Anpara thermal power station is UPRVUNL’s largest plant with total capacity of 2,630 MW. The plant is situated in the critically polluted area of Singarauli – Sonbhadra. It sources coal from the nearby NCL coal mines and water from the Rihand dam. The plant has seven units that were commissioned in three phases. The units have to comply with the new norms by 2021-22.

Data Quality — CSE review concludes that the emissions data reported by the independent lab as well as the CEMS data is flawed. For e.g., CSE estimated SOx emissions of over 1400mg/N.cu.m based on stoichiometry analysis whereas the independent lab reports around 400mg/N.cu.m and the CEMS shows around 700-800 mg/N.cu.m. In case of NOx, CEMS reported data was around 40 per cent higher than independent lab’s data for Units 3-5. Also, lab reported that NOx emissions of Unit 7 were twice that of Unit 6, which seemed wrong as both units are of same vintage and size.

Table 1: Compliance deadlines for units in Anpara thermal power station
Tender must be awarded latest by end of this year to ensure compliance

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Capacity in MW</th>
<th>Commissioning Year</th>
<th>Compliance deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>500</td>
<td>2012</td>
<td>Jun 2021</td>
</tr>
<tr>
<td>5</td>
<td>500</td>
<td>1994</td>
<td>Apr 2022</td>
</tr>
<tr>
<td>3</td>
<td>210</td>
<td>1989</td>
<td>Aug 2022</td>
</tr>
<tr>
<td>1</td>
<td>210</td>
<td>1987</td>
<td>Oct 2022 R&amp;M in 2015</td>
</tr>
</tbody>
</table>

Source: Central Electricity Authority, 2019

EMISSIONS AND SUGGESTED TECHNOLOGY:

- Particulate matter: Units 1-5 emissions are 60-90 per cent higher than the norms (see Table 2: PM emissions in Anpara thermal power station). Units 1-5 may need to add fields to meet the norms. High emissions for Units 6-7 indicate poor operations since their ESPs are of sufficient size.

Table 2: PM emissions in Anpara thermal power station
All the old units require up-gradation

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>CEMS</th>
<th>Lab</th>
<th>Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>136-186</td>
<td>162</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>140-221</td>
<td>147</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>175</td>
<td>149</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>188</td>
<td>207</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>206</td>
<td>174</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>146-263</td>
<td>48</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>148-270</td>
<td>59</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Centre for Science and Environment, 2019
**Sulphur dioxide:** Anapara’s emissions are estimated to be high at over 1400mg/N.cu.m (see Table 3: Sulphur Dioxide emissions in Anpara thermal power station). The older 210 MW units 1-3 have to meet the norm of 600mg/N.cu.m, which they may be able to meet with partial FGD. Units 4-7 will need to install full FGD to comply with the 200 mg/N.cu.m norm.

### Table 3: Sulphur Dioxide emissions in Anpara thermal power station

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>CEMS</th>
<th>Lab</th>
<th>CSE’s estimate</th>
<th>Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>592-600</td>
<td>338</td>
<td>1469</td>
<td>600</td>
</tr>
<tr>
<td>2</td>
<td>632-650</td>
<td>542</td>
<td>1469</td>
<td>600</td>
</tr>
<tr>
<td>3</td>
<td>667-680</td>
<td>401</td>
<td>1469</td>
<td>600</td>
</tr>
<tr>
<td>4</td>
<td>700-800</td>
<td>577</td>
<td>1425</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>663-850</td>
<td>445</td>
<td>1425</td>
<td>200</td>
</tr>
<tr>
<td>6</td>
<td>720</td>
<td>450</td>
<td>1377</td>
<td>200</td>
</tr>
<tr>
<td>7</td>
<td>710</td>
<td>790</td>
<td>1377</td>
<td>200</td>
</tr>
</tbody>
</table>

Source: Centre for Science and Environment, 2019

**Oxides of nitrogen:** The old units – Unit 1-5 show compliance with the new emission norms (see Table 4: Oxides of nitrogen emissions in Anpara thermal power station), which we find suspect. However, these units may need at the most minimal upgradation to achieve compliance. Units 6-7 are equipped with OFA/LNB and need to ensure combustion optimisation to comply.

### Table 4: Oxides of nitrogen emissions in Anpara thermal power station

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>CEMS</th>
<th>Lab</th>
<th>Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>348-500</td>
<td>320</td>
<td>600</td>
</tr>
<tr>
<td>2</td>
<td>338-500</td>
<td>466</td>
<td>600</td>
</tr>
<tr>
<td>3</td>
<td>337-500</td>
<td>312</td>
<td>600</td>
</tr>
<tr>
<td>4</td>
<td>375-650</td>
<td>432</td>
<td>600</td>
</tr>
<tr>
<td>5</td>
<td>398-650</td>
<td>356</td>
<td>600</td>
</tr>
<tr>
<td>6</td>
<td>500</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>7</td>
<td>500</td>
<td>654</td>
<td>300</td>
</tr>
</tbody>
</table>

Source: Centre for Science and Environment, 2019

**CURRENT STATUS:**

- We understand the company is in the process of engaging an agency for pre-award services for Unit 4 and 5 for FGD installation. However, no details are available for other units. Also, plan for PM and NO<sub>x</sub> control is unavailable.

**UNIT – 6 & 7 (500 MW):**

- Collect final documents of basic engineering
- Civil foundation – final stages
- Collect final documents of detailed engineering
- Equipment erection – Absorber installation

**ACTION PLAN**

- CSE has prepared unit-wise action plan for all three pollutants. The action plan is based on deadlines given under Section 5 notices sent by the Central Pollution Control Board in December, 2017, which were also submitted to the Supreme Court. In turn, the deadlines were based on the Phase-in Plan prepared by the CEA and the Regional Power Committees.
UNIT – 1, 2, 3 (3 x 210 MW):
- Particulate matter control
- Sulphur dioxide control
- Critical

UNIT – 1 (210 MW):
- PG test final reports
- PG test initiation

UNIT – 2 (210 MW):
- PG test final reports
- PG test initiation

UNIT – 3 (210 MW):
- PG test final reports
- PG test initiation

Event Timeline:
- Ensure tender was awarded
- Check status of equipment delivery
- Site mobilisation
- Civil foundation – initiation
- Dismantling of existing equipment
- Civil foundation – final stages

Dates:
- Sep-19
- Oct-20
- Nov-20
- Dec-20
- Jan-21
- Feb-21
- Mar-21
- Apr-21
- May-21
- Jun-21
- Jul-21
- Aug-21
- Sep-21
- Oct-21
- Nov-21
- Dec-21
- Jan-22
- Feb-22
- Mar-22
- Apr-22
- May-22
- Jun-22
- Jul-22
- Aug-22
- Sep-22
- Oct-22
- Nov-22
- Dec-22
- Jan-23
- Feb-23
- Mar-23
- Apr-23
- May-23
- Jun-23
- Jul-23
- Aug-23
- Sep-23
- Oct-23
- Nov-23
- Dec-23
- Jan-24
UNIT – 4 (500 MW):
- Particulate matter control
- Sulphur dioxide control
- Critical

**2019**
- Sep-19: Ensure tender was awarded
- Dec-19: Collect details of Vendor negotiation

**2020**
- Mar-20: Collect final documents of basic engineering
- Jun-20: Collect final documents of detailed engineering
- Sep-20: Check status of equipment delivery
- Dec-20: Site mobilisation

**2021**
- Mar-21: Trial run initiation

**2022**
- Jul-21: Complete construction – Painting and insulation

**2023**
- Apr-22: Collect documents on PG test performance

**2021**
- Oct-21: Collect documents on trial run performance
- Dec-21: PG test initiation

**2022**
- Feb-22: Collect documents on PG test performance
- Sep-21: Trial run initiation

**2023**
- Jun-21: Erection of new equipment

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UNIT – 5 (500 MW):

**2019**
- Sep-19: Ensure tender was awarded
- Dec-19: Collect details of Vendor negotiation

**2020**
- Mar-20: Collect final documents of basic engineering
- Jul-20: Collect final documents of detailed engineering
- Sep-20: Check status of equipment delivery
- Dec-20: Site mobilisation

**2021**
- Feb-21: Dismantling of existing equipment

**2022**
- Sep-21: Trial run initiation
- Dec-21: PG test initiation

**2023**
- Jun-21: Erection of new equipment

Disclaimer – The analysis/timelines mentioned in this document for preparing action plan has been made based on the inputs provided by various technology suppliers.