

Annexure 4.1 (ii)

Coal-based Power Plant

| <i>The Variables</i> | | | | | | | | | |
|----------------------|--|------|---------------|------|---------------|------|---------------|------|---------------|
| 1 | Size | 750 | MW | 750 | MW | 750 | MW | 750 | MW |
| 2 | Area | 2500 | Hectares | 2500 | Hectares | 2500 | Hectares | 2500 | Hectares |
| 3 | Project cost per MW | 3.5 | Crores Rs | 3.5 | Crores Rs | 3.5 | Crores Rs | 3.5 | Crores Rs |
| 4 | Location (Forest area/ Non forest area) (1 or 0) | 1 | | 0 | | 0 | | 1 | |
| | - Area | 1000 | Hectares | | | | | 1000 | Hectares |
| | - Density of forest | 1 | | | | | | 1 | |
| 5 | Cost for ash dyke construction | 2.5% | of total cost | 2.5% | of total cost | 7.5% | of total cost | 7.5% | of total cost |
| 6 | Inflation rate | 9% | | 9% | | 9% | | 9% | |
| 7 | Per capita income of oustees | 700 | Rs | 700 | Rs | 700 | Rs | 700 | Rs |
| 8 | Number of oustees | 2000 | | 2000 | | 2000 | | 2000 | |
| 9 | Cost of supplying fuel wood | 2.4% | of total cost | 2.4% | of total cost | 2.4% | of total cost | 2.4% | of total cost |
| 10 | Annual benefits foregone from forest | 7990 | Rs/ha/annum | 7990 | Rs/ha/annum | 7990 | Rs/ha/annum | 7990 | Rs/ha/annum |
| 11 | Cultivable land | 1500 | | 1500 | | 1500 | | 1500 | |
| 12 | Loss of agriculture production | 2000 | Rs/ha/annum | 2000 | Rs/ha/annum | 2000 | Rs/ha/annum | 2000 | Rs/ha/annum |
| 13 | Loss of animal husbandry | 300 | Rs/ha/annum | 300 | Rs/ha/annum | 300 | Rs/ha/annum | 300 | Rs/ha/annum |
| 14 | Loss of facility in rural area | 200 | Rs/ha | 200 | Rs/ha | 200 | Rs/ha | 200 | Rs/ha |

| | | | | | | | | | |
|----|------------------------|-------|------------------|-------|------------------|-------|------------------|-------|------------------|
| 15 | Green belt development | 0.01% | of total cost | 0.01% | of total cost | 0.01% | of total cost | 0.01% | of total cost |
|----|------------------------|-------|------------------|-------|------------------|-------|------------------|-------|------------------|

| Environmental cost (Rs. Crores) | | <i>PS2/LT1/A</i> | <i>WB norms</i> | <i>PS2/LT2/A</i> | <i>WB norms</i> | <i>PS2/LT2/A</i> | <i>WB norms</i> | <i>PS2/LT1/A</i> | <i>WB norms</i> |
|--|--|---|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| | | <i>D1</i> | | <i>D1</i> | | <i>D2</i> | | <i>D2</i> | |
| Control / Stability measures | | | | | | | | | |
| Air pollution | | | | | | | | | |
| SPM | Electrostatic precipitators | 53.21 | 106.43 | 53.21 | 106.43 | 53.21 | 106.43 | 53.21 | 106.43 |
| SO ₂ , NO _x | Chimney with Stack height: | 17.85 | 17.85 | 17.85 | 17.85 | 17.85 | 17.85 | 17.85 | 17.85 |
| SO ₂ | Flue gas desulphurisation unit | | | | | | | | |
| | Dust extraction & suppression systems | 3.91 | 3.91 | 3.91 | 3.91 | 3.91 | 3.91 | 3.91 | 3.91 |
| | Equipment to monitor environment | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| | Equipment to monitor ambient air quality | | | | | | | | |
| Water pollution | | | | | | | | | |
| | Effluent treatment facility | 4.45 | 4.45 | 4.45 | 4.45 | 4.45 | 4.45 | 4.45 | 4.45 |
| | Condensate cooling water including Reservoir, Tubewells, etc. & sanitation | 25.14 | 25.14 | 0.00 | 0.00 | 0.00 | 0.00 | 25.14 | 25.14 |
| | DM plant waste treatment systems | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 |
| | Sewerage collection, treatment & disposal system | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Land | | | | | | | | | |
| | Rehabilitation & resettlement of displaced persons | These values are highly location specific and hence any average would be distorting | | | | | | | |
| | Restoration of land in construction area | | | | | | | | |

| Ash di sposal | | | | | | | | | |
|---------------|--------------------------------|-------|-------|-------|-------|--------|--------|--------|--------|
| | Ash handling system | | | | | | | | |
| | - Civil Works | 18.49 | 18.49 | 18.49 | 18.49 | 18.49 | 18.49 | 18.49 | 18.49 |
| | - Mechanical Works | 46.29 | 46.29 | 46.29 | 46.29 | 46.29 | 46.29 | 46.29 | 46.29 |
| | Treatment of ash pond effluent | | 0 | | 0 | | 0 | | 0 |
| | Ash Dykes | 65.63 | 65.63 | 65.63 | 65.63 | 196.88 | 196.88 | 196.88 | 196.88 |

| Environmental cost (Rs. Crores) | | <i>PS2/LT1/A</i> | <i>WB norms</i> | <i>PS2/LT2/A</i> | <i>WB norms</i> | <i>PS2/LT2/A</i> | <i>WB norms</i> | <i>PS2/LT1/A</i> | <i>WB norms</i> |
|--|---|---|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| | | <i>D1</i> | | <i>D1</i> | | <i>D2</i> | | <i>D2</i> | |
| Control / Stability measures | | | | | | | | | |
| Forest | | | | | | | | | |
| | Environmental losses (when compensatory afforestation is not done) or afforestation | 276.36 | 276.36 | 0.00 | 0.00 | 0.00 | 0.00 | 276.36 | 276.36 |
| | Cost of supplying free fuel wood to workers during construction | 63.00 | 63.00 | 63.00 | 63.00 | 63.00 | 63.00 | 63.00 | 63.00 |
| Noise | | | | | | | | | |
| | Measures to control noise impact (ear muffs) | The noise level is maintained within limits | | | | | | | |
| Visual | | | | | | | | | |
| | Green belt development | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 |
| Other costs | | | | | | | | | |
| | Control of fire & explosion hazards (safety measures) | 8.64 | 8.64 | 0.00 | 0.00 | 0.00 | 0.00 | 8.64 | 8.64 |
| | Loss of value of timber, fuel wood and minor forest produce and manhours lost on annual basis | 2.06 | 2.06 | 0.00 | 0.00 | 0.00 | 0.00 | 2.06 | 2.06 |
| | Loss of animal husbandry, productivity, fodder | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| | Loss of agriculture produce | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 |
| | Loss of public facilities | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| | Social cost for suffering to | 1.08 | 1.08 | 1.08 | 1.08 | 1.08 | 1.08 | 1.08 | 1.08 |

| | | | | | | | | | |
|--|---------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | oustees | | | | | | | | |
| | TOTAL | 589.83 | 643.04 | 277.63 | 330.84 | 408.88 | 462.09 | 721.08 | 774.29 |
| | Environment cost as % of TOTAL | 22% | 24% | 11% | 13% | 16% | 18% | 27% | 29% |

| | | |
|------------------------|---------------------------------|--|
| Impact measures | | <p>The valuation techniques available are mostly applicable to developed countries and hence not possible to extend to Indian conditions. The impact of air study done by Brandon and Hommann is an analysis for all air pollution from all sources and hence cannot be extended to one single power project. Thus one needs to keep in mind the additional cost associated with these impacts and the corresponding under estimation involved in environmental costing.</p> |
| Health | | |
| | Morbidity | |
| | Mortality | |
| Displacement | | |
| | Psychological suffering | |
| | Health impact | |
| | Loss in livelihood | |
| Biodiversity | | |
| | Marine life | |
| | Wildlife habitat | |
| | Upsetting of ecological balance | |
| Land/Material | | |
| | Soil erosion effect | |
| | Material erosion/soiling | |
| | Impact of productivity loss | |
| Noise | | |
| | Hearing loss | |
| | Psychological effect | |
| Visual | | |
| | Aesthetic loss | |

Note. Control/Stability measures and other costs will have corresponding monetary values. For the impact measures corresponding economic valuation have to be done.