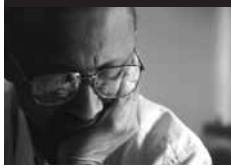


HEAT ON POWER

GREEN RATING OF COAL-BASED POWER PLANTS



GREEN RATING PROJECT
Centre for Science and Environment



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Preface

Coal is the most polluting fossil fuel and the process of producing electricity from coal is one of the most polluting industrial activities. In fact, it is an environmentalist's nightmare. If that is so, why should Centre for Science and Environment rate the environmental performance of India's coal-based power plants, let alone give awards to a few "green" plants? This was the question that confronted us about two years ago when we decided to undertake the Green Rating of coal-based power plants.

The Green Rating Project (GRP) is one of the very few public-disclosure projects in the world in which a non-governmental, non-industry organisation rates the environmental performance of industries and makes the results public. The project, started in 1997, 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, using an exhaustive and participatory process wherein companies are encouraged to disclose data voluntarily and open their gates for independent scrutiny of the plants and records. Even where companies do not agree to participate, GRP surveyors visit the plant and collect secondary information from various government and non-governmental sources, including local communities. We follow a robust and transparent process and the outcomes of our ratings have been used by companies to improve policies and practices as well as policymakers.

Discussing coal in India is a taboo. Environmentalists don't want to discuss coal. They just want coal to go and for the right reasons. Coal mining has devastated local ecologies and communities in some of the poorest parts of India. Coal-based power plants have the reputation of causing high air and water pollution and mismanagement of fly ash. As coal contributes a significant proportion of global greenhouse gas emissions, it is also a climate villain. So, international NGOs have made banning coal a global mission. The government, on the other hand, also doesn't want to discuss coal as it believes that coal-based power is the most important and least expensive way to meet the energy needs of the country and, therefore, environmental and social costs must be paid to fulfil this essential need. "If you want affordable electricity, you must have coal", has been told to us umpteen times in the last two years. But in this tug-of-war, no one is talking about improving the environment performance of existing plants or upcoming plants. This is very important simply because the world will continue to depend on coal to meet a significant proportion of its energy needs at least in the medium term.

Today coal is the most important source of electricity in the world. About 40 per cent of global electricity is produced from coal. In India, about 70 per cent of the power is provided by coal. The numbers are also high in the US (40 per cent), China (75 per cent) and European Union (30 per cent). Coal currently meets about 29 per cent of the world's primary energy needs and even in the most optimistic scenario, this number is projected to reduce only to about 23-24 per cent by 2035. The fact is that climate change mitigation plans put in place by most countries are just not sufficient to make a significant dent in coal consumption in the coming two decades. In such a scenario, we will have to do everything to make sure that dirty coal is cleaned to the extent possible. This is especially important for a country like India, which is going to add more coal-based power plants to meet its electricity needs. This was our prime motivation to take up the green rating of coal-based power plants.

The exercise was daunting, considering that we had to rate 47 thermal power plants (half of all the plants operating in 2012) spread over 16 states of India. It was made more difficult by the fact that a significant number of these plants were owned by the government; they simply refused to

share information with us. NTPC Ltd, the biggest power company of the country owned by the Central government, also refused to participate. We, therefore, had to undertake extensive surveys to fill the data gap. GRP surveyors went to all selected plants and documented their environmental performance, the challenges they faced and the impacts they had on ecology and communities. We also collected samples of water and tested these in our laboratory to check for compliance with pollution standards.

In general, we found the sector to be quite polluting and resource-inefficient. This was obvious, considering that no country in the world uses coal as poor in quality as India's. Thermal power plants in India commonly use coal that has 40-50 per cent ash content. On top of this, our power plant fleet is old and based on inefficient subcritical technologies. In fact, a quarter of the total capacity under the study had exceeded operational life. India has only started introducing more efficient supercritical technologies in the last few years.

The problem is compounded by the fact that our pollution regulations are obsolete and out of tune with new knowledge or technologies. Power plants are highly air polluting but we have only set standards for particulate matter (PM) and not for other pollutants like SO₂, NO_x and heavy metals like mercury. The PM norms are also lax; they vary from 50 to 350 mg/Nm³ – the older the plant, the more are the emissions permitted. In comparison, China enforces PM norms of 30 mg/Nm³. The worst part is that most plants routinely flout even this lax norm and under the rationale of the need for power, even the most inefficient and polluting plants are allowed to operate.

But we also found plants that were doing exceedingly well in some or other areas. There are plants that have installed state-of-the-art technologies to meet stringent PM and SO₂ standards. There are plants that have used all means to reduce water consumption to global standards and have achieved zero-liquid-discharge standards. Few plants have managed to utilise all their fly ash for cement and brick manufacturing. This gives us the confidence that there is ample scope to clean up existing and upcoming plants. But for this, the regulators will have to demand better environmental performance from this sector, something they have refused to do so far. If today the thermal power sector is doing badly on the environment front, the pollution regulators are equally to blame for the current state of affairs. The same holds true for the energy planners and regulators.

The plant load factor (PLF) of coal-based plants in 2013-14 was as low as 65 per cent. Plant after plant informed us that though they are available to generate power, there is not enough demand for them to operate at full capacity. We seem to have installed too many power plants in the last decade. The result is that plants are operating at lower PLF, which is leading to lower efficiency and higher pollution loads. In addition, as per the "merit order dispatch", plants producing cheapest power are allowed to feed the grid first. In general, old plants with outdated technologies and lower investments in pollution control are able to produce the cheapest power. So we have a perverse tariff structure under which inefficient and polluting plants are allowed to operate at full capacity and efficient plants are being made inefficient by being asked to operate at lower capacity. This must change; so must many other things if we do not want the environmental and social costs of this sector to become unmanageable. China offers troubling insights into what can go wrong if we do not take into account the social and environmental costs of coal-power generation.

Managing fly ash, air pollution and water consumption will be critical for coal-based power plants. In addition, if we want to add more plants, we will have to make sure that only the most efficient are installed and operated.

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. We will need

a comprehensive action plan to deal with this menace.

We will also need to control emissions of PM, SO₂, NO_x and mercury from existing and upcoming plants. For this, new stricter norms will have to be set and enforced. Most importantly, we will have to put in place credible monitoring mechanisms to ensure compliance.

Water might turn out to be the biggest constraint to the growth of the sector. Of all the industries, coal-based power sector is the largest consumer of water. Presently, many plants are water-profligate. Some use water as much as four to five times what the best plants in the country consume. The sector average is double the water consumed by the best in the country. Water consumption is expected to increase by more than 80 per cent by 2021-22. With many parts of India already under high water-stress, such large consumption will exert an enormous strain on local water resources and competing users like agriculture and urban areas. We will, therefore, have to set norms for water consumption for new plants and encourage existing plants to adopt best practices.

All of the above is technically feasible and affordable and there is no reason why industry should not be pushed to adopt these best practices.

The bottom line is that we cannot afford to continue discounting environmental and health costs of polluting coal-based power plants. This is the clear message from our rating. We hope that the industry and government listen to this message and act on it.

Sunita Narain
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