

Annexure 4.1 (i)

Coal-based Power Plant

<i>The Variables</i>									
1	Size	1000	MW	1000	MW	1000	MW	1000	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	Hectares	1500	Hectares	1500	Hectares	1500	Hectares
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>PS1/LT1/A</i>	<i>WB norms</i>	<i>PS1/LT2/A</i>	<i>WB norms</i>	<i>PS1/LT2/A</i>	<i>WB norms</i>	<i>PS1/LT1/AD2</i>	<i>WB norms</i>
		<i>D1</i>		<i>D1</i>		<i>D2</i>			
Control / Stability measures									
Air pollution									
SPM	Electrostatic precipitators	70.95	141.90	70.95	141.90	70.95	141.90	70.95	141.90
SO ₂ , NO _x	Chimney with Stack height:	23.81	23.81	23.81	23.81	23.81	23.81	23.81	23.81
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	33.52	33.52	33.52	33.52	33.52	33.52	33.52	33.52
	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 disposal									
	Ash handling system								
	- Civil Works	24.66	24.66	24.66	24.66	24.66	24.66	24.66	24.66
	- Mechanical Works	61.73	61.73	61.73	61.73	61.73	61.73	61.73	61.73
	Treatment of ash pond effluent		0		0		0		0
	Ash Dykes	87.50	87.50	87.50	87.50	262.50	262.50	262.50	262.50

Environmental cost (Rs. Crores)		<i>PS1/LT1/A</i>	<i>WB norms</i>	<i>PS1/LT2/A</i>	<i>WB norms</i>	<i>PS1/LT2/A</i>	<i>WB norms</i>	<i>PS1/LT1/AD2</i>	<i>WB norms</i>
		<i>D1</i>		<i>D1</i>		<i>D2</i>			
Control / Stability measures									
Fore st									
	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	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00
Nois e									
	Measures to control noise impact (ear muffs)	The noise level is maintained within limits							
Visu al									
	Green belt development	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Other costs									
	Control of fire & explosion hazards (safety measures)	11.51	11.51	11.51	11.51	11.51	11.51	11.51	11.51
	Loss of value of timber, fuel wood and minor forest produce and manhours lost on annual basis (for forest area)	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 oustees	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
	TOTAL	689.33	760.28	410.91	481.86	585.91	656.86	864.33	935.28
	Environment cost as % of TOTAL	20%	22%	12%	14%	17%	19%	25%	27%

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	
Bio-diversity		
	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.