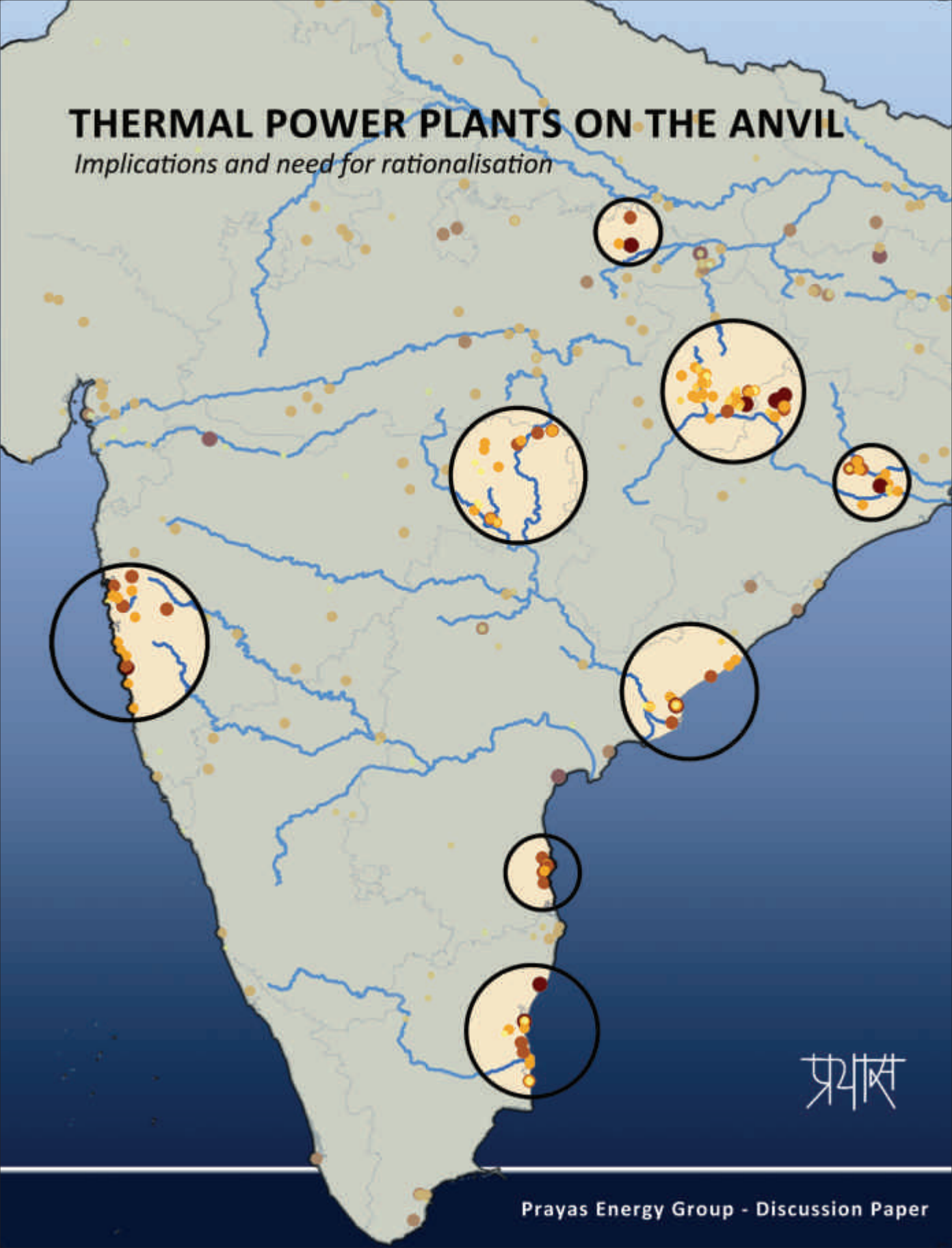
THERMAL POWER PLANTS ON THE ANVIL

Implications and need for rationalisation



Prayas Energy Group - Discussion Paper

THERMAL POWER PLANTS ON THE ANVIL
Implications and Need for Rationalisation

Discussion Paper by Prayas Energy Group

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The cover shows locations of proposed Thermal Power Plants and major river basins in India.
Note the high concentration of Thermal Power Plants in a few clusters.

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About Prayas

Prayas (Initiatives in Health, Energy, Learning and Parenthood) is a non-governmental, non-profit organisation based in Pune, India. Members of Prayas are professionals working to protect and promote the public interest in general, and interests of the disadvantaged sections of the society, in particular.

The Prayas Energy Group works on theoretical, conceptual and policy issues in the energy and electricity sectors. Activities cover research and intervention in policy and regulatory areas, as well as training, awareness, and support to civil society groups. The past work of the Prayas Energy Group includes an analysis of the power purchase agreement between the Dabhol Power Company and the Maharashtra State Electricity Board, an analysis of the Sardar Sarovar Project, the development of a least-cost, integrated resource plan (IRP) for the state of Maharashtra, an analysis of agricultural power consumption and subsidy, a critique of the activities of multilateral development banks in the energy sector in India, and the organisation of numerous capability building workshops. Since the last few years, the group has focused mainly on issues relating to power sector reforms, renewable energy, energy efficiency and climate change. Its work in the area of power sector reforms includes a study of the regulatory aspects of the Orissa model of power sector reforms, several policy and regulatory interventions at the Central and State levels, a survey based report on Electricity Regulatory Commissions, a report on the privatisation of distribution in Delhi, and a study of the Bhiwandi distribution franchisee model.

All publications, presentations and reports by the Prayas Energy Group are available at the Prayas website.

SUMMARY

The thermal power generation capacity in India is set to expand massively. Data from the MoEF analysed by the Prayas Energy Group shows that the ministry has accorded environmental clearances to a large number of coal and gas-based power plants whose capacity totals 192,913 MW. Another 508,907 MW are at various stages in the environmental clearance cycle, that is, they are either Awaiting Environmental Clearance, or have Terms of Reference (TOR) Granted, or are Awaiting TOR. It is extremely rare for a thermal power plant (TPP) to be denied environmental clearance. This means that there are around 701,820 MW of coal and gas plants waiting to be built in the coming years. Coal-based plants account for an overwhelming 84% of these in-pipeline projects.

These additions are more than six times the currently installed thermal capacity of 113,000 MW. They are also three times the capacity addition that would be required to meet the needs of the high renewables-high efficiency scenario for year 2032 projected by the Planning Commission's Integrated Energy Policy report.

Strikingly, many of the projects in pipeline will be geographically concentrated in a few areas. Only 30 districts (or 4.7% of the total 626 districts in India) will have more than half of the proposed plants with their capacity adding up to about 380,000 MW. Several of these districts are adjoining each other, and hence the real concentration of power plants is even higher than that revealed by the district-wise figures.

While the state and central sectors have a large share in existing TPPs (at 82%), private sector participation is set to increase significantly, with the private sector accounting for 73% of all projects in pipeline. Also, only 10 private corporate groups are planning to build about 160,000 MW.

The projects in pipeline are likely to have severe social and environmental impacts. Major pollutants include sulphur dioxide, mercury and ash. The MoEF has not mandated sulphur removal equipment except for a handful of plants. There are no ambient air quality standards for mercury, nor any limits on mercury emissions from power plants. The MoEF now requires 100% utilisation of coal ash within four years of plant commissioning, but the capacity to do so remains doubtful and the monitoring weak. Meanwhile, ash disposal in ponds or dumps continues to create serious pollution and health problems for local communities.

In 2009, the MoEF identified several areas in the country as Critically Polluted. Large numbers of proposed plants, with a total capacity of 88,000 MW, are located within the same districts as eight of these critically polluted areas. The geographic concentration and location within critically polluted areas is likely to exacerbate the pollution impacts of these thermal power projects.

As most of the capacity in the pipeline is coal based, and a large proportion of it relies on domestic coal, the implications on fuel supply are substantial. While India is said to have abundant coal, the country has not been able to achieve the required production from these reserves, and a steep rise in imports is forecast for the end of the 12th Plan. Partly as result of this, coal allocations being made to various coal plants are in the nature of spreading thin this resource. That is, large number of plants are not getting enough coal for their full requirement. This is creating uncertainty for

individual plants, and also means that the resource is not being allocated optimally.

The proposed plants are also going to create massive demands for water. As water is an intensely local need, the local impacts are crucial. A river basin may have enough water at the basin level, but may be under immense stress in the area where the TPP is located. The geographical concentration of plants will further aggravate this situation. Moreover, the availability of water varies through the year, and it may be particularly difficult to provide water to TPPs in some parts of the year. Most macro level water balances of river basins do not account for the needs of local communities or of the ecology. This report estimates that the consumptive water needs of just the plants with Environmental Clearance Granted will be close to 4.6 billion cubic meters per year. Given this, a number of potential water conflict situations appear to be in the making.

These projects in pipeline represent a massive over-capacity in the making. Thus, valuable and scarce natural resources of land, water, gas and coal will be allocated to projects that are not required. Crucially, land for such TPPs is invariably acquired compulsorily by governments by using the Land Acquisition Act (LAA), which allows forcible acquisition for a public purpose. Given that the thermal capacity in pipeline is far in excess of that required, it is clear that many of these plants will not serve a public purpose. Hence, the use of the LAA to acquire land for such TPPs cannot be justified.

With the delicensing of thermal power generation, it is now assumed that the market will weed out excess and inefficient capacity. However, key inputs like coal, gas, land and water are all allotted on the basis of non-market criteria, mostly with huge concessions and subsidies. These inputs involve critical common property resources and have significant externalities. A market based weeding out process will be littered with many incomplete projects which would have displaced people, impacted the environment and locked up huge amounts of financial resources, creating stranded assets of plant and transmission facilities. The costs of such weeding will be borne to a significant extent by the common people, the country and the environment.

Thus, it would be a mistake to let the market play the arbitrator. Instead, it would be important to step in with purposive and deliberate interventions.

The report therefore recommends an immediate moratorium on any further environmental clearance to new power plants. Further, it also recommends that from the 200,000 MW that have already been given the environmental clearance, projects with very high social and environmental impacts, projects that do not have broad local acceptance, and projects leading to sub-optimal use of transmission, fuel, land and water should be put on hold. It also calls for simultaneously initiating a fully transparent deliberative process to (a) completely revamp the environmental clearance procedures of power plants, so as to minimise social and environmental impacts of power projects, and mandate prior regional carrying capacity studies to decide on the extent of projects in an area, (b) to ensure a coordinated approach of different agencies for optimising fuel, land and water allocations for different projects and (c) to reassess the long term demand for power and measures to meet this demand in an optimal manner, including energy efficiency as well as renewable energy, so as to improve energy security and minimise the social and environmental damage due to power sector development.

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INTRODUCTION

A massive expansion of the thermal power generation capacity of the country is on the anvil. The total installed electricity generation capacity in India as on 30 April 2011 was 174,361 Megawatts (MW). Of this, coal-based capacity was 94,653 MW, while gas-based capacity was 17,706 MW, taking the total thermal capacity to 113,559 MW [1]. Information collated from the central Ministry of Environment and Forests (MoEF) shows that huge additions of thermal power capacity are in the pipeline.

With the Electricity Act 2003 delicensing thermal power generation, this sector is no longer within the scope of any systematic planning process. Data on proposed new plants is scattered. At the same time, media and other reports point to substantial new thermal power capacity in the pipeline.

With the environmental clearance of thermal power plants possibly being the sole permission required from the central government, a comprehensive record of all the thermal projects in the pipeline may only be available at the central Ministry of Environment and Forests (MoEF). This report therefore compiles information about the thermal power projects in the pipeline from data available from the MoEF for projects in its environmental clearance cycle.

This study aims to develop a broad picture of the scale and other features of the proposed capacity addition in the thermal power sector, and understand various issues of concern that arise as a result.

SCALE

Data from the MoEF analysed by the Prayas Energy Group shows that the ministry has accorded environmental clearances to a large number of coal

Box 1 : EC approval process

Thermal power plants (TPPs) based on coal/lignite/naptha/gas of more than 500 MW capacity, and under some other conditions, require prior environmental clearance (EC) from the central MoEF as per the MoEF Notification S.O. 1533 dated 14 Sept. 2006, issued under the Environment Protection Act 1976.

This process takes the project through four steps. When the project developer applies, it is in the Awaiting TOR (Terms of Reference) stage. After this, the project undergoes Scoping by the Expert Appraisal Committee (EAC). Scoping involves determination of the terms of reference for the preparation of the EIA (Environmental Impact Assessment). With this, the project comes to the stage of TOR Granted. The completion of the draft EIA is followed by a Public Hearing, and the finalisation of the EIA and EMP (Environment Management Plan). After these steps are completed and reports submitted to the MoEF, the project is at the EC Awaited stage. Next, the EAC examines the EIA and EMP, outcomes of the public hearing, and other related documents, and recommends a grant or rejection of the clearance. Once the project is granted clearance, it is in the EC Granted stage.

* This report looks at the proposed thermal power plants in India from the perspective of local social and environmental concerns and issues relating to land, water and fuel. It does not look at GHG emission and global climate change related issues, as the development imperative is the first concern for a country like India.

1 Source: http://www.cea.nic.in/reports/monthly/executive_rep/apr11/8.pdf Accessed 23 May 2011. The total thermal power capacity includes 1,200 MW of diesel-based generation. There is also a grid connected captive capacity of 19,509 MW. Figures for off-grid captive power capacity have not been mentioned.

and gas-based power plants with capacities totalling to 192,913 MW [2]. Moreover, another 508,907 MW [3] are at various stages in the environmental clearance cycle, that is, they are either Awaiting Environmental Clearance, or have Terms of Reference (TOR) Granted, or are Awaiting TOR (See Box 1). It is extremely rare for a thermal power plant (TPP) to have its environmental clearance rejected. In fact, not a single thermal power plant has been denied clearance by the MoEF from 2006 to July 2010, according to the data obtained by the EIA Response Centre, New Delhi under the RTI Act [4] (See Also Box 2). This means that there are around 701,820 MW of coal and gas plants waiting to be built in the coming years. This figure includes only those plants that are in the MoEF clearance process. There are more power plants whose capacity will add up to thousands of MW that are not yet in the MoEF cycle, but have been announced. For example, the Government of Orissa has announced several thermal power plants in the state, and also signed MoUs with many companies. Out of these, 9 plants whose capacity adds up to 18,920 MW are

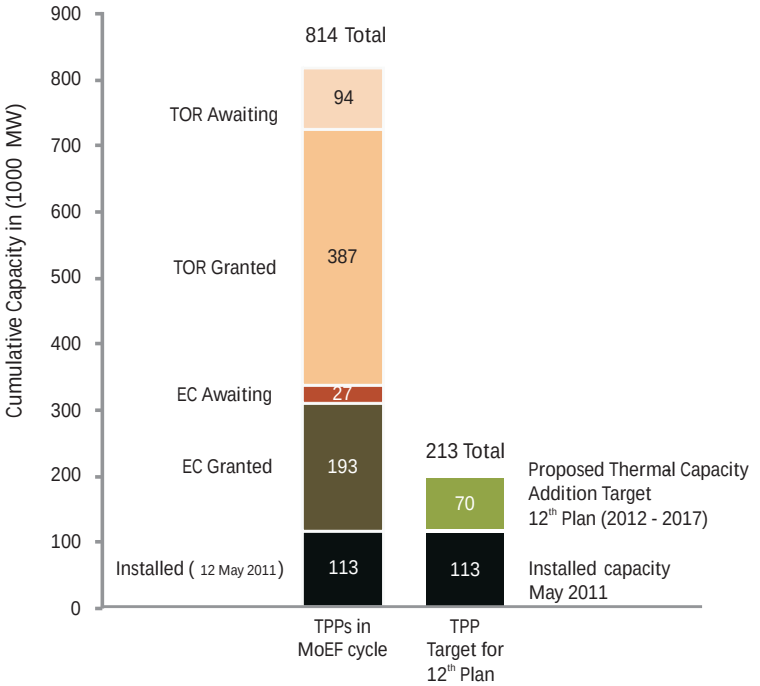

Figure 1: Current and In-Pipeline Thermal Power Capacity as of 12 May, 2011
Source: Current Capacity - CEA, See Footnote 1, In-Pipeline Capacity - MoEF.

Box 2 [5]: RTI query by EIA resource centre

According to the letter of the MoEF dated 9 Dec 2010 in response to the RTI query by EIA Resource Centre, "Regarding the rejection [of TPPs], I may like to inform that thermal power plants not being site specific... the Expert Appraisal Committee (EAC) during scoping invariably advises the project proponent to change to alternative site in case a particular site is not acceptable to the EAC". In other words, a TPP is never likely to be rejected, but only asked to change its location.

2 As on 12 May 2011. Includes 433 MW of thermal power capacity based on biomass and bagasse. We have excluded TPPs that were given an environmental clearance before 31 Dec 2006. In other words, this figure includes only those TPPs that were given an environmental clearance between 1 Jan 2007 and 12 May 2011. It should be noted that as per the EIA Notification S.O. 1533, dated 14 Sept 2006 issued by the MoEF, the "Validity of Environmental Clearance" that is, the period from the granting of a prior environmental clearance to the start of production operations by the project or activity, is 5 years for a thermal power plant. This can be extended by another 5 years by the MoEF.

3 As on 12 May 2011. Includes about 2200 MW of capacity based on biomass, bagasse, etc.

4 Information obtained from the MoEF under RTI applications by the EIA Response Centre, New Delhi shows that between 2006 and 2008, the MoEF approved 1746 projects, while only 14 proposals were rejected (this includes all projects, not just TPPs). Further, between 1 August 2009 and 31 July 2010, 535 projects across all sectors were approved, with only 6 being rejected. Among the approved projects, the number of thermal power projects was 134 (year 2006-08) and 49 (Aug 2009 to July 2010). No TPPs were rejected, though the clearance given to one TPP was cancelled later on. Source: ERC Website http://www.ercindia.org/rtiresp.php and Press Note by ERC http://www.ercindia.org/files/ECpress.doc

5 http://www.ercindia.org/files/rti/scan0005.pdf Downloaded 6 June 2011

not in the MoEF cycle as yet, and hence are not included in the above figures[6]. A similar situation exists in some other states as well. However, in this report, we have considered only those TPPs that are in the MoEF cycle[7]. Table 1 and Figure 1 illustrate these numbers.

Table 1: Existing and In-Pipeline Thermal Power Plants Capacity in India by Ownership

		In pipeline (MoEF Cycle)				Total MW
	Existing Thermal Capacity	EC granted	EC Awaiting	TOR Granted	TOR Awaiting	
Central	41,648	19,014	1,950	49,766	3,640	116,018
State	50,732	44,305	6,207	57,280	5,520	164,044
Private	21,082	129,593	18,940	280,339	85,265	535,219
Total MW	113,462[8]	192,912	27,097	387,385	94,425	815,281

Source: Current Capacity - CEA, See Footnote 9, In-Pipeline Capacity - MoEF

FUELWISE BREAKUP

Coal-based plants account for an overwhelming part of the in-pipeline (and existing) projects. If we look only at projects that are in the Environmental Clearance Granted stage, close to 87% of these plants are coal-based plants. This proportion is also about the same for the projects in pipeline, with 512,652 MW (84%) of the total 607,396 MW being coal-based [9] (Figure 2).

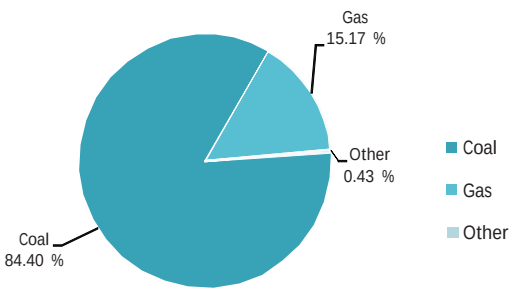

Figure 2: Fuelwise Distribution of TPP Capacity in Pipeline (As of 12 May 2011)
Source: MoEF
(Note: Projects with TOR Awaited are not included as the fuel-wise break up is not available for all projects in this category)

COMPARISON WITH PROJECTED CAPACITIES

A few comparisons will help to understand what these figures indicate. The total thermal capacity [10] as of April 2011 is about 113,000 MW. At 701,820 MW, the proposed capacity addition of the projects in pipeline is more than 6 times this capacity.

The Planning Commission is proposing a total capacity addition target (including non-thermal sources) of 100,000 MW for the 12th Five Year Plan (2012-2017) [11] . The capacity of the thermal projects already given environmental clearance adds up to almost twice this target.

6 Source: Data on MoUs from the Government of Orissa Department of Energy http://218.248.11.68/energy/MoU_IPP.asp?lnk=14 Accessed 19 May 2011. Only Plants > 500 MW are considered.

7 We have also not considered TPPs below 500 MW that are cleared at the state level, as these are not likely to add up to a very large capacity compared to the TPPs in the Central Government's MoEF cycle.

8 A slight discrepancy between the total existing capacity in this table and the figure quoted earlier is because two separate documents were referred to for these figures, because the fuel-wise and ownership-wise break-up was given in different documents. This figure is from
http://www.cea.nic.in/reports/monthly/generation_rep/actual/may11/opm_06.pdf
http://www.cea.nic.in/reports/monthly/generation_rep/actual/may11/opm_07.pdf
http://www.cea.nic.in/reports/monthly/generation_rep/actual/may11/opm_05.pdf
Accessed 23 May 2011

9 We have considered the projects with EC Granted, TOR Granted and EC Awaiting. Projects with TOR Awaiting have not been considered here as the fuel-wise break-up in not available for all the TOR Awaited projects.

10 In this note, we take the 'thermal capacity' to include only coal and gas. Oil is excluded; besides, in terms of numbers it is very small compared to coal and gas as Footnote 1 shows.

11 Presentation by the Planning Commission in the Full Meeting of the Commission on 21 April 2011
http://planningcommission.nic.in/plans/planrel/12appdrft/pc_present.pdf

The Integrated Energy Policy (IEP) of the Planning Commission (2006) projects the energy needs of India in the year 2032. It has estimated the total installed capacity required in the year 2032 at 778,000 MW [12] . However, this is the total capacity needed, and not just that from coal and gas. In the scenarios described by the IEP, the scenario with large scale use of renewable energy and high efficiencies requires 269,997 MW of coal and 69,815 MW of gas [13] , that is, a total of about 340,000 MW. If we account for the already existing capacity of 113,000 MW, this implies a thermal capacity addition of about 230,000 MW. Thus, the proposed capacity addition already in the MoEF pipeline is about three times the capacity that would be needed in 2032 [14] even according to the IEP.

DISTRIBUTION

Apart from the sheer scale of the TPPs in the pipeline, some other important features of the proposed capacity addition are the geographic concentration of the projects, their location (coastal or inland), and the ownership pattern. These are discussed in detail below.

Geographic Concentration

A significant feature of the proposed thermal power plants is the high concentration of the plants in a few locations. As Table 2 shows, just 30 districts (only 4.7% of the total 626 districts in India) will have more than half of the proposed plants with their capacity adding up to about 380,000 MW. Fifteen districts each have plants with capacities totalling to 10,000 MW or more. Districts Janjgir-Champa and Raigarh in Chhatisgadh have the highest concentration of proposed TPPs in the country, with 30,470 MW and 24,380 MW planned, followed by Nellore in AP with 22,700 MW.

Several of these districts are adjoining each other, and hence the real concentration of power plants is even higher than that revealed by the district-wise figures. For example, the districts of Rewa (17,820 MW), Singrauli (15,240 MW), Sonbhadra (7,638 MW), Sidhi (5,240 MW, not in the top 30) and Allahabad (5,280 MW, not in top 30) are adjoining, adding up to a proposed capacity of 51,218 MW within close quarters. There are several other such clusters. Figure 3 is a map showing the proposed capacity additions in various districts (includes all projects in the pipeline from EC Granted to TOR Awaited).

One of the implications of this development is the local impact. Serious as the impacts of thermal power plants are, a concentration of many plants in a small area can have cumulative impacts that are greater than the sum of their parts. Of particular concern will be the impacts of sulphur dioxide and mercury pollution, ash disposal, and the impacts on water resources due to high water withdrawals. (See the next section on pollution for a detailed discussion.)

12 Planning Commission (2006): Integrated Energy Policy - Report of the Expert Committee, Planning Commission, Government of India, New Delhi. Available at http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf Page 20. This is for a continuous 8% annual growth in GDP for the next 20 years, with Electricity to GDP elasticities falling from 0.95 to 0.78.

13 Scenario 11, described on Page 46. The Scenario also envisages 27,778 MW from coal bed methane and 22,222 MW from in situ coal gas. These are separate from the conventional coal and gas TPPs.

14 Some of the existing capacity of 113,000 MW may be retired by 2032 if its working life is over. However, this is likely to be a relatively small amount, and will probably be replaced or refurbished at the same place. So the projects in the pipeline today are over and above the existing ones.

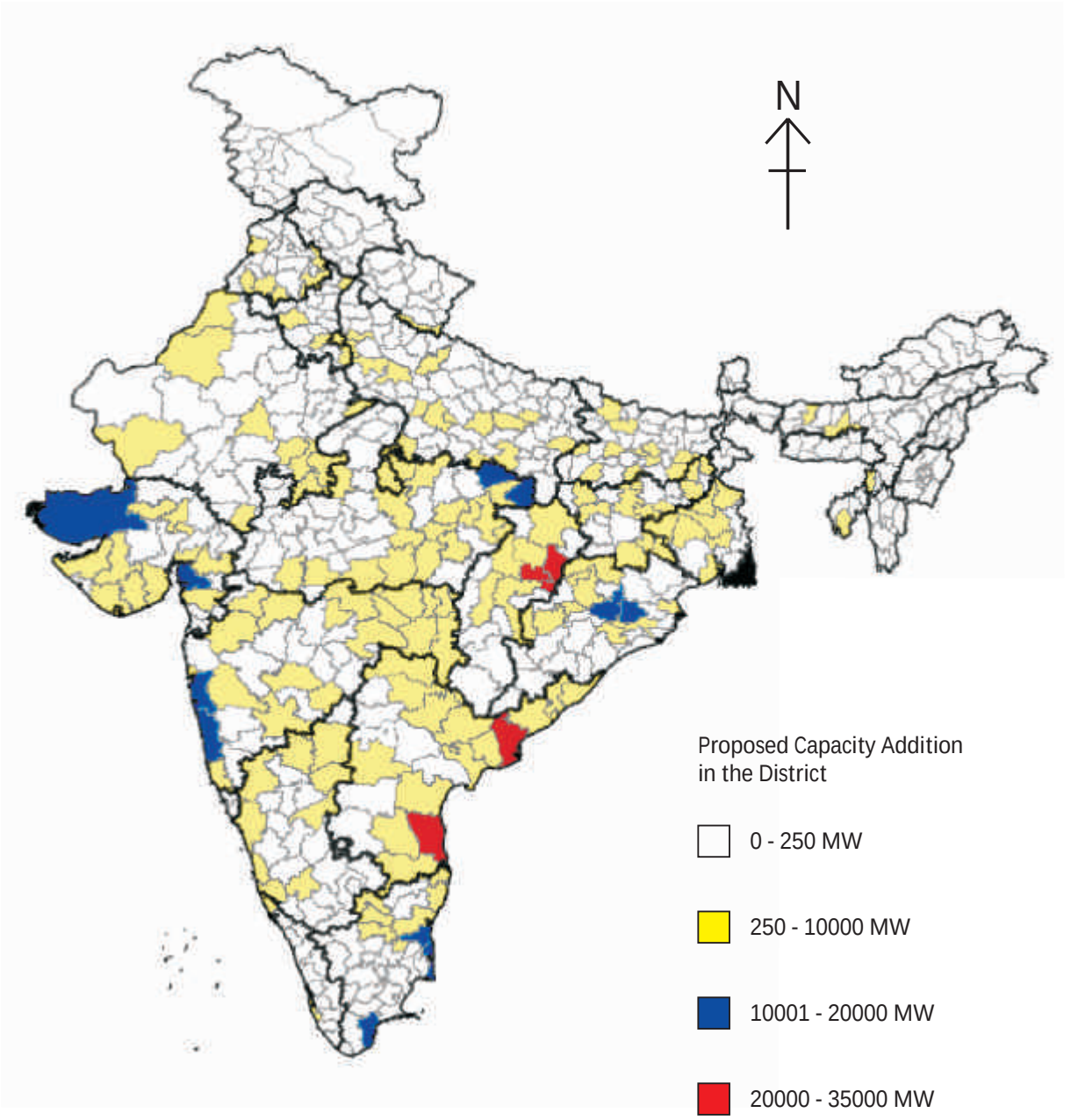

Figure 3: District-wise Capacity Addition in Pipeline
Source: MoEF

Location: Coastal or Inland

The distribution between the coast and inland of the thermal power plants with Environmental Clearance Granted is shown in Figure 4. Close to 72% of the capacity (137,986 MW) is to be located inland, while 28% (54,818 MW) is to be located on the coast.

Figure 5 also shows that while most of the inland capacity will be supplied with domestic coal, and most of the coastal capacity with imported coal, there is still significant inland capacity that will use imported coal, and coastal capacity that will use inland coal. This will involve the long distance transport of coal.

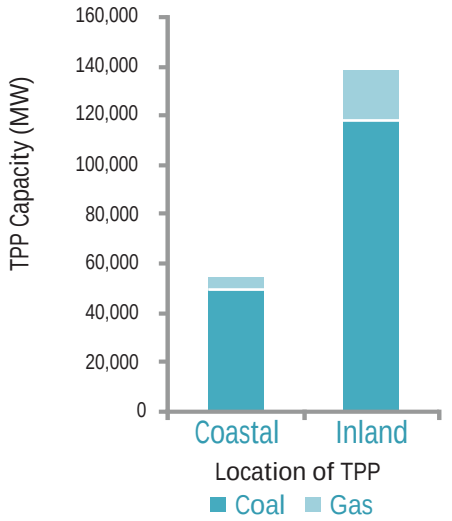

Figure 4: Coastal and Inland Distribution of TPPs with EC Granted
Source: MoEF

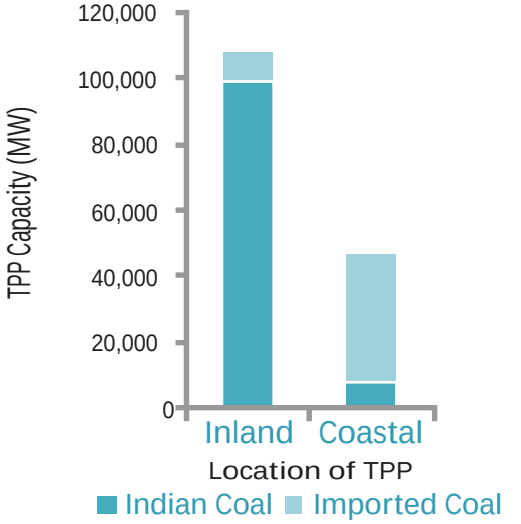

Figure 5: Coal Source and Locationwise Distribution of TPPs with EC Granted
Source: MoEF

Table 2: Districts with a large concentration of In-Pipeline TPPs

District	EC granted			EC awaiting			TOR granted			TOR awaiting			Grand Total (MW)
	Coal	Gas	Total	Coal	Gas	Total	Coal	Gas	Total	Coal	Gas	Total	Total
Janjgir-Champa	4,920		4,920				24,230		24,230	1,320		1,320	30,470
Raigarh (CG)	4,500		4,500	1,320		1,320	16,580		16,580	1,980		1,980	24,380
Nellore	12,260		12,260				9,120		9,120			1,320	22,700
East Godavari		3,470	3,470				6,300	9,002	15,302		1,770	1,770	20,542
Raigad (MH)	3,205	4,100	7,305				3,200	5,000	8,200		2,825	2,825	18,330
Kutch	7,960		7,960	1,320		1,320	4,700		4,700	4,000		4,000	17,980
Angul	2,370		2,370				11,470		11,470	4,000		4,000	17,840
Rewa							5,940		5,940			11,880	17,820
Tuticorin	3,235		3,235				7,240	2,265	10,585	2,640		2,640	16,460
Bharuch		1,450	1,450	2,640		2,640	1,320	10,250	11,570				15,660
Singrauli	9,280		9,280				3,320		3,320			2,640	15,240
Nagapattinam	5,780		5,780	1,080		1,080	3,600		3,600	2,640		4,240	14,700
Ratnagiri	1,200		1,200				8,200	3,300	11,500				12,700
Dhenkanal	3,420		3,420				8,060		8,060				11,480
Cuddalore	6,320		6,320	1,800		1,800	1,770		1,770	250		250	10,140
Nagpur	4,220		4,220				3,330		3,330	1,000		2,320	9,870
Amreli	1,600	1,050	2,650				6,760		6,760		400	400	9,810
Prakasam							8,000		8,000	1,400		1,400	9,400
Jharsuguda	5,095		5,095				3,980		3,980				9,075
Jamnagar	1,200		1,200				5,160		5,643			1,320	8,163
Chandrapur	2,770		2,770	1,200		1,200	3,830		3,830				7,800
Khandwa	1,200		1,200				5,240		5,240			1,320	7,760
Sonbhadra	3,200		3,200				4,438		4,438				7,638
Korba	4,050		4,050				3,520		3,520				7,570
Jhajjar	2,820		2,820				1,320	3,423	4,743				7,563
Sundargarh							7,200		7,200				7,200
Latehar	3,160		3,160	2,000		2,000	1,860		1,860				7,020
Srikakulam	3,840		3,840				2,640		2,640				6,480
Anuppur	1,200		1,200				5,160		5,160				6,360
Bokaro	500		500			-	720		720			5,050	6,270
Grand Total (MW)			109,375			11,360			213,011			50,675	384,421

Source: MoEF

Ownership

While the state and central sectors have a large share in existing TPPs (45% and 37% respectively, or a total of 82%) [15] , private sector participation has increased significantly (67%) in the TPPs with Environmental Clearance Granted stage, as Table 1 shows. If one looks at all the projects in the pipeline, the proportion of the private sector is even higher, at 73%. Also, only 10 private corporate groups are planning to build about 160,000 MW, and further consolidation is expected. The publicly owned National Thermal Power Corporation (NTPC) is proposing to add about 60,000 MW. Figure 6 shows the ownership of the proposed projects for some major companies.

POLLUTION

Plants in Critically Polluted Areas

In 2009, the MoEF undertook an assessment of selected industrial clusters to identify the level of pollution in these clusters. This was done using a composite index measuring land, water and air pollution called the Comprehensive Environmental Pollution Index or CEPI [16]. When the CEPI was above 70, the cluster was considered 'critically polluted'. An important facet of the proposed thermal power plants is that many of them are located either within such Critically Polluted Industrial Clusters or in the vicinity of such clusters, in the same districts. This is likely to aggravate the situation in these areas. Table 3 shows the districts that contain Critically Polluted Areas, and the proposed thermal power plant capacity in the district.

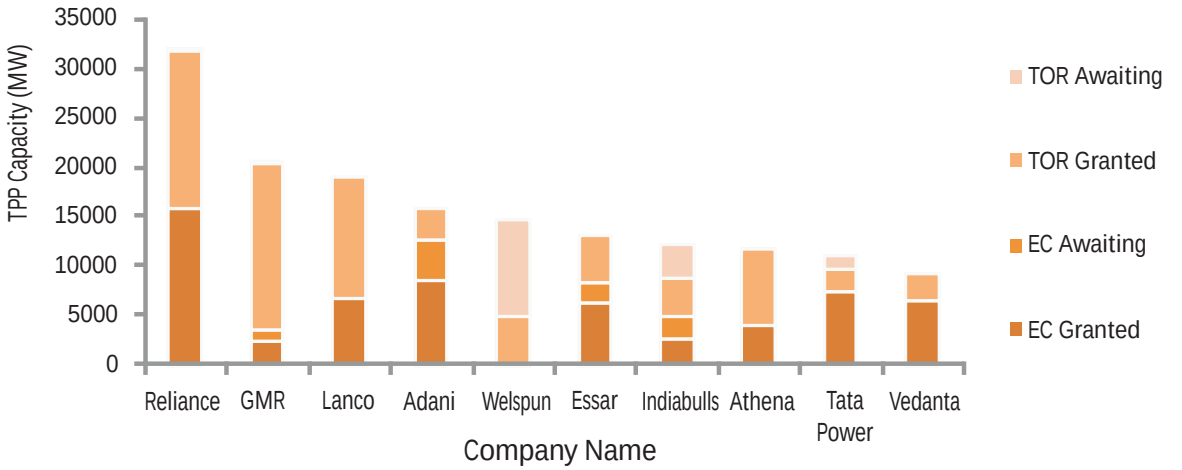

Figure 6: Planned Thermal Power Capacity Addition at Different Stages in the EC Cycle by Major Companies as of 12 May 2011
Source: MoEF

15 CEA (2011): Generation Installed Capacity (MW) of Power Utilities in States/UTs as on 30.04.11, Central Electricity Authority, Government of India, New Delhi. Available at http://www.cea.nic.in/reports/monthly/executive_rep/apr11/9-10.pdf Accessed 23 May 2011

16 CPCB (2009): Comprehensive Environmental Assessment of Industrial Clusters: Ecological Impact Assessment Series: EIAS/5/2009-10, Central Pollution Control Board, Ministry of Environment and Forests, Government of India, New Delhi. Available at
http://moef.nic.in/downloads/public-information/Industrial%20Clusters_env_assessment.pdf
Downloaded 11 April 2011

Table 3: Thermal Power Plants Coming Up in Critically Polluted Areas

Critically Polluted Area	Proposed Capacity Addition in MW in the District
Angul, Orissa	17,840
Bharuch, Gujarat	15,760
Singrauli, M.P.	15,240
Cuddalore, Tamil Nadu	10,140
Jharsuguda, Orissa	9,075
Chandrapur, Maharashtra	7,800
Korba, Chhatisgadh	7,570
Visakhapatnam, A.P.	4,690

Source: For Critically Polluted Areas, CPCB - See Footnote 16. For Capacity Addition - MoEF

Sulphur dioxide (SO_2)

One of the major pollutants from coal-based power plants is SO_2. Flue Gas Desulphurisation (FGD) is used to capture and remove the SO_2. However, FGD is not mandatory for coal-based power plants in India. FGD / other sulphur removal equipment has been made mandatory only for 8 plants of a total of 5448 MW capacity, or just 3.2% of the total coal-based capacity that has been granted environmental clearance (refer Table 4). In case of many others, only a space provision for FGD is mandated, in case FGD is to be installed in the future. It may be mentioned that since the installation of FGD and other sulphur removal equipment is costly, project promoters would install it only if it is mandatory.

There does not seem to be any clear criteria for mandating sulphur removal equipment. One would expect that either large plants, or plants using coal with high sulphur content, or plants which are concentrated in a small area, would be mandated to install such equipment. However, a look at these 8 plants shows that 3 (totalling 4,120 MW) are Gigawatt scale (>1000 MW), having sulphur content in coal measuring 0.6% to 0.8%, while other 5 TPPs (totalling 1,328 MW) are having sulphur content in coal measuring 0.4% to 1.3%.

On the other hand, several large sized TPPs which have been granted environmental clearance will use coal with higher sulphur content, however, FGD has not been mandated for them. They have only been asked to provide space for FGD if it is needed in the future. These large TPPs include:

i. 1000 MW lignite-based TPP at Barmer (JSW) is using lignite with 2% sulphur content
ii. 4000 MW Tunda TPP (Mundra UMPP of Tatas) is using coal with 1% sulphur content
iii. 4000 MW Nellore TPP (Krishnapatanam UMPP of Reliance) is using coal with 0.8% sulphur content
iv. 4000 MW Tilaiya TPP (Tilaiya UMPP of Reliance) is using coal with 0.5% sulphur content

We have seen earlier that there are several places in which many coal-based plants are concentrated. In these places, even if the SO_2 emissions from individual plants are small, cumulative emissions could end up being high. This underscores the need to undertake a cumulative and regional impact assessment before clearing individual plants in such areas.

Ash Disposal

Disposal of ash from coal plants has been a major problem in the past, and will only aggravate with increasing capacity. This is especially so for those plants using Indian coal which is high in ash content. For years, ash has been disposed off either in ash ponds in the form of slurry, or in ash dumps in the dry form. This has serious impacts in terms of pollution of underground and surface local water sources, and ash dispersal due to wind leading to the depositing of ash dust on houses, fields,

Table 4: List of Plants Mandated with Sulphur Removal Equipment

Sr. No.	Project Name	Plant Capacity (MW)	State	District	Max. Sulphur Content in Coal (%)	Method of Sulphur Removal
1	2x800 MW Koradi TPS expansion	1600	Maharashtra	Nagpur	0.8	FGD with one unit of 660 MW will be installed, and remaining units would depend on ambient SO2 concentration
2	Enhancement of Project Capacity from 1050 MW to 2x600 MW TPP at Padubidri	1200	Karnataka	North Kannada	0.8	FGD - Wet limestone type unit with 85% SO2 removal efficiency
3	2x660 MW TPP	1320	Tamil Nadu	Nagapattinam	0.6	FGD
4	540 MW Coal Fired TPP at Tamminapatnam and Mommidi	540	Andhra Pradesh	Nellore	1.3	Circulating Fluidised Bed Combustion (CFBC) technology with lime injection having SO2 removal efficiency up to 95%
5	540 MW Coal-based TPP in Nellore	540	Andhra Pradesh	Nellore	1.3	CFBC technology with lime injection having SO2 removal efficiency up to 95%
6	2x60 MW Coal-based TPP at Choudhar	120	Orissa	Cuttack	0.4	CFBC boiler with lime injection with efficiency of sulphur removal up to 90%
7	2x60 MW Power Plant at Ghugus	120	Maharashtra	Chandrapur	N.A.	CFBC boiler with lime injection having efficiency of sulphur removal up to 90%
8	1x8 MW Captive Power Plant at Patapura	8	Rajasthan	Dungarpur	N.A.	Atmospheric Fluidised Bed Combustion (AFBC) boilers with lime injection having SO2 removal efficiency of at least 85%

Source: MoEF

equipment, and even people. One of the severe risks to local populations is the possibility of a breach of the ash dyke, and the subsequent inundation of large areas with ash slurry. Such breaches have taken place at several places with very serious impacts on local populations.

Even if the disposal of ash in ponds and dumps is managed properly to avoid these impacts – somewhat difficult to visualise given the Indian experience so far, major implications for local communities will remain. This is because such disposal needs a huge amount of water and vast areas of land. Some newer plants are being asked to use the High Concentration Slurry Disposal method for ash disposal. While this is supposed to use less water, we have not been able to obtain figures for water savings with the use of this technology, and other trade-offs involved.

The main policy regarding ash disposal involves reusing the ash by mixing it with cement for construction, land filling, making bricks and paving, etc. The initial steps included mandating all cement and brick making industries within a certain distance from coal plants to use fly ash in certain proportions. Later, this policy was extended to construction activity in the vicinity of coal plants. In 1999, the MoEF issued a notification[17] that required all plants to achieve 100% utilisation of ash produced within 15 years of the notification. This notification has been subsequently amended from time to time. The latest position, as per the amendment [18] of 3 November 2009, is that all coal and lignite-based thermal power plants commissioned after the notification date must achieve 100% utilisation of ash in 4 years from the date of commissioning, while those commissioned before the notification will have 5 years from the date of publication of the amendment to do so. However, some TPPs seem to have been mandated with stiffer conditions. For example, 3 plants of a total of 4240 MW which were given the environmental clearance in 2010 have been asked to achieve 100% ash utilisation from the date of commissioning itself.

As mentioned above, the policy of reuse of ash has been in place since 1999, but utilisation had been largely lagging. In recent years, it has picked up, but even so, it has reached only 42%, and areas with coal plants continue to suffer from the impacts of ash disposal [19]. Given the massive expansion in coal-based generation that is on the anvil, the volume of ash produced is likely to rise sharply. This raises the important question of whether there is enough capacity and preparedness in the cement and construction sector to ensure the full utilisation of this ash.

The issue is more critical in areas where the TPP concentration is high. It demands that both disposal and ultimate reuse must be rigourously monitored.

17 http://www.moef.nic.in/legis/hsm/so763%28e%29.pdf Accessed 1 July 2011

18 http://moef.nic.in/downloads/public-information/2804.pdf Accessed 1 July 2011

19 According to the Technical EIA Guidance Manual for Thermal Power Plants prepared by IL&FS for the MoEF in September 2009 (http://moef.nic.in/Manuals/Thermal%20Power.pdf Accessed 17 June 2011) , total fly ash utilised in the country was 55.01 million tons in 2006-07 (Pages 4-47). The amount of ash generated is not mentioned in this document, but a Department of Science and Technology document (http://www.dst.gov.in/whats_new/what_new08/fly-ash.pdf) places this amount at 130 million tons, yielding an utilisation of 42%.

Mercury

A significant pollutant, mercury has been a subject for growing concern in recent years. According to the Technical EIA Guidance Manual for Thermal Power Plants prepared by Infrastructure Leasing and Financial Services Limited (IL&FS) for the MoEF in September 2009 [20]:

"A growing concern in India is the release of various toxic trace elements such as mercury (Hg), arsenic (As), lead (Pb), cadmium (Cd), etc., from power plants through the disposal and dispersal of coal ash. Among the various toxic elements mercury emissions from coal based TPP are of particular concern, mercury emitted in flue gases or in flyash/bottom ash that is disposed off in ash ponds enters the hydrological system, wherein the mercury can be methylated. Then this methyl-mercury can then enter the human food chain, mainly through consumption of fish (Shah et al., 2008). Thus this food chain exposure pathway to mercury at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages.

"Mercury can be emitted in three different forms: elemental (Hg0), oxidized (Hg2+) and particle bound (HgP). Upon combustion, coal flyash tends to have a higher concentration of mercury, and estimates indicate that Indian coal ash has an average mercury concentration of 0.53 mg/kg, based on measurements from a few selected power plants.

"Besides Indian coal is very high in mercury contents ... The levels in Indian coal are high in comparison to other countries...

"Currently, there is no NAAQS [21] for mercury, although there are consent conditions necessitating monitoring of ambient and emission Hg for Greenfield TPP. Although there are no limits set at this stage for mercury emissions from power plants, there are some general guidelines available for mercury in power plant effluents."

Thus, while mercury emissions from plants are likely to have serious implications, there are neither standards nor limits set for power plants. This will be of particular concern where there are clusters of many power plants in a small area. Clearly, modelling mercury emissions in areas with a high concentration of TPPs, and mandating mercury control measures where appropriate is called for.

In February 2009, the Governing Council of the United Nations Environment Program (UNEP) agreed on the need to develop a global, legally binding instrument on mercury [22]. India is a party to these negotiations. However, the negotiations on this front are planned to be completed only by 2013. Therefore, the Government should not wait for this instrument to come into force to take up measures to control the impacts of mercury emissions.

Meanwhile, the UNEP Governing Council 25/5 has specified that the UNEP Global Mercury Partnership will be one of the main mechanisms for the delivery of immediate actions on mercury during the negotiation of the global mercury convention. The overall goal of the UNEP Global Mercury Partnership is to protect human health and the global environment from the release of mercury and its compounds. However, India is not a Partner in this initiative[23] .

20 http://moef.nic.in/Manuals/Thermal%20Power.pdf Annexure I, Page i Accessed 17 June 2011

21 The full form is not mentioned, though given the context this should stand for National Ambient Air Quality Standard.

22 http://www.unep.org/hazardoussubstances/MercuryNot/MercuryNegotiations/tabid/3320/language/en-US/Default.aspx

23 http://www.unep.org/hazardoussubstances/Mercury/GlobalMercuryPartnership/tabid/1253/language/en-US/Default.aspx

Moreover, India's approach towards the negotiations for the globally binding instrument is not cause for optimism. India's submission to the 3rd Meeting of the Intergovernmental Negotiating Committee scheduled from 31 October to 4 November 2011 states the following [24] :

"It is not feasible to adopt mandatory targets and rigid timelines. In India, thermal power sector is large and any change in technology or new measures will involve substantial financial implications. ... We are constantly trying to reduce our emissions intensity through technology up-gradation. However, the technologies currently available for reducing mercury emissions, are not cost effective and are not suited to our national circumstances. It would be difficult to retrofit the existing coal based thermal plants due to financial constraints. Further, the principle of common but differentiated responsibilities, including with natural resource endowments, energy infrastructure, population size and other issues need to be taken into consideration. India, therefore, is of the view that there should be a voluntary 'Reduction' of atmospheric emissions of mercury under conducive conditions and not the 'Elimination' of atmospheric emissions of mercury."

While India is justified in calling for the principle of common but differentiated responsibility at the international level, its stand that technologies currently available for reducing mercury emissions are not cost effective, and not suitable for our national circumstances, is a cause for concern as it can become an alibi to ignore the problem at the cost of severe domestic impacts.

RESOURCE IMPACTS

Coal Requirements

Close to 85% of the projects in pipeline are coal based. While coal resources of the country are said to be abundant, such a massive expansion raises questions about the adequacy of the fuel supply for these TPPs. Coal requirements for individual plants are not available for all the proposed TPPs, but we can use a thumb rule to estimate the level of coal resources that may be needed. Based on the data in the MoEF lists, we estimate that around 416,000 MW of capacity based on Indian coal is in the pipeline. Another 144,000 MW capacity is to be based on imported coal. Assuming a coal requirement of 4,800 tons of coal per MW per year for plants based on Indian coal, we estimate that close to 2000 million tons (2 billion tons) of coal will be needed every year for these plants. Another 440 million tons will have to be imported. This is in addition to coal being used for existing coal power plants.

Despite our plentiful coal reserves, the forecasts for actually achieving the required domestic production and being able to use these reserves to meet domestic demands are pessimistic. As noted by the Mid Term Appraisal (MTA) of the 11th Plan, coal production in the country is falling short of projections, and there is a need to import a larger quantity of coal than that planned for [25]. The MTA has revised the estimate for annual coal production from 680 million tons to 629.91 million tons, increasing the need for imports from 51 to 83.33 million tons [26]. Moreover, the MTA projects that the gap between demand and supply, and hence the

24 "India's views regarding the elements of a comprehensive and suitable approach to a Legally Binding Instrument on Mercury", dated 19 March 2011. Available at http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/INC3/India.pdf Accessed 17 August 2011.

25 Planning Commission (2011): Mid Term Appraisal for Eleventh Five Year Plan 2007-2012, Oxford University Press, New Delhi, Para 1.77, Page 14. Available at http://planningcommission.gov.in/plans/mta/11th_mta/MTA.html or http://planningcommission.gov.in/plans/mta/11th_mta/chapterwise/Comp_mta11th.pdf Accessed 18 Aug 2011

26 ibid, Table 15.1, Page 305

import dependence, is likely to be much larger by the end of the 12th Five Year Plan, necessitating imports to the tune of 230 million tons. Thus, there is little scope for optimism about the possibility of meeting domestic needs to the tune of 2 billion tons per annum.

There are also several indications [27] that the allocation of domestic coal to various proposed thermal power plants is spreading this resource thin. That is, large number of plants are not getting enough coal for their full requirement. Apart from creating uncertainty for individual plants, this means that the resource is not being allocated optimally.

Water Requirements

Coal-based power plants need massive amounts of water, both, for cooling and ash disposal. In case of coastal power plants, the water requirement is normally met from the sea, but for inland TPPs, water is a far more critical issue.

Out of the 192,804 MW that have got the environmental clearance, about 138,000 MW or 72% are inland. Of these, close to 50% are concentrated in four river basins, namely, Ganga (33,255 MW), Godavari (16,235 MW), Mahanadi (14,595 MW) and Brahmani (6534 MW).

While some of the these basins like Mahanadi are considered water surplus [28] , if the needs of agriculture, local communities like small farmers, riverine settlements, fisherpeople, and the environment are considered, most river basins in India including the Mahanadi would be stretched to meet these multiple demands. In such a situation, water withdrawals by thermal plants, especially a large number of plants in a basin / sub-basin, have the potential to lead to intense conflicts. For example, in 2007, more than 30,000 farmers gathered at the Hirakud reservoir (on the Mahanadi river), forming a human chain in protest against the allocation of water to industries when they were not getting water for irrigation. Now a large number of TPPs are being proposed in this very basin.

In April 2010, Mahagenco, the state power generating company of Maharashtra, had to shut down several units of the 2340 MW super thermal power station in Chandrapur district, due to a lack of water. Deficient rainfall had led to a severe water shortage, and the water in the Irai dam (the source of water for the plant) had to be reserved for drinking water purposes, resulting in a loss of generation of 1900 MW [29] . Now close to 8,000 MW of coal-based TPPs are in the pipeline in this very district, including an expansion by the 1000 MW capacity of the Mahagenco plant, which will also source water from the same Irai dam.
The figures for water required by individual projects

27 For example, the Model Fuel Supply Agreement between a Coal India Subsidiary and the private power utility, put up by the Ministry of Coal on its website, specifically states that if the subsidiary cannot provide the scheduled quantity of coal, it can supply the balance quantity from alternative sources including imported coal, and the purchaser shall bear the extra cost. (See Para 4.3 of the FSA, available at http://www.coalindia.in/Documents/NCDP/Model%20FSA%20for%20new%20pwrgenutilthru%20LOA%2011082008.pdf). It is also interesting that the subsidiary is not liable to pay any compensation for short supply of coal as long as it is able to supply 50% of its Annual Contracted Quantity.

28 For example, the National Water Development Agency, which is developing the Interlinking of Rivers Project involving 30 links for transferring water from 'surplus' basins to 'deficit' ones, considers the Mahanadi as a surplus basin. See http://nwda.gov.in/index2.asp?slid=3&sublinkid=3&langid=1

29 The order of the Maharashtra Electricity Regulatory Commission in Case No. 23 of 2010, dated 30 May 2011. Page 4. Available at www.mercindia.org.in/pdf/Order%2058%2042/Order23of2010.pdf Downloaded 7 July 2011.

are not given for all plants in the MoEF data. However, using a thumb rule from the Central Electricity Authority (CEA) that consumptive use by coal-based TPPs is about 3.92 million cubic metres per 100 MW per year [30] , and that there are 117,500 MW of inland coal-based power plants with Environmental Clearance Granted, we arrive at a total consumptive water use of about 4608 million cubic meters. This water can irrigate about 920,000 ha of land in a year, or provide drinking water to about 84 million people or 7% of India's population every day for a year [31] . Note that this is the requirement only for the EC Granted plants, and the water needed will be significantly higher once projects in rest of the pipeline are also considered. Moreover, in the case of water, only the amount of water required does not convey the true picture of possible problems. For one, water is an intensely local need, so the local impacts matter a lot. A river basin may have enough water at the basin level, but may be overstressed in the area where the TPP is located. Equally important, the availability of water varies through the year, and it may be particularly difficult to provide water to TPPs in some parts of the year like the summer. The Chandrapur example illustrates this well.

Given this, and the huge quantity of water that the TPPs will need, a number of potential water conflict situations appear to be in the making. This signals the need for comprehensive river basin level planning to determine how much water from the basin can be used for thermal power generation without adversely affecting other functions. River basin planning is a participatory process that takes into consideration all possible uses and functions of water to evolve a plan for a balanced development of the basin.

IMPLICATIONS

Clearly, the TPPs in pipeline represent a massive over-capacity in the making. What are the implications of this?

First of all, this is a clear signal that the capacity addition proposed in the thermal sector is effectively disconnected from the needs and objectives of the power sector and any sort of planning. Apart from the obvious issues of excess capacity, it is impossible to optimise transmission planning or even match demand-supply locations with such a flawed process of capacity addition.

Ever since the licensing requirement for thermal power projects was done away with, it has been assumed that the setting up and operation of TPPs will be governed by market forces, which are said to be a more efficient way to plan and allocate scarce resources. Thus, one could assume that the market would weed out inefficient and unnecessary capacities. Excess capacity will imply less demand, and hence an absence of market off-take. This will lead banks and other lenders to refrain from lending to these projects. Thus, several projects may not achieve financial closure, and will not take off. Other projects may fall aside due to a lack of demand.

However, this reasoning ignores the fact that the thermal power sector is not governed only by the market. In particular, key inputs like coal, gas, land and water are all allotted on the basis of non-market and often discretionary and non-transparent criteria, mostly with huge concessions and subsidies[32]. These inputs involve critical common property resources like rivers, lakes, forests,

30 NCIWRD (1999): The Integrated Water Resource Development Plan, National Commission for Integrated Water Resource Development, Ministry of Water Resources, Government of India, New Delhi, Page 63

31 Assuming an irrigation delta of 50 cm, or a drinking water requirement of 150 litres per capita per day

agricultural land, gas, and minerals like coal, and have significant externalities in the form of displacement of communities, ecological disruption, and destruction of bio-diversity. Thus, because they involve the allocation of these resources, decisions to establish thermal power plants come at huge costs to the nation, both in terms of direct financial, social and environmental costs, and indirect opportunity costs.

As the TPPs exceed the requirement by far, one implication is that we are allocating valuable and scarce natural resources of land, water, gas and coal to projects that are not required. Further, even if market processes reject the inefficient and excess plants and thus strike a balance between the demand and supply, this process will be littered with many incomplete projects which would have displaced people, impacted the environment and locked up huge amounts of financial resources, creating stranded assets of plant and transmission facilities. In a market system, the cost of such a weeding out is shouldered by the promoters of the project; however, in case of the TPPs, large parts of the costs will be borne by the common people, the country and the environment. In fact, some of these stranded assets will be used as arguments for further (and likely sub-optimal) allocation of resources.

Crucially, the land for such TPPs is invariably acquired compulsorily from the people by governments by using the Land Acquisition Act (LAA). The essence of the LAA is that governments can acquire lands forcibly if they are needed for any public purpose. Given that the thermal capacity in pipeline is far in excess of that required, it is clear that many of these plants will not serve a "public purpose". Hence, the use of the LAA to acquire land for such TPPs would not be justified. Similar logic would apply to the water, coal and gas allocations also, which are made and justified under the assumption that these plants are needed for the public good.

As each of the TPPs stakes claim to water supply, land and fuel linkages [33], the excessive number of TPPs raises the apprehension that some projects may be a means of grabbing resources. They may be intended to capture rights to land, water and coal under the guise of setting up power plants. Subsequently, they could reap the benefits of the true value of the resources obtained virtually at a pittance by diverting these resources to other uses or for speculative activities.

Thus, if a coal plant with land already allocated is not able to achieve financial closure, it may never see the light of the day, but the promoters could make windfall profits from the land they have already secured. Some of the plants may even be promoted primarily to obtain such benefits.

This highlights another implication of the massive expansion of TPPs in the pipeline – that key governance processes are missing or not working.

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32 There is some thinking in the Government after the report of the Ashok Chawla Committee to allocate some of these resources like coal through a market based route. We will need to wait till this is actually done, and the precise mechanisms put in place, to assess what this implies for TPPs. This will also have implications for tariffs and the supply of electricity for the weaker sections. However, as of today, these resources are being allocated on a non-market basis.

33 Fuel linkages involve the assured allocation of coal from specifically designated coal mines to individual power plants. Allocating mines to specific power plants for their captive use is another means of providing assured coal to the thermal power plants. In the former, the mines remain with the Subsidiary of Coal India, whereas in the latter case, the mine is operated by the power plant owner.

Given these considerations, it would be a mistake to let the market play the arbitrator, hoping it would weed out inefficient and excess capacity. Instead, it woud be important to step in with purposive and deliberately directed interventions, with clear criteria of maximising inclusive growth, minimising social and environmental impacts, checking regional concentrations, making optimal use of water resources and so on. In other words, instead of letting the market do the weeding out, with its attended heavy costs, the state should step in and use this opportunity to eliminate the plants that cause the most social, environmental, or financial harm, or those that serve the least social purpose.

Another reason for such an intervention is the sheer scale of the in-pipeline capacity which makes issues like pollution, ash disposal, and the water requirement extremely significant. There are also other issues including displacement and land acquisition that have not been touched upon in this report. Moreover, the concentration of TPPs in some locations makes these issues even more severe in regions that will bear the cumulative impacts of many plants. Unfortunately, current impact assessment frameworks and environmental clearance processes do not take into consideration any cumulative impact. Assessments are limited to the impacts of individual projects, and leave much to be desired [34] . There is an urgent need to not only strengthen the impact assessments for individual projects, but also undertake regional impact and carrying capacity assessments beforehand. Clearance to individual projects should be given only in the light of the recommendations of these studies, and the scale should be tempered on the basis of cumulative impact assessments.

THE WAY FORWARD

The data presented above clearly demonstrate that the thermal power capacity which has already received environmental clearances or is in the clearance pipeline is far in excess of what is needed in the coming two decades. Due to this excess capacity, critical resources like fuel, land, water and finances are being spread thin. Apart from this sub-optimal use of scarce resources, the excess capacity is likely to exacerbate the already severe social and environmental impacts of the power sector. Hence, there is an urgent need to fundamentally review our approach to the development of power projects. Going forward, we recommend the following measures:

1. There should be an immediate moratorium on any further grant of environmental clearances to TPPs. This includes, in particular, the 500,000 MW capacity that is Awaiting EC, Granted TOR or Awaiting TOR.
2. Among the projects that have already been granted Environmental Clearance (i.e. about 200,000 MW), the projects with very high social and environmental impacts, projects that do not have broad local acceptance, and projects leading to a sub-optimal use of transmission, fuel, land and water should be put on hold.
3. Simultaneously, in the next two years we should undertake a fully transparent, deliberative process
   a. to completely revamp the environmental clearance procedures of power plants, so as

34 While the process of environmental clearance and the quality of EIAs in particular has been heavily criticised by civil society, even Shri Jairam Ramesh, then Minister for Environment and Forests, had himself admitted to the poor quality of EIAs. He is reported to have said, at Hyderabad on 19 March 2011: "Frankly speaking, environmental impact assessment reports prepared for projects are bit of a joke. Under the system we have today, the person who is putting up the project prepares the report. Even reputed government institutions do cut and paste jobs." (Reported in Headlines India, amongst others. See http://headlinesindia.mapsofindia.com/environment-news/global-warming/environmental-impact-assessment-is-a-joke-jairam-ramesh-78425.html)

to minimize social and environmental impacts of power projects. In particular, this process should aim to mandate / establish the use of prior regional carrying capacity and cumulative impact assessments to regulate the extent to which such TPPs can be set up in specific areas,

b. to ensure a coordinated approach of different agencies for optimising fuel, land and water allocations for different projects,

c. to re-assess long term demand for power and measures to meet this demand in most optimal manner including energy efficiency and renewable energy in order to improve energy security, and minimize social and environmental damage due to power sector development.

Considering the capacity that has already been granted environmental clearance and/or is under construction, such a moratorium and review can easily be carried out without jeopardising the power needs of the country in the next decade.

The implementation of these suggestions will significantly address the urgent need from both, the power planning perspective and from the social and environmental perspective, to restore balance, systems and basic good governance processes and principles in the development of thermal power in the country.

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1.Analysis of international policies in solar electricity sector-Prayas LBNL, July 2011

2.Rajiv Gandhi Rural Electrification Programme: Urgent Need for Mid-course Correction, July 2011

3.Transition from MOU to Competitive Bidding: Good take-off but Turbulence ahead. Review of thermal capacity addition through competitive bidding in India.

4.Need to realign India's national solar mission, Economic & Political Weekly, 20/03/2010

5.An overview of Indian Energy Trends: Low Carbon Growth and Development Challenges, Prayas,2009

6.Review of the Distribution Franchisee model implemented by MSEDCL in the Bhiwandi circle, Prayas, 2009

7.Proceedings of the National Conference on 'Regulation and Electricity Service to the Poor', Prayas,2009

8.Shortcomings in Governance of the Natural Gas Sector, Economic & Political Weekly, 25/07/2009

9.Balancing Regulation And Incentives to Enhance Energy Access to The Poor and Women In Privatising Energy Markets, Energia, 2009

10.Climate Change: Separating the Wheat from the Chaff, Economic & Political Weekly, 31/01/2009

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12.Electricity Governance Initiative a) The Electricity Governance Toolkit : Benchmarking Best Practice and Promoting Accountability in the Electricity Sector, 2007 b) Empowering People: A Governance Analysis of Electricity, India, Indonesia, Philippines, Thailand 2007

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15.A Critical Review of the Performance of Delhi's Privatized Distribution Companies and the Regulatory Process – Prayas Occasional Report – 1/2006, 2006

16.Restarting Dabhol: Who Will Bear the Cost? And Why?, Economic & Political Weekly, 28/06/2005

17.Quality of Service of Distribution Utilities – Need for End to End Commitment : Prayas Occasional Report – 1/2005, 2005

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THERMAL POWER PLANTS ON THE ANVIL

Implications and Need for Rationalisation

The Nandira Nallah in Angul in Orissa polluted with ash from a nearby ash pond

A massive expansion in thermal power generation in India is on the anvil. Environmental clearances have already been granted to about 200,000 MW of thermal power projects and capacity totaling to another 500,000 MW is in various stages of securing environmental clearance. This report highlights, apart from the sheer scale of the capacity addition, the geographic concentration of the proposed plants, their predominantly private sector ownership, the severe environmental consequences and the implications for resources like coal and water.

The report discusses the implications of the over-capacity in the making, the problems of a market driven sector and emphasises the need for a course correction. This course correction is required from both, the power planning perspective and from the social and environmental perspective, to restore balance and basic good governance processes in the development of thermal power in the country. It also proposes some key actions to meet these aims.

The report will be of interest to anyone who is concerned about the future of India's power sector and its implications for our society.

The ash dump of a coal plant in Orissa. Note the location of the dump on the banks of a water body

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