

The State of our Power Plants



Centre for Science and Environment

Green Rating of coal-based thermal power sector

Centre for Science and Environment's (CSE) Green Rating Project (GRP) released its analysis and rating of India's coal-based thermal power plants. 47 plants, covering half of the sector and spread over 16 states, were selected for rating. The ratings and the study report – *Heat on Power* – were released by eminent scientist M S Swaminathan in the presence of Ashok Lavasa, Secretary, Union ministry of environment, forests and climate change (MoEF&CC) and Arvind Subramanian, chief economic advisor, Government of India.

The Green Ratings Project (GRP) started in 1997, and has so far rated five major industrial sectors of India – pulp and paper, iron and steel, chlor-alkali, cement and automobiles. The coal-based power sector is the sixth it has rated. Key findings of the study are as follows:

- The sector scores poorly on all parameters getting a mere 23 per cent score compared to 80 per cent that a plant following all best practices can get; 40 per cent of the plants rated received less than 20 per cent score. The top performers were West Bengal-based CESC-Budge Budge, followed by JSEWL-Toranagallu (Karnataka), Tata-Trombay (Maharashtra) and JSW-Ratnagiri (Maharashtra). They scored between 45-50 per cent. In addition, Tata-Mundra (Gujarat) received an award for having the highest energy efficiency, while Gujarat Industries Power Company Ltd (GIPCL), Surat, won an award for lowest water use.
- Inefficient resources use and technological backwardness leading to high levels of pollution– says the rating report card. There is immense scope for improvement, CSE study has found.
- Plants operating at 60-70 per cent capacity only. If capacity utilisation is improved, the sector can meet additional power requirement without building new plants.
- The average efficiency of the plants in the study was 32.8 per cent, one of the lowest among major coal-based power producing countries. Average CO₂ emission was 1.08 kg/kWh, 14 per cent higher than China's.
- India's thermal power plants are estimated to withdraw around 22 billion cubic metre of water, which is over half of India's domestic water need. Even the plants with cooling towers use an average of 4 m³/MWh; the average water consumption in Chinese plants is 2.5 m³/MWh.
- Fifty-five per cent of the units were violating air pollution standards which are already extremely lax – particulate matter (PM) norms are at 150-350 mg/Nm³ (milligram per normal metre cube) compared to Chinese norms of 30 mg/Nm³.
- Fly ash disposal remains a major problem. Thirty-six of the 47 plants were unable to meet the MoEF&CC's mandated target of utilising 90 per cent of the solid waste (ash) generated – average use was only 54 per cent. Presently, only about 50-60 per cent of the 170 million odd tonne of fly ash generated by the sector is "utilised"; the remaining is dumped into poorly designed and maintained ash ponds. Currently, about a billion tonne of these toxic ashes lie dumped in these ponds, polluting land, air and water. By 2021-22, the sector will produce 300 million tonne of fly ash every year.
- Ash slurry, which has toxic heavy metals, was found in river and reservoirs of 20 plants. Tests done CSE lab found that nearly 40 per cent of the plants did not meet the basic total suspended solid (TSS) norms for effluents

discharged by them. 60 percent plants had not installed effluent and sewage treatment plants.

- The performance of the NTPC Ltd., the largest coal-power producing company in India, was found to be below par. NTPC did not disclose its data, and hence was rated based on a primary survey and publicly available information. The six plants of NTPC that were rated received scores of 16-28 per cent. The poorest of the lot was Delhi's Badarpur plant.

How rating was done

Industries assessed under the GRP project are awarded leaves for their performance – the highest being five leaves and the lowest being none. In the current rating, only four plants scored between 40 and 60 per cent and received the Three Leaves award.

The project selected a diverse group of plants from all regions, of various vintages, sizes and technologies and owned by all major companies, including state and central ones, to ensure as wide a representation as possible. GRP is a participatory process -- companies voluntarily disclose data and permit the GRP team to independently scrutinise the plants and their records.

The plants were rated on around 60 parameters covering everything from coal and water use and plant efficiency to air and water pollution and ash management. Local community views and impacts on them were given due weightage along with the plants' compliance record and environment policies. The ratings involve comparing the performance of the plants against the best practices.

What is the way ahead?

- National norms for PM are very weak and need to be brought in line with global standards.
- National norms for SO₂, NO_x and mercury are absent and need to be established with short breathing room to install new abatement technologies.
- Monitoring by regulators should be strengthened – they should be given more powers (including imposing stiff penalties) to enforce compliance.
- Ash policy should support higher usage of ash. Utilisation targets for individual plants should keep in mind scope for utilisation.
- Coal washing capacity needs to be doubled to meet increased use.
- Regulations/incentives to ensure improvement in capacity utilisation.
- Approvals for new capacities should be only for supercritical/ultra supercritical plants.
- Old, inefficient plants should be closed at an aggressive pace.
- Efficiency improvement schemes like Perform, Achieve and Trade (PAT) should be strengthened with ambitious targets and more thorough analysis of plants' performance.
- The dispatch order (i.e. the sequence in which plants are asked to supply power) should ensure polluting plants are not called first because they are the cheaper.
- Clearances given to new capacities should be based on best achievable water consumption practices and levels.
- Water tariffs should increase to curb excessive use.

State-wise performance

CHHATTISGARH

Chhattisgarh state has the one of the highest power generating capacity in the country at around 9GW. A capacity addition of 30 GW capacity is in the pipeline. The Green Rating Project (GRP) assessed the following four plants in Chhattisgarh, capturing more than 60 per cent of the current capacity in the state:

1. O.P. Jindal Power plant, Tamnar (JPL, Tamnar)
2. Chhattisgarh State Power Generation Company Ltd- Korba- East (CSPGCL-Hasdeo)
3. NTPC- Sipat Super Thermal Power Station (NTPC- Sipat)
4. Lanco- Amarkantak thermal power station (Lanco- Amarkantak)

Only two plants- JPL, Tamnar and CSPGCL- Hasdeo agreed to participate. Despite repeated attempts, NTPC-Sipat and Lanco – Amarkantak were not ready to share the information and allow plant visit.

The power plants were found to be ranked low in the rating.

- Lanco-Amarkantak, CSPGCL-Hasdeo, NTPC- Sipat and JPL-Tamnar scored 22 per cent, 15 per cent, 28 per cent and 39 per cent respectively.
- Out of 4 plants shortlisted, 2 plants -Lanco-Amarkantak and CSPGCL-Hasdeo are in Korba. Despite the fact that Korba is a classified critically polluted area, it has a high concentration of power plants in the state. Having multiple power plants, mostly polluting ones, at the same location has resulted in extremely poor ambient air quality.
- None of the plants has Sulphur dioxide and Nitrogen oxides emission control system.
- None of the plants was found in full compliance to the stipulated norms.
- None of the plants had a cordial relationship with the local community.
- All the plants failed to meet ash utilisation norms of MoEF&CC.

How did the plants perform?

1. JPL- Tamnar

JPL- Tamnar with its 4 units was assessed. Four more units of 600MW capacity each were under construction. The plant is average 5 years old which sources domestic coal from its captive Gare-Palma coal mines and water from River Kelo.

- Since the plant is comparatively new, the operational performance was found satisfactory. The operating availability of was above 95 per cent, and PLF was 95.
- The plant reported stack particulate matter (PM) emissions comply with the CECB norm of 50 mg/ Nm³. However during GRP survey, emissions from stacks were visible which ideally should not be visible at this concentration.
- The plant is a zero liquid discharge (ZLD) plant which is a positive. However, during the GRP survey, stakeholders had raised the issue of wastewater discharge from the plant and the mine during monsoon into Kelo River.
- Out of nearly 20 lakh tonnes of generated ash, only 54 per cent of it was utilised whereas it had to meet 100 per cent ash utilisation norm of

MoEF&CC. During GRP survey, nearby villages raised the issue of ash emissions from the pond, especially in summer. With increasing capacity, the ash generation may further increase significantly and therefore the issue of ash handling, reuse and disposal are important.

- On the social front, complaints about irregularity in public hearing process, starting plant construction without prior environmental clearance and illegal land capturing for colony settlement for mines etc. were noted. The local community indicated irregularity in expansion of the plant for which MoEF&CC had once cancelled the Terms of Reference (TOR). A court case has been filed against the coal washery and the mine. NGT has declared the public hearing procedure as mockery of the law and recommended a fresh public hearing procedure for the project.

2. CSPGCL- Hasdeo

CSPGCL-Hasdeo with its four 210MW capacity units was assessed. The plant is around 28 years old which sources domestic coal from South Eastern Coal mines (SECL) mines and water from River Hasdeo.

- The plant doesn't have a valid "consent to operate".
- The plant claimed stack emission complied to the CECB norm of 150mg/Nm³. However, high levels of stack emission were visible at the time of survey. Emission monitoring practices were also noticed to be incorrect. During night, stack emissions were noticed to be higher.
- An enormous amount of water is sourced by water since it has once-through cooling system (OTC), which typically requires 100-200m³water/MWh compared to the best plant consuming less than 2m³/MWh. The plant couldn't provide actual water balance. Not a single drop of wastewater is recycled in the plant.
- Surprisingly, the plant has no effluent or sewage treatment system (ETP and STP). Therefore, all the wastewater generated is discharged without any treatment into Hasdeo river.
- Out of nearly 19.6lakh tonnes of ash generated by plant annually, only 19 per cent was utilised whereas it was required to meet 100 per cent utilisation norms of MoEF&CC. The local community complains that dust storms from its ash ponds cover entire village, destroys food, agriculture, water storage, etc. and causes breathing problems among residents, especially in summer.
- Although the plant has maintained 88 per cent PLF, its efficiency was below average at 32 per cent.

3. NTPC- Sipat

NTPC- Sipat with its 2980MW (including 3 super-critical 660MW capacity units) was assessed. Two more units of 600MW capacity each were under construction. The plant was originally conceived in 2001 but took a decade for completion. The plant is on an average 3 years old which sources domestic coal from South Eastern Coal mines (SECL) and water from Hasdeo barrage on River Damodar.

- Since the plant is new, environmental issues were found to be limited, pertaining to ash emission and seepage from ash pond and coal dust emission coal-handling area. The community complained that fugitive dust emissions from the ash pond are affecting agriculture. One of the predominant social issues in the plant is compensation for land acquisition. The issue of inadequate CSR and no electricity supply in local areas was complained about by the local people.
- Plants claimed stack SPM emission to be below the CECB norm of 50mg/Nm³. However, Chhattisgarh Environment Conservation Board

(CECB's) reports indicate often non-compliance in some units. During GRP survey, slight stack emission was visible which should not be the case at this lower emission concentration. CECB report also indicates poor ambient air quality in B-type colony.

- Out of nearly 30 lakh tonnes of ash generated by plant, it utilised only 16 per cent whereas it was required to meet 50 per cent utilisation norms of MoEF&CC. The local community complains that the ash pond dries up in summer, causing the ash to get airborne and settle on homes and farms in nearby villages. In addition, the airborne ash is causing respiratory problems among residents. Adding to it, seepage of water from ash pond reportedly causes water-logging in agricultural fields.
- Although the efficiency of the plant is better than the average at 36.5 per cent, PLF was found 68 per cent only where best plants achieve above 100 per cent. The water requirement of the plant is as high as 3.4 m³/MWh compared to the best plants in India consuming less than 2 m³/MWh. It is a ZLD plant.

4. Lanco- Amarkantak

Lanco- Amarkantak with 600 MW capacity (2 x 300 MW units) was assessed. Two more units of 600 MW capacity each were under construction. The plant is new (average only 3 years old) which sources domestic coal from South Eastern Coal mines (SECL) and water from River Hasdeo.

- The plant has been issued closure notices for high stack emission and several directions for higher fugitive dust emissions affecting ambient air quality in the area. Local community complains that people living in the area are suffering from respiratory problems, allergies etc.
- Plant claims itself a zero liquid discharge (ZLD) plant, but CECB has issued notices to the plant for ash and coal mixed wastewater discharge into the nearby drain and water stream. The local community complains that in spite of several warnings in the past few years, the plant continues to discharge water mixed with ash slurry into their fields, adversely affecting crop yields.
- Notices and directions issued by CECB also state that it poorly manages its ash pond area. Local community claims that ash emissions are high, particularly in dry seasons, which results in ash settling on houses, stored water and in the agricultural fields.
- Although the efficiency of the plant is better than the average at 36.7 per cent, its operational performance is not satisfactory. The plant has a very low PLF of 69 per cent whereas best plants achieve above 100 per cent. The water requirement of the plant is as high as 3.9 m³/MWh – double than the best plants in India. Out of nearly 10 lakh tonnes of ash generated by the plant, it utilised merely 0.33 per cent whereas it was required to meet 50 per cent utilisation norms of MoEF&CC.

JHARKHAND

Jharkhand state has around 4.5 GW power generating capacity. The Green Rating Project (GRP) assessed 5 plants, in Jharkhand, capturing around 75 per cent of the current capacity in the state:

1. Jharkhand State Electricity Board, Patratu (JSEB- Patratu)
2. Tenughat Vidyut Nigam Limited, Lalpania (TVNL- Lalpania)
3. Maithon Power Limited (MPL- Maithon)
4. Jojobera Thermal Power Station (Tata- Jojobera)
5. Bokaro Thermal Power Station (DVC- Bokaro)

Only two plants – TVNL, Lalpania and Tata-Jojobera – agreed to participate. Despite repeated attempts, the other 3 plants were not ready to share the information and allow plant visit. The government-owned plants primarily have smaller sized and outdated units which performed very poorly. Private plants were better performers. The worst performer plant of the study, JSEB-Patratu, is also from Jharkhand.

- Tata-Jojobera and MPL- Maithon scored 37% and 22% respectively while other 3 plants- TVNL- Tenughat, DVC-Bokaro and JSEB-Patratu scored 9%, 8% and 6% respectively.
- Except Tata-Jojobera, all the plants use dams for its enormous water need.
- None of the plants have Sulphur dioxide and Nitrogen oxides emission control system.
- None of the plants was found in full compliance to the stipulated norms.
- None of the plants had a cordial relationship with the local community.
- All the plants failed to meet ash utilisation norms of MoEF&CC.
- All the 3 government-owned plants were found highly air and water polluting.

How did the plants perform?

1. JSEB- Patratu

The worst performer with 770MW capacity (4x 40MW + 2x 90 MW+ 2x 105MW+ 2x 110MW) was assessed. The plant is average 30-40 years old which sources domestic coal from Central Coalfields Ltd. (CCL) and water from Patratu dam.

- A sick plant that is able to operate merely 80-120MW capacity and lowest 21% efficiency. PLF was noted merely 8 per cent. Per MW capacity it uses 77acres of land (compared to 1.8acre/MW sector average) and 17.5persons/MW (compared to CEA guideline of 1.1person/MW).
- Water pollution was extreme. Untreated effluent and used oil is directly discharged into the Nalkari River. Ash slurry was also found being discharged from plant and ash pond directly into Nalkari River. The river was found full of ash and used oil patches and in downstream it pollutes Damodar River.
- None of the stacks of the plant has even the port holes, platform and ladder for collection of samples for stack air quality monitoring. No stack monitoring and AAQ is done by JSPCB regional office.
- The water consumption is very high at 9.84m³/MWh compared to the best, below 2m³/MWh. Auxiliary power requirement is more than 15 per cent compared with the sector average of 8 per cent. Out of 1.5-2.5lakh tonnes generated ash, merely 4 per cent was used. It indicates that the ash is mostly being discharged into the river.
- Besides pollution impacts on livelihood, social issues from the plant are all-time high, largely related to irregularity in land acquisition and compensation and lack of CSR initiatives. Contractual labours have been demanding adequate pay for their work.

2. TVNL- Lalpania

TVNL-Lalpania with its 420MW capacity units was assessed. The plant is average 16.5 years old which sources domestic coal from Central Coalfields Ltd. (CCL) and water from Tenughat dam.

- An OTC type plant which requires huge quantity of water, 100-200m³/MWh, compared to the best plant which needs less than 2m³/MWh. The plant doesn't have STP or ETP for effluent and sewage treatment,

therefore untreated wastewater is discharged in the dam. Lab test of ash pond effluent found TSS about 170 times higher than norm.

- Plants failed to meet 100 per cent ash utilisation norm of MoEF&CC, nearly 7 lakh tonnes of ash generated is dumped in ash pond and in low lying area. The ash slurry discharged from ash pond has completely killed the Katel River. The local community complained that the dam water is not potable anymore and it causes skin diseases.
- There is no system of self stack or ambient air quality monitoring in the plant. The plant falsely claims stack PM emissions complying with the JSPCB standard of 150mg/Nm³ was. During survey, a high dark and sooty emission was found emitting from stacks.
- The poor PLF of 69 per cent, the efficiency was below average at 29.6 per cent.
- Beside poor environmental performance, multiple social issues were found. Despite the plant's long presence in Tenughat, it appears to have passed on little benefit to its surrounding community. The plant's CSR activities are virtually non-existent. Other social issues being faced by the community are primarily related to inadequate rehabilitation & compensation during land acquisition, loss of cattle due to ash slurry discharge in the river.

3. MPL- Maithon

This one-and-a-half year old plant with its 1050MW capacity (2x 525MW) was assessed. It sources domestic coal from Bharat Coking Coal (BCCL) and CCL and water from Maithon dam.

- The plant was supposed to be a ZLD. Despite the fact that the plant is new, water pollution issues are serious here. JSPCB inspection report notices and community complaints indicate that the plant has been discharging untreated wastewater and ash water into the Maithon Dam and agricultural fields.
- The plant failed to meet ash utilisation norm of MoEF&CC and was able to use only 28 per cent of more than 8 lakh tonnes of ash generated.
- The plant has been non-compliant to many of the environment clearance conditions: to make effluent collection tank impervious, to use 33 per cent ash containing coal, to submit ground water analysis report, to install water flow meter, do rainwater harvesting etc.
- High fugitive dust emission from ash pond, coal handling area and during ash transportation by uncovered trucks was noted. Social issues of the plant were mainly related to the impact of pollution caused by it and poor CSR measures. According to the community, 4 out of 5 lakes in the area were acquired by the plant during land acquisitions which were filled up for plant construction.

4. Tata- Jojobera

Tata-Jojobera with its 547.5MW capacity was assessed. The plant is average 9 years old which sources domestic coal from Mahanadi Coalfields Ltd. (MCL) with some quantity of imported coal and water from Subarnarekha River.

- It is a ZLD plant which requires 3.1m³/MWh water compared to the best plant which needs less than 2m³/MWh. With nearly 78 per cent PLF, the efficiency was found below average at 30 per cent. However ash utilisation was above 100 per cent.
- Environmental and social issues of the plant were limited. One of the units of the plants was found with higher stack emission at the time of GRP

survey which indicates its non-compliance with the JSPCB stipulated limit. During the survey, several people complained that coal dust often flies into the village and is causing respiratory diseases.

5. DVC- Bokaro 'B'

One of the poor performer with 630MW capacity (3x 210MW) was assessed. The plant is average 23 years old which sources domestic coal from Central Coalfields Ltd. (CCL) and water from Bokaro barrage.

- Working without Consent to Operate, the plant has an abysmal environmental track record. There have been numerous reports, in media, from the public, from the local administration and from the JSPCB regarding continued non-compliance.
- Water pollution was extreme. Surprisingly, while the plant claims above 100 per cent ash utilization, it has been issued show cause notices by JSPCB for discharging ash slurry into the Konar River. The local district administration has filed a case against the plant for the same. During the GRP survey, the community also complained of this.
- Air pollution was also found to be high. High levels of emissions from the stacks were noticed during the survey. High levels of fugitive emissions due to trucks carrying fly ash and coal was also reported.
- The specific water consumption is very high at 8.7m³/MWh, more than four times that of the best, plant. Auxiliary power requirement is more than 11.6 per cent compared to sector average of 8 per cent. Highest CO₂ emission of 1.31tCO₂/MWh was estimated compared to study average at 1.08tCO₂/MWh. Out of 1.5-2.5lakh tonnes generated ash, merely 4 per cent was used. It indicates that the ash is mostly being discharged into the river.
- Social issues reported were related to loss of crop because of pollution, poor CSR initiatives and polluted drinking water supply.

ODISHA

Odisha has significant power generating capacity of around 7.7 GW. The GRP assessed 2 plants, capturing around 45 per cent of the total capacity in the state. The plants were:

1. OPGCL-Ib valley thermal power station (OPGCL-Ib valley)
 2. NTPC- Talcher thermal power station, Kaniha (NTPC-Kaniha)
- None of the plants agreed to participate.
 - Both the plants had poor environment performance and scored 23-24 per cent score.
 - Air and water pollution issues were high in both plants.
 - None of the plants has Sulphur dioxide and Nitrogen oxides emission control system.
 - None of the plants was found in full compliance to the stipulated norms.
 - None of the plants had a cordial relationship with the local community.
 - All the plants failed to meet ash utilisation norms of MoEF&CC.

How did the plants perform?

1. OPGCL- Ib valley

The plant with 420MW capacity (2x 210MW) was assessed. It is average 18 years old which sources domestic coal from Mahanadi Coalfields Ltd. (MCL)

and water from Hirakud reservoir.

- However the plant was noted with above 35% efficiency and 84 per cent PLF, environment pollution and social issues were high.
- Out of 10.9lakh tonnes of generated ash, only 20.5 per cent is used. Ash pond was noted a major source of air and water pollution. The community keeps complaining and protesting on severe dust emission from the ash pond which causes respiratory problems among the villagers. During rainy season, the ash pond breaches frequently which floods nearby fields. This affects land fertility and crop production in the surrounding areas. Also, the ash pipelines passing over the Hirakud reservoir leak sometimes and contaminate reservoir water which is the primary source for communities in the region.
- Air pollution was equally high. However, plants report stack PM emission under OSPCB norm of 150 mg/Nm³, during survey heavy stack emissions was visible. Ambient air quality was found to be polluted beyond the norms.
- Social issues in the area are largely related to health and safety concerns due industrial activities in the area. Air and water pollution due to overall industrial activities has severely affected public health status in the area. A lot of people in the villages suffer from Asthma, bronchitis, gastric and other liver and lungs diseases.

2. NTPC- Kaniha

The plant with 3000MW capacity (6x 500MW) was assessed. The plant is on average 12 years old and is located in a critically polluted area. It sources domestic coal from Talcher Coalfields and water from Samal Barrage Reservoir on Brahmani River.

- However the plant was noted with above 36% efficiency and 83.4 per cent PLF, environment pollution and social issues were high.
- Out of 67lakh tonnes of generated ash only 36 per cent is used, while the remaining ash is dumped in a poorly managed ash pond. Several incidents of breach of ash dyke have been reported. The power plant was issued notices due to ash pond pipeline leakage and ash discharge in the fields. During the survey, ash slurry pipeline leakage was also noted. The problems of ash emission from ash silos and ash pond were also noted.
- Water pollution was also a major issue. During site inspections in 2011, OSPCB had found that the ETP, which treats washings from the ESP and the plant area, was defunct. An overflow of untreated effluent from the ETP into the River Tikira was observed by the authorities. A PIL has also been filed against the plant in the High Court of Odisha for polluting river Brahmani.
- Ambient air quality was noted beyond the norms. The plant has a history of causing air pollution in the area. The PM emission levels have been found to be above the OSPCB norm of 100 mg/Nm³. The stack emissions were found to be extremely high during the GRP survey.
- Social issues are mainly pollution impacts related which includes lowering of the yield of crops, impact on health, contamination of drinking water sources and inadequate CSR.

BIHAR

Bihar has small power generating capacity of around 3GW. The Green Rating Project (GRP) assessed only one plant in the state: NTPC- Kahalgaon super thermal power station (NTPC-Kahalgaon)

- The plant did not agree to participate.
- The plant fetched 26 per cent score.
- Plant does not have Sulphur dioxide and Nitrogen oxides emission control system.
- It was not found to be in full compliance to the stipulated norms.
- Non-compliance on ambient air quality was noted.

How did the plant perform?

1. NTPC- Kahalgaon

The plant with 2340MW capacity (4x 210MW+ 3x 500MW) was assessed. The plant is average 10 years old which sources domestic coal from Eastern Coalfields Ltd. (MCL) and water from Ganga River.

- However, the plant was noted with above 35.8 per cent efficiency, while PLF was poor at 68 per cent.
- The most pressing environment issue related to the plant is ambient air pollution. Notices were issued by BSPCB for extremely high 1,551 µg/m³ of PM level in the ambient air. During the survey, numerous complaints regarding pollution due to fly ash from the ash pond were reported. The residents of nearby villages complained of high air pollution especially during the windy months.
- Out of 41lakh tonnes of generated ash, only 23 per cent was used, thus not complying to the MoEF&CC norm of 100 per cent utilisation. Low utilization of ash forces plant to dump ash in ash pond or send to mines for back filling. This has led to agitations by the local community against pollution from ash pond which affects agriculture.
- The average specific water consumption of the plant is 4 m³/MWh which is double than that of the best plant.
- The social issues in the area were with respect to land acquisition. As per local stakeholders survey, around 30 per cent of those persons from whom land was acquired were yet to be compensated. As per a petition submitted to the Lok-Sabha Secretariat, the locals who have been displaced due to the project accuse NTPC management of improper rehabilitation and discrimination.

MADHYA PRADESH

Madhya Pradesh has small power generating capacity of around 9 GW. The Green Rating Project (GRP) assessed only one plant in the state: MPPGCL-Birsinghpur super thermal power station (MPPGCL-Birsinghpur)

- The plant agreed to participate.
- The plant fetched scored 23 per cent score.
- Plant does not have Sulphur dioxide and Nitrogen oxides emission control system.
- The plant was not found in full compliance to the stipulated norms.
- Water consumption is high and pollution is not under control.

How did the plant perform?

1. MPPGCL- Birsinghpur

The plant with 1340 MW capacity (210 MW x 4 + 500 MW x 1) was assessed. The plant is average 13 years old which sources domestic coal from SECL and water from Birsinghpur reservoir.

- However the plant has poor 29% efficiency and 71.4 per cent PLF. The most pressing environmental issue related to the plant is ambient air pollution.
- Out of 22.7lakh tonnes of generated ash only 58-78 per cent was used, thus non-complying the MoEF&CC norm of 100 per cent utilisation. Due to road transport of ash the public roads have been badly damaged and full of ash. Local community complained that heavy traffic movements lead to frequent accidents and fugitive dust emission causes respiratory problems in locals. Numerous complaints regarding pollution due to fly ash emission from the ash pond were also reported.
- An OTC type plant which requires huge quantity of water, 100-200m³/MWh, double compared to the best plant.
- Water pollution is another big issue. Community complains that overflow from the ash pond is being disposed of into the Ganjra Nallah, which meets the Johilla River. The community living downstream is getting affected by the large amount of ash mixed with the water. Community also added that effluent laden with oil and grease is sometimes dumped directly into the river without treatment.
- Social issues are mainly focussed on damage of road, ash spillage and fugitive emission on road, drop in crop yield due to ash emission and lack of CSR initiatives.

UTTAR PRADESH

Uttar Pradesh has a large power generating capacity of around 17 GW. The Green Rating Project (GRP) assessed 3 plants in the state:

1. UPRVUNL- Anpara “A&B” thermal power plant (UPRVUNL-Anpara”A&B”)
2. UPRVUNL- Obra thermal power plant (UPRVUNL-Obra)
3. NTPC- Singrauli super thermal power plant (NTPC-Singrauli)
4. Reliance- Rosa thermal power plant (Reliance-Rosa)

Reliance Rosa did not agree to participate. However, UPRVUNL plants agreed to participate but failed to provide required information.

- Where Reliance- Rosa and NTPC- Singrauli cored 30% and 21 per cent respectively, UPRVUNL-Anpara “A&B” and UPRVUNL-Obra scored merely 12% and 8 % respectively.
- Except Reliance-Rosa, all three plants are from an identified critically polluted area, are still polluting.
- Sonebhadra region has a high concentration of power plants and coal mines and has been identified with mercury contamination. CSE’s laboratory tests have confirmed the mercury contamination in water, soil, fishes and residents in Sonebhadra.
- Except Reliance-Rosa, all three plants have once-through cooling system, which requires enormous amounts of water.
- None of the plants has Sulphur dioxide and Nitrogen oxides emission control system.

How did the plants perform?

1. UPRVUNL- Anpara “A&B”

The plant with 1630 MW capacity (3x 210 MW+ 2x500 MW) was assessed. The plant is average 21.5 years old which sources domestic coal from Northern Coalfields Limited (NCL) and water from Rihand dam.

- However the plant has high 37.89 per cent efficiency and 87.7 per cent PLF. The plant performs poorly on environment. It is running without a valid consent to operate from the pollution control board.
- Stack emissions of the plant is high in the records, including inspection reports of Uttar Pradesh Pollution Control Board (UPPCB). During the GRP survey, stack emission was found to be extremely high. Ambient environment in the plant was very poor. During site visit, coal unloading, storage and processing area was found very dusty with high fugitive emission.
- Out of 30.7 lakh tonnes of generated ash, only 1.0 per cent was used. Ash pond is another major polluting source. Ash water from decanted ash water pond keeps overflowing in the dam. Ash water contamination of the dam water is clearly visible even from satellite imageries.
- Specific water consumption of the plant is around 171m³/MWh compared to 2m³/MWh in a best plant. The plant does not have an effluent treatment plant (ETP) to treat the effluent. All the effluents generated in the plant are discharged into dam through a drain.
- Social issues are also many which include pending compensation and rehabilitation issues, lack of local employment opportunity in the plant, lack of electricity and drinking water supply in local areas, health related issues due to excessive air and water pollution by the plant, etc.

2. UPRVUNL- Obra

The plant with 1288 MW capacity (3x 50 MW+ 2x 94 MW+ 5x 200MW) was assessed. The plant is average 35 years old which sources domestic coal from Northern Coalfields Limited (NCL) and water from Obra dam.

- The plant has poor 28.5 per cent efficiency and merely 39 per cent PLF. It is a polluting plant running without a valid consent to operate from the pollution control board.
- Stack emissions of the plant is infamously high in all the records including inspection reports of UPPCB. During GRP survey, stack emission was found extremely high as usual. Ambient air quality also exceeds the norm.
- Out of 14.9 lakh tonnes of generated ash, only 12.4 per cent was used. Ash pond is another major polluting source. Ash pond is one of the major polluting source. As the ash pond is not unlined and systematic, it flows all around and ultimately discharges its ash containing overflow in the river. CSE study found mercury contamination in the soil, water, fish and residents of Obra village.
- Specific water consumption of the plant is around 261m³/MWh compared to 2m³/MWh in a best plant. All the effluents generated in the plant are discharged into dam through a drain.
- The social issues are also many which includes pending compensation and rehabilitation issues, lack of local employment opportunity in the plant, lack of electricity and drinking water supply to the locals, health related issues due to excessive air and water pollution by the plant, etc.

3. NTPC- Singrauli

The plant with 2000 MW capacity (5x 200 MW+ 2x 500MW) was assessed. The plant is average 28 years old which sources domestic coal from Northern Coalfields Limited (NCL) and water from Rihand dam.

- The plant, however, has 36 per cent efficiency and 92 per cent PLF, and has poor environmental performance.
- However, the plant claims (UPPCB supports) stack emissions under the

norm of 150mg/Nm³, stack emission was found extremely high as usual. The Ambient Air Quality reports given by the UPPCB also state that all the parameters measured are within the norms, however comprehensive environmental pollution Index (CEPI) study of central pollution control board found the parameters beyond the acceptable level.

- Out of 39 lakh tonnes of generated ash, only part of it is used and remaining is dumped in the ash pond. During the visit ash slurry was observed being discharged from the ash pond into Rihand Dam, the source of drinking water to the villages in the area. The satellite image of the area also shows ash pond discharge in the dam. CSE study found mercury contamination in the soil, water, fish and local residents.
- Since it is OTC type plant, specific water consumption of the plant is 100-200m³/MWh compared to 2m³/MWh in a best plant.
- Social issues include lack of support for development of nearby villages, lack of electricity and drinking water supply to neighbouring communities, and inadequate jobs.

4. Reliance- Rosa

The plant with 1200 MW capacity (4x 300 MW) was assessed. The plant is average 2 years old which sources both domestic and imported coal and sources water from Garrah River.

- The plant, however, has 35.4 per cent efficiency; PLF was only 68 per cent. Though the plant is new, it has not been running on full operating availability. The environmental issues from the plant are limited to dust emission and seepage from ash pond, ground water extraction, etc.
- However, the plant claims (UPPCB supports) stack emissions under the norm of 150mg/Nm³, stack emission was found extremely high as usual. The Ambient Air Quality reports given by the UPPCB also state that all the parameters measured are within the norms. However, comprehensive environmental pollution Index (CEPI) study of central pollution control board found the parameters beyond the acceptable level.
- Out of 11 lakh tonnes of generated ash, only 18 per cent was used and remaining is dumped in the ash pond. Communities in the neighbourhood raised issues related to fugitive dust emission as well as seepage from the ash pond in the nearby areas. Fly ash settled on and in houses, deposited in cattle feedstock and grain storage were observed during GRP survey.
- Specific water consumption of the plant is 3m³/MWh compared to 2m³/MWh in a best plant. Environment clearance conditions for plant state that plant cannot extract ground water for operation. The community alleges that plant has been extracting ground water which is reflecting in ground water depletion in the area.
- Social issues include land acquisition problem, lack of CSR especially electricity supply to the local villages and pollution related health impacts.

