FACTSHEET

ENVIRONMENTAL STATUS OF COAL-BASED THERMAL POWER PLANTS IN THE NATIONAL CAPITAL REGION

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ENVIRONMENTAL STATUS OF COAL-BASED THERMAL POWER PLANTS IN THE NATIONAL CAPITAL REGION

Background

In 2015, the Ministry of Environment, Forest and Climate Change (MoEF&CC) introduced stringent emission norms for coal-fired thermal power plants. The emissions from thermal power plants (TPP) travel long distances and affect atmospheric concentrations. Given the exigency of the situation, the power plants were given an initial deadline of 2017 to meet the norms. However, due to several regulatory and technical issues, none of the plants could meet them and were therefore granted an extended deadline of another five years.

However, owing to high levels of pollution in the Delhi-NCR region, 2019 was accepted as the revised deadline for coal TPPs in the National Capital Region (NCR).

As the 2019 deadline drew closer, all power plants, except the Dadri Thermal Power Plant run by NTPC in the Centre and Mahatma Gandhi Thermal Power Plant run by China Light Power, a private entity, failed to meet the stipulated norms within the set timeline.

Once the deadline had elapsed, no action was initiated against these power generators for not abiding by the notification. Instead, like for all other plants, the deadlines for the coal-based thermal power plants in Delhi NCR were also extended to 2022 by the MoEF&CC.

In March 2021, all coal power plants in the country, including the 11 plants in the NCR, were classified under three different categories—A, B and C, with different deadlines for compliance. Plants in Category A are to comply first, followed by plants in Category B and C respectively. The criteria for these categories are as follows:

- **Category-A:** Plants that fall within a 10 km radius of the National Capital Region or cities with a million-plus population.
- **Category-B:** Plants that fall within a 10 km radius of critically polluted areas or non-attainment cities.
- **Category-C:** Remaining plants.

MoEF&CC revised these deadlines once again in September, 2022.

The Dadri TPP in Uttar Pradesh along with the Indira Gandhi TPP, Mahatma Gandhi TPP and Panipat TPP in Haryana have been placed under Category A,

while the remaining seven plants have been placed under Category C based on the above mentioned criteria. The latest deadlines for all the three categories are as follows:

Table 1(a): Latest deadlines for meeting emission norms by coal thermal power plants

Category	Parameters other than SO_2 norms	SO_2 emissions
Category-A	31 December, 2022	31 December, 2024
Category-B	31 December, 2023	31 December, 2025
Category-C	31 December, 2024	31 December, 2026

Note: Plants that have been declared 'to be retired' have different deadlines for compliance with the norms and are not part of this table

Source: MoEF&CC September, 2022

Table 1(b): Emission norms for coal thermal power plants

Parameter	SO_2	NOx	PM
Units	mg/Nm^3	mg/Nm^3	mg/Nm^3
Units installed before 31 December, 2003	600 (<500MW) 200 (</ 500 MW)	600	100
Units installed in 2004–16	600 (<500 MW) 200 (>/500 MW)	450	50
Units installed from 1 January, 2017	100	100	30

Source: MoEF&CC 2015 notification and amendments thereof

Until recently, compliance with the norms had become more or less synonymous with and limited to the installation of an air pollution control device (APCD) called flue-gas desulfurization (FGD), for the removal of sulphur dioxide (SO_2) in coal thermal power plants. Compliance with other parameters was considered easier in comparison. While ministries (MoEF&CC and MoP), regulatory authorities, and coal thermal power plants have cited various reasons for the delay in meeting SO_2 norms, there is mutual silence on compliance with other norms.

In fact, until recently, the Central Electricity Authority (CEA)—the technical arm of the MoP—only disseminated information on the installation of FGD by TPPs in the public domain, the other norms had conveniently taken a backseat in reporting.

Methodology

Centre for Science and Environment (CSE) has analyzed emissions reported by the Central Electricity Authority (CEA) in the 'Monthly Environment Status Report' for the period of April 2022 to August 2023 (17 months) for all power plants in NCR.

The environmental data is published for all units of all the coal thermal power plants in the country, as submitted by them to the CEA. These reports give the minimum and maximum readings for the parameters—particulate matter (PM), nitrogen oxides (NOx), and sulphur dioxide (SO_2). Reports that have been published post April 2023 give the maximum reading for each of the parameters and the monthly average for all TPPs.

In most instances, the unavailability of environmental monitoring results is due to power plants not reporting data to the CEA. Faulty measuring equipment or shutting down of TPP units have also been cited as reasons for the non-availability of monitoring results in some places.

While analyzing the data, CSE considered the total number of readings for all the units of a plant and estimated the number of times these readings have met or exceeded the norms. Each unit will have a maximum of 17 readings for each parameter as the data reported spans 17 months. For example, if a plant has six units, the total number of expected readings during the study period for each of the parameter would ideally be 102 (6 units x 17 months). However, if the plant has cited 'shut-down' (during maintenance) as the reason for not reporting data for, say, two months, the total number of expected readings in that case would be 100 (5 units x 17 months + 1 unit x 15 months). The number of readings available for analysis is dependent on the data submitted by the plant and may vary depending on the regularity of data submission by that plant.

1. Dadri Thermal Power Plant by NTPC

Capacity: 1,820 MW | **Sector:** Central sector | **Total no. of units:** 6 | **Category-A**: TPP within 10 km of Delhi NCR

Table 2: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2024
NOx	2022
PM	2022

Source: MoEF&CC (2022)

The plant has a total of six units. Units one to four are of 210 MW each and were commissioned during 1991–94. These units need to comply with emission standards for PM100 mg/Nm^3, NOx 600 mg/Nm^3 and SO_2 600 mg/Nm^3. Units five and six which are of 490 MW each were commissioned in 2010 and have to meet the emission norms for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 600 mg/Nm^3

Table 3: Number of times the coal power plant exceeded the norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	99	None
SO_2 (mg/Nm^3)	97	83
NOx (mg/Nm^3)	99	5

Source: CSE analysis based on environment status reports by CEA

Table 4: Unit-wise status of SO_2 emissions (from April 2022 to August 2023)

Unit no.	Total no. of readings for SO_2 emissions	No. of readings that exceed the SO_2 norm
Unit 1	16	15
Unit 2	16	16
Unit 3	17	16
Unit 4	17	16
Unit 5	15	5
Unit 6	16	15

Source: CSE (based on environment status reports by CEA)

Table 5: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	October, 2023*	Electrostatic Precipitator
NOx	February, 2020	Combustion modifications made in units 5 and 6
SO_2	February, 2023	FGD installed in units 1 to 5; Bid awarded for FGD installation for Unit 6

Source: Compiled by author (data from CEA, *TPP survey)

Comment: Dadri Thermal Power Plant is the first government-owned power generating station that installed flue-gas desulfurization (FGD) in the country. The environmental data for the plant shows that all units of the plant have been meeting the emission norms for both PM and NOx.

However, the plant has been exceeding SO_2 emission limit in all its units, even for the units where SO_2 control equipment have been installed (one to five). As shown in table 5, except for Unit 5, all other units have been barely meeting the SO_2 emission norms during the reporting period. It is clear that the older units (one to four) require more refurbishing for SO_2 control compared to their counterparts.

All the units of the Dadri TPP have to meet the prescribed limit of 600 mg/Nm^3 for SO_2. However, the plant has exceeded the norm 83 times out of the 97 reported readings. The emissions go as high as 1,280 mg/Nm^3, which is more than double the standard set by the MoEF&CC for the plant. This shows that the plant is not running the FGD either continuously or efficiently.

It is to be noted that the average SO_2 emissions from the plant, reported from April 2023 to August 2023, have exceeded the norms 14 out of 30 times. This shows that the SO_2 emissions from the plant are continuously on the higher side in a month.

2. Indira Gandhi Super Thermal Power Plant by NTPC and Haryana Power Generation Corporation Limited

Capacity: 1,500 MW | **Sector:** Joint venture | **Total no. of units:** 3 | **Category-A:** TPP within 10 km of Delhi NCR

Table 6: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2024
NOx	2022
PM	2022

Source: MoEF&CC (2022)

The plant has a total of three units. All the units are of 500 MW each and were commissioned during 2010–12. These units need to comply with emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 200 mg/Nm^3.

Table 7: Number of times the coal power plant exceeded the norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	45	None
SO_2 (mg/Nm^3)	45	45
NOx (mg/Nm^3)	45	2

Source: CSE analysis based on environment status reports by CEA

Table 8: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	No information
NOx	February, 2020	De-NO_x work order awarded on 20^t October, 2018
SO_2	February, 2023	Work order awarded for all the units for FGD installation

Source: Compiled by author (data sourced from CEA)

Comment: The environmental data for the plant shows that all units of the plant have been meeting the emission norms for both PM and NOx. However, the plant has been exceeding the SO_2 norms in all its units.

All the units of Indira Gandhi TPP have to meet the prescribed limit of 200 mg/Nm^3 for SO_2 by 2024. The plant has exceeded the norm in all months of the reporting period. The emissions go as high as 1,626 mg/Nm^3.

Overall, the plant has been able to control its PM and NOx emissions, but SO_2 emissions are more than four times the prescribed limit in case of all the three units throughout the reporting period of 17 months.

3. Harduaganj Power Station by Uttar Pradesh Rajya Vidyut Utpadan Nigam Limited

Capacity: 1,265 MW | **Sector:** State | **Total no. of units:** 4 | **Category-C:** others

Table 9: Deadline for the coal power plant to comply with the norm (Units 8, 9 and 10)

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has a total of four units. Commissioned in 1978, Unit 7 is the oldest unit of 105 MW. It has to comply with the emission standards of PM100 mg/Nm^3, NOx – 600 mg/Nm^3 and SO_2 600 mg/Nm^3. Units 8 and 9 of 250 MW each were commissioned in 2011 and 2012 respectively. These units have to comply with the emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 600 mg/Nm^3. Unit 10 of 660 MW was commissioned last year and has to comply with the norms for PM30 mg/Nm^3, SO2 100 mg/Nm^3, and NO_x 100 mg/Nm^3

Table 10: Number of times the coal power plant exceeded the norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	11	5
SO_2 (mg/Nm^3)	9	6
NOx (mg/Nm^3)	11	1

Source: CSE analysis based on environment status reports by CEA

Table 11: Control measures adopted by the coal power plant (Units 8, 9 and 10)

Parameter	Reporting period	Control measure
SPM	October, 2023*	Electrostatic precipitator
NOx	October, 2023*	De-NOx commissioned
SO_2	February, 2023	Bid opened for FGD installation in Unit 8&9 *FGD installed in Unit 10

Source: Compiled by author (data sourced from CEA, *TPP survey)

Comment: Harduaganj Thermal Power plant has the most poorly reported environmental data in the NCR. The plant has submitted environmental readings for only four months during the reporting period. The submitted data is inconsistent in the sense that it is not necessarily available for all the parameters and for all units in a month.

It is important to note here that unit 7 of the plant was established in 1978 and the FGD plan has not been revealed by CEA for this unit, unlike for units 8 and 9. It can be speculated that unit 7 has been declared 'to be retired,' although CSE could not access any information pertaining to a retirement plan for the unit.

Units 8 and 9 of the plant have reported maximum reading for particulate matter—some as high as 193 mg/Nm^3 and 502.5 mg/Nm^3 respectively. The original equipment manufacturer (OEM) needs to be contacted for any operational or design changes required in the units since these readings are very high and have to be controlled if the plant is to run continuously. There are no readings available for the newest unit i.e. unit 10 (Expansion-II) and therefore, it is uncertain if the plant has been meeting the SPM norms.

In case of NOx, the monthly average reported for unit 10 (expansion-II) is more than five times that of the norm i.e. 553.2 mg/Nm^3. It is highly unlikely that unit 10, which was commissioned last year, does not have the requisite systems in place to control NOx emissions. A NOx emission of 550 mg/Nm^3 is too high for a new 660 MW unit. It appears that there are operational or monitoring issues and hence the unit needs to be monitored closely. For the rest of the units, the monthly averages, wherever reported, are within the limits.

Similarly, for SO_2, the monthly averages reported in April 2023 for units 7, 8 and 9 are more than 900 mg/Nm^3 for all the three units and have exceeded the prescribed norm by more than 300 mg/Nm^3.

Although it is not yet possible to reach a conclusive understanding due to insufficient environmental readings for the plant, it is clear from the few readings that are available for whichever unit, that the plant is blatantly polluting the environment.

4. Mahatma Gandhi Thermal Power Plant by CLP India Private Limited

Capacity: 1,320 MW | **Sector:** Private | **Total no. of units:** 2 | **Category-A:** TPP within 10 Km of Delhi NCR

Table 12: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2024
NOx	2022
PM	2022

Source: MoEF&CC (2022)

The plant has a total of two units. All the units are of 660 MW each and were commissioned in 2012. These units need to comply with emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 200 mg/Nm^3.

Table 13: Number of times the coal power plant exceeded the norms from (April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	29	None
SO_2 (mg/Nm^3)	29	2
NOx (mg/Nm^3)	29	None

Source: CSE analysis based on environment status reports by CEA

Table 14: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Statutory limits being complied
NOx	February, 2020	Combustion modification done
SO_2	February, 2023	FGD commissioned

Source: Compiled by author (data sourced from CEA)

Comment: Mahatma Gandhi Thermal Power Plant in Jhajjar is the only plant in the NCR that is meeting the emission norms for plants. It is the only privately-owned plant in the NCR that has installed and commissioned FGD in its units.

Except for April and May 2023, the plant has consistently reported its environmental monitoring data to the CEA.

5. Talwandi Sabo Power Station by Talwandi Sabo Private Limited (a subsidiary of Vedanta)

Capacity: 1,980 MW | **Sector:** Private | **Total no. of units:** 3 | **Category-C:** Others

Table 15: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has a total of three units. All the units are of 660 MW each and were commissioned during 2014 to 2016. These units need to comply with emission standards for PM 50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 200 mg/Nm^3.

Table 16: Number of times the coal power plant exceeded the norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	42	3
SO_2 (mg/Nm^3)	42	42
NOx (mg/Nm^3)	42	None

Source: CSE analysis based on environment status reports by CEA

Table 15: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Statutory limits being complied
NOx	February, 2020	Statutory limits being complied
SO_2	February, 2023	Tender specifications finalised as on April'23

Source: Compiled by author (data sourced from CEA)

Comment: Except for in April 2022, all three units have been complying with the SPM emission limits. Apart from this, the plant has been meeting all environmental norms other than for sulphur dioxide.

The plant has not reported its environmental monitoring results for May–July 2022. The SO_2 emissions by the plant have been extremely high during the entire reporting period.

6. Panipat Thermal Power Station by Haryana Power Generation Corporation Limited

Capacity: 710 MW | **Sector:** State | **Total no. of units:** 3 | **Category-A:** within 10 km radius of NCR or cities with a million plus population

Table 16: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2024
NOx	2022
PM	2022

Source: MoEF&CC (2022)

The plant has a total of three units. Unit 1 was commissioned in 2001 and has to comply with emission standards for PM100 mg/Nm^3, NOx 600 mg/Nm^3 and SO_2 600 mg/Nm^3. Units 7 and 8 of 250 MW each, were commissioned in 2004 and 2005 respectively. These units have to comply with emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 600 mg/Nm^3.

Table 17: Number of times the coal power plant exceeded the norms from (April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	17	5
SO_2 (mg/Nm^3)	17	12
NOx (mg/Nm^3)	17	9

Source: CSE analysis based on environment status reports by CEA

Table 18: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Statutory limits being complied
NOx	October, 2023*	SOFA (separated overfire air) will be commissioned for NOx control before the deadline for compliance.
SO_2	February, 2023	Bid opened for FGD work order as on April'23

Source: Compiled by author (data sourced from CEA, *TPP survey)

Comment: Panipat Thermal Power Station has only reported emissions for the period of September 2022 to January 2023, and again in August 2023.

From the limited reported data it is clear that the plant is exceeding the prescribed limits for all the parameters—PM, NOx and SO_2.

The SPM emissions from the plant have been reportedly high during October–December, 2022 and in January, 2023. This is especially concerning as these are the months when Delhi-NCR witnesses its worst spike in air pollution due to unfavourable metrological conditions.

In case of NOx emissions, the plant has reportedly been emitting double the statutory limit. The deadline for compliance with the NOx norms for Panipat TPP was December, 2022. The plant has reported its environmental parameters only twice after the lapse of the deadline, and in January 2023; units 7 and 8 have exceeded the limit for NOx. Therefore, it is uncertain if the plant is complying or violating the norm given the paucity of data post the lapse of the deadline for compliance.

Similarly, as per the status reported by CEA in April 2023, the plant is accepting financial and technical bids for the installation of FGD to control sulphur dioxide emissions. However, the installation of FGD itself takes 2–2.5 years. The plant is also supposed to shut down during a period of six months as part of the installation process. Keeping in mind these procedures in place and that the plant has to meet the SO_2 norms by the end of next year, it is highly unlikely that the plant will be able to meet the deadline for compliance with emission norms within the stipulated timeline.

7. Guru Gobind Singh Super Thermal Power Plant by Punjab State Power Corporation Limited

Capacity: 840 MW | **Sector:** State | **Total no. of units:** 4 | **Category-C:** others

Table 19: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has a total of four units. All the units are of 210 MW each and were commissioned in 1988, 1989, 1992 and 1993 respectively. These units need to comply with emission standards for PM100 mg/Nm^3, NOx 600 mg/Nm^3 and SO_2 600 mg/Nm^3.

Table 20: Number of times the coal power plant exceeded the norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	34	None
SO_2 (mg/Nm^3)	34	33
NOx (mg/Nm^3)	34	None

Source: CSE analysis based on environment status reports by CEA

Table 21: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Statutory limits being complied
NOx	February, 2020	Statutory limits being complied
SO_2	February, 2023	Bid opened for FGD work order as on April'23

Source: Compiled by author (data sourced from CEA)

Comment: The power plant has reported its emissions for nine out of the 17 months that were considered for the analysis. From the reported data, it is seen that except for SO_2, all units have reported emissions for PM and NOx within the prescribed limit. In the case of SOx emissions, the reported monitoring results are as high as 989 mg/Nm^3 for emission norm of 600 mg/Nm^3.

8. Guru Hargobind Thermal Plant by Punjab State Power Corporation Limited

Capacity: 920 MW | **Sector:** State | **Total no. of units:** 4 | **Category-C:** others

Table 22: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has a total of four units. Units 1 and 2, of 210 MW each, were commissioned in 1997 and 1998 respectively. These units need to comply with emission standards for PM100 mg/Nm^3, NOx600 mg/Nm^3 and SO_2 600 mg/Nm^3. Units 3 and 4 of 250 MW were commissioned in 2008 and have to meet the emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 600 mg/Nm^3

Table 23: Number of times the coal power plant exceeded the norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	47	43
SO_2 (mg/Nm^3)	33	33
NOx (mg/Nm^3)	33	12

Source: CSE analysis based on environment status reports by CEA

Table 24: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Matter being taken up by BHEL
NOx	February, 2020	Matter being taken up by BHEL
SO_2	February, 2023	Bid opened for FGD work order as on April'23

Source: Compiled by author (data sourced from CEA)

Comment: Units 1 and 2 are the older units of the plant and have reportedly exceeded the prescribed limit for particulate matter three times out of the total 17 reported values. The relatively newer units of 3 and 4 are to comply with stricter norms for SPM and are expected to be less polluting due to more efficient boilers. However, all monitoring values reported for the SPM emissions by units 3 and 4 are higher than the prescribed limit.

In case of NOx emissions as well, unit 4's reported emissions have been above the prescribed limits in all the reporting months. Whereas, units 1 and 2 seem to be complying with the NOx norms.

In case of SO_2 emissions, in October 2023, the CEA reported that the plant had conducted a feasibility study for the installation of FGD. The plant is still in the initial stages of compliance with SO_2 norms despite eight years having elapsed since the introduction of the norms by the environment ministry. All the reported values for the plant are higher than the statutory limit for the plant.

9. Rajiv Gandhi Thermal Power Station by Haryana Power Generation Corporation Limited

Capacity: 1,200 MW | **Sector:** State | **Total no. of units:** 2 | **Category-C:** Others

Table 25: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has two units of 600 MW each, commissioned in 2010. Both the units have to comply with emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 200 mg/Nm^3

Table 26: Number of times the coal power plant exceeded norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	24	1
SO_2 (mg/Nm^3)	24	24
NOx (mg/Nm^3)	24	14

Source: CSE analysis based on environment status reports by CEA

Table 27: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Repair for ESP fields during overhauling in October–November, 2019
NOx	October, 2023*	SOFA (separated overfire air) will be commissioned for NOx control before the deadline for compliance
SO_2	February, 2023	Bid opened for FGD work order as on April'23

Source: Compiled by author (data sourced from CEA, *TPP survey)

Comment: The emissions for particulate matter for the plant are within the prescribed limit. However, the plant has exceeded statutory limit for NOx 14 times out of the 24 reported values. Similarly, all the reported values for SO_2 are much higher than the norm and go as high as 2,016 mg/Nm^3.

10. Yamunanagar Thermal Power Plant by Haryana Power Generation Corporation Limited

Capacity: 1,200 MW | **Sector:** State | **Total no. of units:** 2 | **Category-C:** Others

Table 28: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has two units of 300 MW each, commissioned in 2007. Both the units have to comply with emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 600 mg/Nm^3

Table 29: Number of times the coal power plant exceeded norms (from April 2022 to August 2023)

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	16	None
SO_2 (mg/Nm^3)	18	17
NOx (mg/Nm^3)	18	14

Source: CSE analysis based on environment status reports by CEA

Table 30: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Repair for ESP fields during overhauling in October–November, 2019
NOx	October, 2023*	SOFA (separated overfire air) will be commissioned for NOx control before the deadline for compliance
SO_2	February, 2023	Bid opened for FGD work order as on April 2023

Source: Compiled by author (data sourced from CEA, *TPP survey)

Comment: The power plant has reported its emission monitoring for eight out of the 17 months that have been considered for analysis. The plant has been meeting the particulate matter norms, but emissions for both SO_2 and NOx are on the higher end.

11. Rajpura Thermal Power Station by Nabha Power Limited

Capacity: 1,400 MW | **Sector:** Private | **Total no. of units:** 2 | **Category-C:** Others

Table 31: Deadline for the coal power plant to comply with environmental norms

Parameter	Deadline
SO_2	2026
NOx	2024
PM	2024

Source: MoEF&CC (2022)

The plant has two units of 700 MW each that were commissioned in 2014. Both the units have to comply with emission standards for PM50 mg/Nm^3, NOx 450 mg/Nm^3 and SO_2 200 mg/Nm^3

Table 32: Number of times the coal power plant has exceeded the norms (from April 2022 to August 2023

Parameter	Total no. of readings (including all units)	No. of readings that exceed the norm
SPM (mg/Nm^3)	20	None
SO_2 (mg/Nm^3)	20	20
NOx (mg/Nm^3)	20	None

Source: CSE analysis based on environment status reports by CEA

Table 33: Control measures adopted by the coal power plant

Parameter	Reporting period	Control measure
SPM	February, 2020	Statutory limit being complied
NOx	February, 2020	Statutory limit being complied
SO_2	February, 2023	Bid opened for FGD work order as on April'23

Source: Compiled by author (data sourced from CEA)

Comment: The PM and NOx emissions from the plant are within the prescribed norms. However, all the reported values for SO_2 emissions are five times the limit for the parameter.

Conclusion and Recommendations

Until recently, the Central Electricity Authority (CEA) had been disseminating information in the public domain regarding the status of compliance with the norms in terms of commissioning flue-gas desulfurization devices (FGD) for controlling sulphur dioxide emissions. Although FGD commissioning took centre stage with respect to compliance with emission norms in TPPs, no data has been disseminated regarding compliance with other emission parameters.

In the absence of any other publicly accessible information, the status of compliance with the norms became synonymous with the installation of FGD within the stipulated deadlines. However, as the case of Dadri TPP clearly shows, the installation of an APCD is not akin to a plant complying with the norms.

Does it imply that we wait for plants to first install the required APCDs and then for several more years to actually meet the norms?

The escalated price of electricity due to commissioning of FGD is another issue. If the plants commission FGD and still don't meet the norm then consumers not only pay the price of compromised health due to pollution from TPPs but also incur the cost of the APCD installed by these plants.

The installation of FGDs require major expenditure on the part of the power plants. Additionally, plants need to be shut down for a period of time as part of the installation process. According to industry experts, the entire process takes about 2–2.5 years. Lack of adequate funds, technology in the market, and lack of planning to maintain the grid in case of plant shut-downs were cited as some of the reasons for the delay in the installation of FGD by coal thermal power plants.

Later on, the Central Electricity Authority (CEA), issued guidelines for the installation of FGDs. The Central Electricity Regulatory Commission (CERC), after several petitions by power plants, agreed to pass on the cost of FGD installations to consumers under the clause of 'change in law'. These measures were expected to ramp up the move towards meeting SO_2 norms. Yet, apart from Mahatma Gandhi Thermal Power Plant, all other plants in the NCR have reported SO_2 emissions up to three times more than that of the prescribed limits. It is clear from the values

reported by the power plants that without any control measures for SO_2, emissions from the plant will not be able to comply with the applicable norms.

In case of particulate matter (PM) emissions, all plants except the Harduaganj thermal power station, Panipat thermal power plant and Guru Hargobind Singh thermal power plant have been reported to meet the prescribed limits. Similarly, for NOx emissions, Panipat TPS, Guru Hargobind TPP, Rajiv Gandhi TPP and Yamunanagar TPP have reported higher emissions than the norm.

Table 34: Performance evaluation of coal TPPs in NCR based on environmental monitoring results

Sr. no.	Coal thermal power plant	Category	Data reporting	Performance evaluation		
				SPM	SO_2	NOx
1	Dadri TPP	A	Very good	+	-	+
2	Indira Gandhi STPP	A	Very good	+	-	+
3	Mahatma Gandhi TPS	A	Very good	+	+	+
4	Panipat TPS	A	Poor	-	-	-
5	Harduaganj TPS	C	Very poor	-	-	+
6	Guru Gobind Singh STPP	C	Poor	+	-	+
7	Guru Hargobind TPP	C	Good	-	-	-
8	Talwandi Sabo TPP	C	Very good	+	-	+
9	Rajiv Gandhi TPP	C	Good	+	-	-
10	Yamunanagar TPP	C	Poor	+	-	-
11	Rajpura TPP	C	Poor	+	-	+

Note: emissions within the prescribed limits (+); emissions exceeding the prescribed limits (-)

Note: Very good (>80% data available); Good (>65-80% data available); Poor (<60% data available); Very poor (<20% data available)

Key takeaways

- Five out of the 11 plants have poor data reporting in the public domain
- Only two out of the 11 plants in the NCR have SO_2 control measures in place
- Only one out of the 11 plants meet the SO_2 emission standards
- Emissions from three out of the 11 plants exceed PM norms
- Emissions from four out of 11 plants exceed NOx emission norms

Although the CEA has made a commendable attempt to make environmental data public for these plants, it is not possible to be certain if the plant is meeting or violating the norms based solely on maximum and minimum environmental readings. A spike in emissions can be an aberration occurring due to a technical glitch in the emission monitoring instrument. A spike may also happen when the plant is restarted using diesel as an auxiliary fuel or due to fluctuating or low plant load conditions.

Twenty-four hour monitoring data for each month, or at the very least monthly averages would give more clarity in understanding the emission status of the plants.

Post March 2023, the CEA has made monthly averages available for all the parameters for all the power plants which will give more clarity on the status of compliance with the emission norms. However, this data will not hold much value if power plants do not report their environmental status on a regular basis. During the reporting period, it was noted that five out of the 11 plants in the NCR have poorly reported monitoring data and have also not offered any explanation regarding non-submission of data. CEA should ensure that the plants submit data on a regular basis in the format prescribed by them. In case of irregularity in the submission of environmental status by the plants, the respective state pollution control boards should take strict action against the plants, such as imposing adequate penalty as a deterrent.

The plants may not be in violation of the 2015 notification due to extended deadlines granted to them, nonetheless, such high emissions for PM, NOx and SO_2 from these plants will only worsen the pollution in the NCR as coal energy generation is a major source of air pollution. Where these power plants were kept on priority earlier to meet the norms, the categorization of the plants have delayed the deadlines for all the plants by five to six years. Many of the plants in the NCR are meeting the PM and NOx emission norms, however, it is important to note that

SO_2 is a reactive gas and converts to sulphates in the form of fine particulate matter -PM2.5, which pose an even greater risk to health and environment. Therefore, controlling SO_2 is crucial from the perspective of controlling particulate matter emissions as well. As the analysis suggests, nobody seems to be serious about the implementation of SO_2 control measures.

Recommendation

- All power plants have been reporting continuous monitoring stack emission data to the Central Pollution Control Board since 2015, but the data has neither been made public nor has any analysis of the data been published by the board yet. Massive investments have been made by thermal power plants in installing continuous stack monitoring instruments and systems for its continuous communication to CPCB. Despite this, the data is still being kept confidential. The online emission monitoring data should be made available in public domain and the methodology for its analysis as well as its analysis should be periodically published.

- Units with SO_2 control equipment are still not able to meet the emission standards for the parameter. It is pertinent for the Central Electricity Authority (CEA) to investigate if the high SO_2 reported by such units is due to the non-operation of FGD in the month or because of some technical issue with the SO_2 control equipment.

- Thermal power plants in the Delhi-NCR are a major point source that adds pollution to the Delhi airshed. Where these plants were initially given stricter deadlines for compliance with the emission norms, now seven of the 11 plants are placed under Category-C which are to comply last. Given the degrading air quality in Delhi and NCR, the Ministry need to prioritize implementation of the norms in the NCR irrespective of the plant categorisation.

- All the power plants where SPM norms are not being met continuously, minor changes in operational parameters and regular maintenance of Electrostatic Precipitators (ESP) can make substantial improvement in compliance. Original Equipment Manufacturers (OEM) can be involved in this exercise.

- NOx norms have already been relaxed by the government and nearly all Thermal Power Plants should be able to meet these norms with proper operational intelligence. OEM should be able to help in case some modifications are required in the boilers.

- Strict action should be taken against plants that are not able to comply with SPM and NOx standards. A feasibility study should be conducted by CEA to understand whether SPM standard can be made further stringent. The plants that are adhering to the norms or are complying more with the norms can also

be ranked higher in the merit order despatch.

- MoEF&CC should not grant further extension to thermal power plants located NCR region beyond 2024.

In this factsheet, the Centre for Science and Environment (CSE) assesses the particulate matter (SPM), nitrogen oxide (NOx) and sulphur di-oxide (SO_2) emissions reported by coal-based thermal power plants in the Delhi-NCR to the Central Electricity Authority, the technical arm of the Ministry of Power. During the reporting period (April'22 to August'23), five out of 11 plants in the NCR have poorly reported monitoring data. During the reporting period, all these power plants in the NCR—barring one—have exceeded SO_2 norms, three have exceeded SPM norms and four have exceeded NOx norms. The plants may not be in violation of the 2015 MoEF&CC notification due to extended deadlines granted to them for compliance with the norms. Nonetheless, such high emissions for SPM, NOx and SO_2 from the coal power plants will only worsen the pollution in the NCR as coal energy generation is a major source of air pollution.

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