development deficit
 - Face problems of pollution, water scarcity, displacement etc.
 - Feeling of “our resources used for others while we get nothing except pollution”
 - Resentment and opposition to new TPPs and coal mining



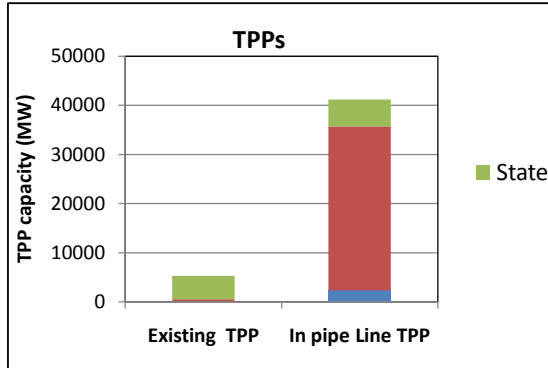
2. An Irony

- Massive number of proposed thermal power plants in Vidarbha projected as “use of local resources for local development”
- Ironically, most of the proposed plants are NOT based on local coal
- Most will source coal from long distance
- Several existing plants sourcing part of coal requirement from long distance
- Raises questions on the rationale of planning so many TPPs in the region
- Possible reasons
 - Belief that ultimately WCL will give coal linkage so TPP will be able to get local coal
 - Possible land and water grab, with these put to speculative profiteering later even if TPPs don’t come up



3. Thermal Power Development in Vidarbha

- Significant thermal capacity already exists – 5260 MW
- This is 29% of total installed capacity of Maharashtra state
- Massive capacity addition in pipeline – 41,195 MW
- Private sector becoming dominant in TPP capacity addition – 80% of in pipeline capacity in private sector



3. Thermal Power Development in Vidarbha (contd.)

District wise Proposed Thermal Capacity Addition in Vidarbha (May, 2011)

| District | Proposed Capacity Addition (MW) |
|--------------|---------------------------------|
| Nagpur | 10,350 |
| Chandrapur | 8,155 |
| Gondia | 5,940 |
| Bhandara | 5,280 |
| Yavatmal | 4,450 |
| Amravati | 3,450 |
| Gadchiroli | 1,990 |
| Wardha | 1,330 |
| Akola | 250 |
| Total | 41,195 |



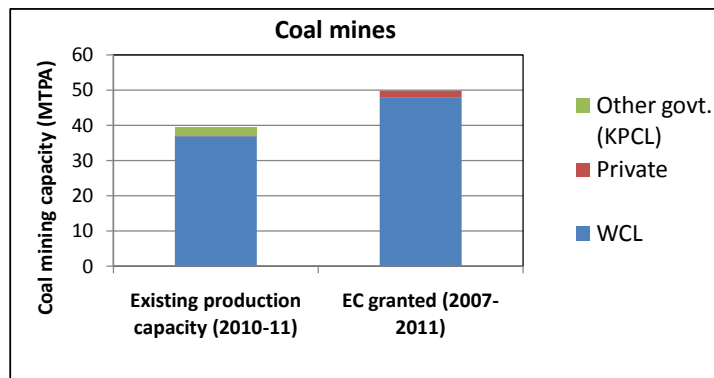
3. Coal Development in Vidarbha

- Total geological coal reserves in Maharashtra are about 10.3 billion tons, all in Vidarbha region, about 33% are extractable
- Production by WCL mines in Maharashtra in 2010-11 was 36.93 million tons , out of total of 39.34 million tons
- This is 85% of total WCL coal production (rest in Madhya Pradesh) and 7% of India's total coal production
- Existing coal mines production can support about 7,000 MW TPP capacity
- Overwhelming capacity, > 99% in public sector



3. Coal Development in Vidarbha (contd.)

- Captive mining 7% of current coal production of Maharashtra
- WCL production stagnated since 5-6 years
- Large number of proposed coal mines with EC Granted totaling to ~50 millions tons per annum production - WCL 48 MTPA and private captive 1.84 MTPA



4. Regional Developmental Imbalance

i. Per Capita Income:

For all Vidarbha districts (excluding Nagpur) is between half and three fourth of average of Maharashtra

ii. Electricity Use:

- Vidarbha Generated 29% of electricity in Maharashtra in 2010-11, at 24,757 million units
- But its **total electricity sales** (which can be considered a proxy for consumption) were only 11,555 million units, 13% of the state
- Its **per capita sales** were only 65% (502 units) of state average (774 units)
- This holds for all sectors (table on next slide)
- As per Census 2011, several districts have **Household Electrification levels** lower than Maharashtra average of 83.9%, including Gadchiroli (59.2%), Yavatmal (69.7%), Washim (76%)
- Many areas continue to face **load shedding and power cuts**



4. Regional Developmental Imbalance (contd.)

Sales of Electricity to Various Sectors in Maharashtra for 2010-11 (Million Units)

| Region | Agriculture | Commercial | Industrial | Other | Residential | Total |
|---------------------------------|--------------|-------------|--------------|-------------|--------------|--------------|
| Khandesh & Northern Maharashtra | 5281 | 483 | 3399 | 1304 | 1338 | 11806 |
| Konkan | 84 | 1263 | 10195 | 972 | 3397 | 15912 |
| Marathwada | 3796 | 336 | 2593 | 386 | 1082 | 8194 |
| Mumbai* | 1 | 5019 | 2490 | 844 | 7017 | 19650 |
| Vidarbha | 2436 | 815 | 4144 | 1289 | 2871 | 11555 |
| Western Maharashtra | 4699 | 1846 | 9197 | 870 | 3213 | 19825 |
| Grand Total | 16298 | 9762 | 32018 | 5666 | 18919 | 86941 |

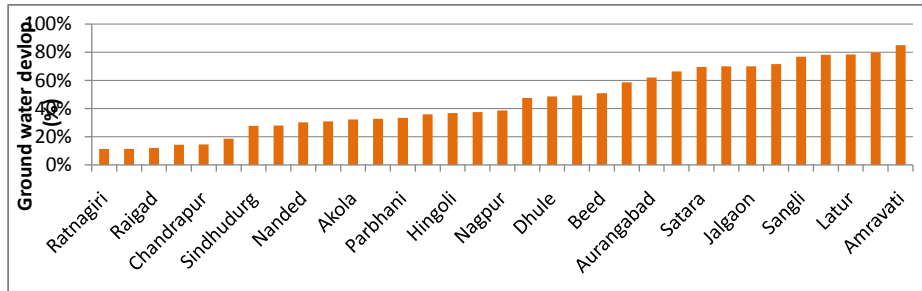
- *- For Mumbai, Tata Power's sector wise sales data for 2010-11 year is not available.



4. Regional Developmental Imbalance (contd.)

iii. Irrigation Development:

- Total irrigation potential created is 10.6 lakh ha (23% of MH), Actual irrigation is 3.27 lakh ha
- Reasons for lower irrigation are sediments accumulation, water diversion to industries (605 Mm³/yr already sanctioned just for thermal power plants, additional 380 Mm³/yr proposed)
- Ground water development low for most Vidarbha districts (except Amravati)
- Lack of water is one of the reasons behind farmer suicides



4. Regional Developmental Imbalance (contd.)

iv. Serious impacts of existing thermal power plants and coal mines

Excess of Pollution

- Air pollution due to coal transport, mining, stack emissions from TPPs etc.
- Water pollution due to ash pond slurry of TPPs, coal mine run offs etc.
- Chandrapur industrial area (Chandrapur MIDC, Tadali, Ballarpur & Ghuggus) categorized as the 4th most polluted industrial cluster of India by MoEF (2010); moratorium on new polluting projects not lifted yet.

Displacement

- Land needed for proposed TPPs (only EC granted 13,545 MW) = 19,200 ha
- Land needed for mining coal for 13,545 MW TPPs= 15,350 ha
- Poor record of rehabilitation, particularly for restoration of livelihoods

Depletion of water sources

- Coal mining has severely disrupted ground and surface water flows, depleting water sources of nearby communities



4. Regional Developmental Imbalance (contd.)

iv. Serious impacts of existing thermal power plants and coal mines

Transmission lines

- Land needed as right of way for proposed 20,000 MW capacity transmission= 50,000 hectares
- Lack of proper compensation for land acquired
- Many activities not permitted in land below transmission lines, even though land not acquired and no compensation given

Livestock Impacted due to depletion of water sources, due to pollution

Health Impacts

- High levels of pollution lead to many adverse impacts on health
- Many complaints of respiratory diseases
- No proper survey of nature and extent of impact

Impact of Heavy Transport

- Traffic of heavy vehicles and trucks create safety problems for common people
- Leads to high pollution
- Leads to deterioration of roads



4. Regional Developmental Imbalance (contd.)

v. Farmer Suicides:

- Farmer suicides during 1995-2010 ~ = 50,500 farmers
- Mainly from Yavatmal, Amravati, Akola, Buldhana & Wardha districts of Vidarbha
- Reasons: Continual crop failure, low yields, poor irrigation, medical expenses, cost of weddings in families, delays in getting electricity connections, un-remunerative prices etc.
- Large number of TPPs being planned in the nearby areas
- Diversion of water to TPPs & other industries may aggravate the situation



4. Regional Developmental Imbalance (contd.)

Annual Water Requirement for Existing TPPs in Vidarbha

| Name of Project | Plant Capacity (MW) | District | Water Requirement (Million m ³ /year) |
|-------------------|---------------------|------------|--|
| Chandrapur TPS | 2340 | Chandrapur | 35.0 |
| Khaperkheda TPP | 840 | Nagpur | 20.4 |
| Koradi TPs | 1040 | Nagpur | 29.2 |
| Paras TPP | 500 | Akola | N.A. |
| Wardha Warora TPP | 540 | Wardha | 13.3 |

- Large water diversions especially for thermal power plants create pressure on water for other uses, especially during the summer month
- In April 2010, several units of 2,340 MW at Chandrapur STPS shut down due to a lack of water.
- If all 40,000 MW capacity in pipeline is added in Vidarbha, it would use about 1600 million cubic meters of water every year
- This is more than entire quantity of water used in 2009-10 in Vidarbha for irrigation
- Can provide close to 300,000 ha of additional irrigation



Stack Emissions from 2340 MW Chandrapur TPP



Transmission Lines Network in Chandrapur



Ash pond of Chandrapur TPP





Opencast mine at Chandrapur



Dried well within 2 km from the coal mines



5. Impact of Thermal Plants and Coal Mines on Local Economy

- Quick literature review shows little study of direct and indirect (spin-off) impacts of TPPs & coal mines on local economy, especially of job creation, boost to local economic activities etc.
- Prayas attempts to see direct impact of TPP, based on actual figures of recent 250 MW expansion of Mahagenco's Paras (Akola) plant
- **Cash Flows in TPPs:**
 - Capital investment: More than 65% goes outside local economy
 - Operating revenues: only 9% goes to local economy
- **Employment**
 - TPP: Direct employment (operation phase)= 0.8-1.5 employees/MW, large part is for highly qualified and trained personnel
 - Coal mines direct employment \approx 800 persons per MTPA production, but many workers from outside the region
 - Increasing automation, higher use of state of art technology & sophistication implies employment generation will go down



6. Suggested Approach to TPPs and Coal Mines

1. Clean up existing impacts.
2. Introduce measures to share the benefits of existing TPPs and coal mines with local communities.
3. No new plants and mines till clean up is done.
4. For proposed plants and mines, undertake carrying capacity studies to determine how many power plants and mines the local environment can support.
5. Carry out River Basin Study for each of the basins / sub basins, to determine the water availability, usage and allocation.
6. Capacity additional to be determined based the 4 and 5 above.
7. Environmental, social and health impact assessment both for individual projects and for cumulative impacts.
8. New capacity to incorporate the benefit sharing mechanisms.

Most of the steps proposed already exist in Indian policy and legal regimes, the need is to bring them together into one comprehensive framework



6. Suggested Approach to TPPs and Coal Mines (contd.)

- i. **Clean Up Existing Impacts – including outstanding resettlement and compensation, pollution, health and other impacts, restoration of completed mines**
 - Detailed documentation regarding impacts on people due to existing TPPs & coal mines by reputed & independent agencies with impeccable credentials
 - Detailing of measures to avoid, mitigate, ameliorate and compensate various impacts, and costs & time lines involved
 - Involvement of local communities fully in its preparation
 - Implementation of cleaning up measures:
 - In time bound manner, under supervision of a committee (including people's representatives, respected citizens, environmental & social activists)
 - Whole process to be funded by cess on electricity and coal
 - No new coal mines and TPP unless clean up of existing plants is done



Estimation of Clean up Tasks and Costs

- List of clean up activities is not comprehensive but includes only key ones
- Costs could be estimated only for some activities and not all
- Estimates are only rough estimates
- In several cases, effective implementation of existing laws may be a more important requirement than money
- Clean up cost (only for those activities where costs estimated) ~ capital investment of Rs. 1400 crores & annual recurring expenditure ~ Rs. 369 crores
- Clean up cess of 20 paise per unit of electricity and Rs. 100 per ton of coal to recover part of clean up costs
- Additional requirement to be met from existing taxes and royalties on electricity and coal (these total to > Rs. 4000 crores)

| Electricity Generated in 2010-11 (Million units) in Vidarbha | Clean Up Cess (Paise per unit) | Amount Generated (Rs. Crore per year) | Coal produced in the year (Million Tons) | Clean Coal Cess (Rs. Per ton) | Amount generated (Rs. Crore per year) |
|--|--------------------------------|---------------------------------------|--|-------------------------------|---------------------------------------|
| 24757 | 20 | 495.14 | 39.34 | 100 | 393.4 |



Cost Estimation for Clean up Measures for TPPs and Coal Mines in Vidarbha

| Sr. No | Problem | Clean Up Action | Cost (Rs. Crore) | |
|--------|--|---|------------------|----------------------|
| | | | Capital | Operational (Annual) |
| 1 | Dust deposits from stack emissions from 2340 MW Chandrapur TPP | Wash coal to reduce ash content and hence reduce stack emissions | | 152.1 |
| 2 | As above, at other power plants | Similar action for another 1000 MW out of total existing capacity | | 65.0 |
| 3 | Depletion of ground water due to coal mines; Water problem in surrounding villages | Assured, piped water supply schemes for all villages in 5 km radius of coal mines | 269.0 | 26.9 |
| 4 | Depletion of groundwater causes loss of agricultural productivity | Provision of irrigation through minor irrigation schemes | 87.0 | 8.7 |
| 5 | Roads being damaged, unsafe roads, coal dust emissions etc | Segregate heavy traffic carrying coal etc, have dedicated roads for these | 1000.0 | 40.0 |
| 6 | Abandoned coal mines | Reclaim and restore the coal mines where mining is over | | 72.0 |
| 7 | Fugitive coal dust emissions from transport | Transport coal in covered trucks | | |
| 8 | Fugitive emissions from stockyards etc | Water sprinklers to be installed (where not done) and to be operated properly. | | |
| 9 | Water pollution from Ash pond | Lining of Ash pond | | |

Contd.



| Sr. No | Problem | Clean Up Action | Cost (Rs. Cr.) | |
|---|---|--|----------------|------------|
| | | | Cap. | Oper. |
| 10 | Health impacts of dust, SPM, water pollution, absence of health care. Key issues will be lung-skin-eye diseases, and heavy metal toxicity. Creation of preventive system, screening and early detection, early warning system and curative system | Dust control, Water pollution control | | |
| | | Health Impact Assessment survey to gauge impact | | |
| | | Orientation & training of existing health system including PHCs, urban dispensaries & private practitioners to take account of health impacts of TPPs and coal mines | | |
| | | Provision of Primary Health Centre, Community Health Centre | 63.0 | 6.3 |
| 11 | Ash dust leading to pollution, covering of plants etc | Speciality hospital/special facility in all major public health centres like taluka hospitals for likely health impacts of coal mines & TPPS, in particular respiratory diseases, skin ailments, eye diseases & for heavy metal toxicity | | |
| | | Ongoing health monitoring system for early detection & screening | | |
| 12 | Ash pollution | Reach 100% re-use of ash at the earliest, latest by 2014. | | |
| 13 | Resettlement of displaced people remaining | Reduce the extent of Ash pond and reclaim excess ash pond land | | |
| 14 | People affected by transmission lines—losing land & restrictions on agricultural & other activities | Provision of livelihoods, land, jobs, amenities at resettlement sites etc. | | |
| | | Bring out a proper policy to compensate transmission lines affected people. Implement it. | | |
| 15 | Smoke from coal chulhas especially in worker colonies | | | |
| 16 | Non implementation of laws to control pollution | Provide easy access to workers to LPG, clean chulhas. | | |
| | | Monitoring mechanisms including measuring meters at individual discharge points, real time data collection & display on web, institutional mechanisms like monitoring committees, charges for experts, labs etc. | | |
| TOTAL (only where estimates are available) | | | 1419 | 369 |

6. Suggested Approach to TPPs and Coal Mines (contd.)

ii. New Thermal Power Projects and Coal Mines

– Comprehensive Carrying Capacity (CCC) Studies

- Carrying Capacity- Maximum rate of resource consumption and waste discharge that can be sustained indefinitely in a defined planning region without progressively impairing bio-productivity and ecological integrity (MoEF)
- Two components – supportive capacity and assimilative capacity
- Some CCC studies done previously in India, can provide important principles and methodologies, the kind of trade-offs encountered, and the criteria used for arriving at decisions for such study in Vidarbha
- Resource in least supply or with greatest constraint will determine Carrying Capacity
- In Vidarbha, water likely to be critical resource on the supportive side, pollution likely to be a constraining parameter on the assimilative side

6. Suggested Approach to TPPs and Coal Mines (contd.)

ii. New Thermal Power Projects and Coal Mines

- **River Basin Studies:**
 - Can be seen as specialised case of Carrying Capacity studies
 - Important for Vidarbha region as many TPPs coming up in the same river basin
 - MWRRA Act 2005 makes it legally mandatory to carry out river basin studies for all basin
 - Act also makes it mandatory for allocations to be based on the river basin studies (via the State Water Plan)
 - Water to thermal power plants needs to be priced to reflect opportunity cost and scarcity value, and in particular opportunity costs in terms of water's role as life and livelihood support



6. Suggested Approach to TPPs and Coal Mines (contd.)

ii. New Thermal Power Projects and Coal Mines

- **Cumulative Impact Assessments (CIA)**
 - Impact assessment of TPPs in cluster to be done cumulatively so as to reflect totality of the impacts of several plants in an area
 - So far, environmental clearance process and EIAs have been done only for individual plants
 - Wrong notion that legal regime for EC does not need cumulative impact assessment
 - EIA notification and recent judgments of National Green Tribunal imply that Cumulative Impact Assessments are legally mandatory



6. Suggested Approach to TPPs and Coal Mines (contd.)

iii. Some Other Suggestions (Some may need detailed examination)

- Carry out several studies: (a) Impacts on health of pollution (b) Direct impacts of TPPs and mines on local economy, indirect multiplier effects, spin-offs (c) impacts of transmission lines including displacement, land loss, loss of agricultural productivity
- Use air cooled condensers for TPPs in water scarce areas to save water (almost 80% water saving, though some negative points, trade offs need to be studied)
- Build TPPs of smaller sizes (< 100 MW)
- Build TPPs closer to load centres
- Explore transmission of power through underground transmission cables
- Set up mechanisms to empower local citizens to monitor and control pollution, use of technology to track pollution from individual industries on real time basis
- Use closed trucks for coal transport
- Dedicated roads for coal transport (separate from daily used roads by citizens)



6. Suggested Approach to TPPs and Coal Mines (contd.)

• Enshrining Benefit sharing mechanism

- It is essentially over and above any compensation measures and is not to be a substitute for measures to ameliorate direct impacts like pollution, land loss etc.

Benefit sharing mechanisms specific to Vidarbha should include:

- A combined Local Area Development Fund (from coal & TPP revenues) for building and running community infrastructure like roads, hospitals, health care, water supply, schools etc.
- Irrigation and water resources development, in particular making available more electricity for energising more agricultural pump sets to develop groundwater
- Electricity for all by provision of money needed for extension of network to all, for installation of Distributed Decentralised Generation, and by provision of actual electricity needed for this
- Supply of cheaper electricity to industry (However, roll out of open access is likely to make this redundant)
- We suggest 5% of electricity and coal produced in the region as shared benefit for local communities



7. Conclusions

- Huge expansion of thermal power capacity and coal mining in the pipeline in Vidarbha
- Severe adverse impact of existing thermal power plants and coal mines, leading to resistance against new capacity
- We propose a package consisting of Clean Up of existing impacts as a first step
- Clean up to be paid for by cess on electrify and coal
- No new plants and mines till clean up has been carried out
- Numbers and locations of new thermal power plants and mines to be decided through carrying capacity studies, river basin studies
- All proposed plants and mines to have an individual and cumulative impact assessment
- Benefit sharing mechanisms to be enshrined in existing and new plants and mines to ensure benefits flow to local communities
- Entire package to be implemented as a whole and not in selective parts



Thank You

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