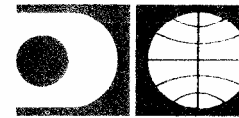


## DEVELOPMENT CONSULTANTS PRIVATE LIMITED

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DCPL-01105/PC-7/CHEM/5273A

June 15, 2005

**Visa Steel Limited,  
8/10 Alipore Road,  
Visa House  
Kolkata**

**Sub. : Computation of unit power cost for  
Visa Steel Limited**

Sirs,

With reference to your letter dated 19.05.05, regarding determination of unit power cost for the proposed integrated iron and steel plant of Visa Steel Limited in Jajpur district of Orissa, we have worked out the same for the following three scenarios as suggested by you:

Scenario-I: Power cost in case entire power is sourced from the grid

Scenario-II: Power cost in case entire power is generated in-house in a coal based CPP

Scenario-III: Power cost in case of partial power generation with surplus by-Product gases and CFBC boiler and the remaining power being sourced from the grid.

The unit power cost for all these three scenarios have been tabulated below:

Comparison of unit power cost at Visa Steel Limited	
Scenario	Unit Power Cost
Scenario-I	Rs. 3.20/kWh
Scenario-II	Rs. 2.09/kWh
Scenario-III	Rs. 2.27/kWh

Please note that the cost of survival power has not been included in the computations as it is found to be minimal and its impact on the above mentioned three options is similar and negligible.

Cont'd.....2/.....



The detailed computation of unit power cost for different scenarios as well as the sensitivity analysis has been enclosed herein for reference.

In case of any further input, please revert.

Thank you and assuring you of our best services at all times,

Very truly yours  
**Development Consultants Pvt. Ltd.**

  
**A. R. Ghosal**  
General Manager

Enclosure:

1. Unit Power Cost for different scenarios
2. Sensitivity Analysis



Power Requirement at Visa Steel Limited					
Parameters	Annual Operational Days (days/annum)	Specific Power Consumption (kWh/ton)	Production (MT/annum)	Total Electrical Energy Requirement (MWh/annum)	Remarks
Blast Furnace	325	165	225000	37125	360 days of annual operation with 90% Load Factor
Coke Oven	325	12	400000	4800	360 days of annual operation with 90% Load Factor
Ferro Chrome	325	3900	50000	195000	360 days of annual operation with 90% Load Factor
DRI Plant	300	125	300000	37500	15 days of annual maintenance and 10 days shut down every 60 days
Steel Melting Shop	325	975	500000	487500	360 days of annual operation with 90% Load Factor
Rolling Mill	325	127	500000	63500	360 days of annual operation with 90% Load Factor
Others	365			43800	5 MW power requirement for other ancillary facilities
Gross Power Requirement				869225	
Gross Power Generation Capacity of a Coal based CPP (MW)				115	Considering 10% auxiliary electricity consumption and 15 days of annual shut down for maintenance



Waste Gas based Power Generation				Remarks/Assumptions
Description	Unit	Value		
Specific Steam Consumption of Turbine	TPH/MW	4.2		
Power Generation with DRI kiln Waste Gas				
Steam Generation with DRI kiln Waste Gas	TPH	96		Considering DRI kiln Waste Gas availability
Power Generated with steam from DRI kiln Waste Gas	MW	20.6		Considering 90% PLF for power generation
Annual Operational Days	Days/annum	300		15 days of annual maintenance and 10 days shut down every 60 days
Gross Electricity Generation	MWh/annum	148114		
Auxiliary Electricity Consumption	MWh/annum	14811		Considering 10% of auxiliary consumption
Net Electricity Generation	MWh/annum	133303		
Power Generation with Blast Furnace Gas				
Steam Generation with Blast Furnace Gas	TPH	24		Considering Blast Furnace Gas availability
Power Generated with steam from Blast Furnace Gas	MW	5.1		Considering 90% PLF for power generation
Annual Operational Days	Days/annum	325		360 days of annual operation with 90% Plant Availability
Gross Electricity Generation	MWh/annum	40114		
Auxiliary Electricity Consumption	MWh/annum	4011		Considering 10% of auxiliary consumption
Net Electricity Generation	MWh/annum	36103		
Power Generation with Coke Oven Gas				
Steam Generation with Coke Oven Gas	TPH	84		Considering Coke Oven Gas availability
Power Generated with steam from Coke Oven Gas	MW	18.0		Considering 90% PLF for power generation
Annual Operational Days	Days/annum	325		360 days of annual operation with 90% Plant Availability
Gross Electricity Generation	MWh/annum	140400		
Auxiliary Electricity Consumption	MWh/annum	14040		Considering 10% of auxiliary consumption
Net Electricity Generation	MWh/annum	126360		
Electricity Generation with Waste Gases				
Gross Electricity Generation with Waste Gases	MWh/annum	328629		
Net Electricity Generation with Waste Gases	MWh/annum	295766		
Electricity Generation with Steam from CFBC Boiler				
Steam generation from CFBC Boiler	TPH	145		Considering Steam sent to SMS
Power Generation with steam from CFBC Boiler	MW	31.1		Considering 90% PLF for power generation
Annual Operational Days	Days/annum	350		
Gross Electricity Generation	MWh/annum	261000		
Auxiliary Electricity Consumption	MWh/annum	26100		Considering 10% of auxiliary consumption
Net Electricity Generation	MWh/annum	234900		



Unit Power Cost in Base Case				Remarks
Description	Units	CFBC		
Power Generation Capacity	MW	115		
Auxiliary Consumption	%	10		
Annual Operational Days	Days/annum	350		
Gross Electricity Generated	MWh/annum	965806		
Net Electricity Generated	MWh/annum	869225		
<b>Variable Cost</b>				
<b>Determination of Fuel Cost</b>				
Station Heat Rate	kCal/kWh	2867		Considering 30% efficiency of power generation
Thermal Energy Input	kCal/annum	2.76864E+12		
Quantity of Coal Fines consumed	MT/annum	36000		@ 120TPD
Gross Calorific Value of Coal Fines	kCal/kg	3600		
Quantity of Coal Char consumed	MT/annum	75000		@ 250TPD
Gross Calorific Value of Coal Char	kCal/kg	2000		
Quantity of Coal consumed	MT/annum	777826		
Gross Calorific Value of Coal	kCal/kg	3200		
Coal Fines Cost	Rs./MT	800		
Coal Char Cost	Rs./MT	0		
Coal Cost	Rs./MT	1150		
Total fuel cost for power generation	Rs./kWh	1.06		
Total Utility Cost-Water & Chemicals	Rs./kWh	0.05		
Total Variable Cost for power generation	Rs./kWh	1.11		
<b>Fixed Cost</b>				
<b>Capital Investment</b>				
Total Project Cost	Rs. Lacs	45991		@ INR 4.0 Crore/MW
Equity Portion	Rs. Lacs	13797		Debt:Equity = 70:30
Loan Portion	Rs. Lacs	32194		
Interest on Loan	Rs. Lacs/annum	3380		@ 10.5%
Return on Equity	Rs. Lacs/annum	1656		@ 12%
Total Interest	Rs./kWh	0.58		
<b>Depreciation</b>				
Depreciation on Building Cost	Rs. Lacs/annum	230		Building Cost @ 15% of Total Project Cost & Depreciation @ 3.34%
Depreciation on Plant & Machineries	Rs. Lacs/annum	2064		Plant & Machineries Cost @ 85% of Total Project Cost & Depreciation @ 5.28%



Total Depreciation	Rs./kWh	0.26	
Operation & Maintenance			
Operation & Maintenance	Rs. Lacs/annum	1150	@2.5% of Total Project Cost
O&M Expenses	Rs./kWh	0.13	
Total Fixed Cost for power generation	Rs./kWh	0.98	
Unit Cost of Power Generation	Rs./kWh	2.09	



Unit Power Cost in Project Case					
Description	Units	CFBC	Waste Gas	Grid	Remarks
Power Generation Capacity	MW	31.1			
Gross Electricity Generated	MWh/annum	267000			
Net Electricity Generated	MWh/annum	234900	295766	338559	
<b>Variable Cost</b>					
<b>Determination of Fuel Cost</b>					
Station Heat Rate	kCal/kWh	2867			Considering 30% efficiency of power generation
Thermal Energy Input (Coal-Char mix)	kCal/annum	7.482E+11			
Quantity of Coal Fines consumed	MT/annum	36000			@ 120TPD
Gross Calorific Value of Coal Fines	kCal/kg	3600			
Quantity of Coal Char consumed	MT/annum	75000			@ 250TPD
Gross Calorific Value of Coal Char	kCal/kg	2000			
Quantity of Coal consumed	MT/annum	146438			
Gross Calorific Value of Coal	kCal/kg	3200			
Coal Fines Cost	Rs./MT	800			
Coal Char Cost	Rs./MT	0			
Coal Cost	Rs./MT	1150			
Total fuel cost for power generation	Rs./kWh	0.84	0.00	0.00	
Total Utility Cost-Water & Chemicals	Rs./kWh	0.05	0.05	0.00	
Total Variable Cost for power generation	Rs./kWh	0.89	0.05	0.00	
<b>Fixed Cost</b>					
<b>Capital Investment</b>					
Capital Project Cost	Rs. Lacs	12429	23571		@ 4Crore/MW for CFBC Boiler based power plant and total power plant cost as INR 360 Crores
Equity Portion	Rs. Lacs	3729	7071		Debt:Equity = 70:30
Loan Portion	Rs. Lacs	8700	16500		
Interest on Loan	Rs. Lacs/annum	914	1733		@ 10.5%



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Return on Equity	Rs. Lacs/annum	447	849	@ 12%
Total Interest	Rs./kWh	0.58	0.87	
Depreciation				
Depreciation on Building Cost	Rs Lacs/annum	62	118	Building Cost @ 15% of Total Project Cost & Depreciation @ 3.34%
Depreciation on Plant & Machineries	Rs Lacs/annum	558	1058	Plant & Machineries Cost @ 85% of Total Project Cost & Depreciation @ 5.28%
Total Depreciation	Rs./kWh	0.26	0.40	
Operation & Maintenance				
Operation & Maintenance	Rs Lacs/annum	311	589	@2.5% of Total Project Cost
O&M Expenses	Rs./kWh	0.13	0.20	
Total Fixed Cost for power generation	Rs./kWh	0.98	1.47	3.20
Total Cost of Power Generation	Rs./kWh	1.87	1.52	3.20
Unit Cost of Power Generation	Rs./kWh		2.27	





Visa Steel Limited Power Cost Sensitivity Analysis				
Sensitivity	Parameters	Variation	Base Case Power Cost (Rs./kWh)	Project Case Power Cost (Rs./kWh)
	Power Cost under normal circumstance		2.09	2.27
1	Coal Cost	+10%	2.19	2.29
		-10%	1.98	2.25
2	Grid Power Cost	+10%	2.09	2.39
		-10%	2.09	2.14
3	Waste Gas based Power Generation	+5%	2.09	2.21
		-5%	2.09	2.32
4	Coal Cost+Grid Power Cost	+10% & +10%	2.19	2.41
		-10% & -10%	1.98	2.12
5	Coal Cost+Waste Gas based Power Generation	+10% & +5%	2.19	2.23
		-10% & -5%	1.98	2.30
6	Grid Power Cost+Waste Gas based Power Generation	+10% & -5%	2.09	2.45
		-10% & +5%	2.09	2.09
7	Coal Cost+Grid Power Cost+Waste Gas based Power Generation	+10%, -10% & -5%	2.19	2.47
		-10%, -10% & +5%	1.98	2.08
8	Coal Cost+Grid Power Cost+Waste Gas based Power Generation	+10%, +10% & +5%	2.19	2.35
		-10%, -10% & -5%	1.98	2.17



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