DETAILED PROJECT REPORT
ON
ENERGY EFFICIENT BOILER (3 TPH)
(SURAT TEXTILE CLUSTER)

Bureau of Energy Efficiency

Prepared By

ZenithEnergy
Horizons Beyond Energy

Reviewed By

ISTSL

ENERGY EFFICENT BOILER (3TPH)

SURAT TEXTILE CLUSTER

BEE, 2010 - 11
Detailed Project Report on Energy Efficient Boiler (3THP)
Textile SME Cluster, Surat, Gujarat (India)
New Delhi: Bureau of Energy Efficiency;
Detail Project Report No: ***SRT/TXT/EEB/01***

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We take this opportunity to express our appreciation for the excellent support provided by Textile Unit Owners, Local Service Providers, and Equipment Suppliers for their active involvement and their valuable inputs in making the program successful and in completion of the Detailed Project Report (DPR).

ZESPL is also thankful to all the SME owners, plant in charges and all workers of the SME units for their support during the energy use and technology audit studies and in implementation of the project objectives.

Zenith Energy Services Pvt. Ltd.

Hyderabad

Content

List of Annexure

List of Table

List of Figure

LIST OF ABBREVATIONS

- BEE - Bureau of Energy Efficiency
- DPR - Detailed Project Report
- DSCR - Debt Service Coverage Ratio
- FD - Forced Draft
- GHG - Green House Gases
- HP - Horse Power
- IBR - Indian Boiler Regulation
- IRR - Internal Rate of Return
- ID - Induced Draft
- MoP - Ministry of Power
- MoMSME - Ministry of Micro Small and Medium Enterprises
- NPV - Net Present Value
- RBI PLR - Reserve Bank of India Prime Lending Rates
- ROI - Return On Investment
- SME - Small and Medium Enterprises
- TFH - Thermic Fluid Heater
- VFD - Variable Frequency Drive
- WHR - Waste Heat Recovery

EXECUTIVE SUMMARY

Zenith Energy Services Pvt. Ltd is executing BEE - SME program in Surat textile cluster, supported by Bureau of Energy Efficiency with an overall objective of improving the energy efficiency in cluster units.

Surat is renowned for the synthetic Sarees and dress materials and there are about 450 above industries in the cluster. The major fuels used in the cluster units are Imported Coal, Lignite, Natural gas and Biomass (Groundnut husk briquettes and Wood). Lignite and imported coal are used in boilers for steam generation. Natural gas is used in Stenter (for heat setting) and Natural gas based generators. The cost of energy as a percentage of manufacturing cost varies anywhere between 12 to 15%, which includes electrical as well as thermal energy cost.

This DPR is prepared for installation of new efficient Boiler of 3 TPH capacity for steam generation used in the machinery like Jet dyeing machines, Drum Machines, Loop Machines etc. for production process. The project activities reduce overall coal (Lignite) consumption by 927 tonne per year while there is no saving in electricity consumption.

This bankable DPR also found eligible for subsidy scheme of MoMSME for "Technology and Quality Upgradation Support to Micro, Small and Medium Enterprises" under "National Manufacturing and Competitiveness Programme". The key indicators of the DPR including the Project cost, debt equity ratio, monetary benefit and other necessary parameters are given in table below:

S.No	*Parameter*	*Unit*	*Value*
1	Project cost	₹ in lakh	19.93
2	Debit equity ratio	ratio	3:1
3	Monetary benefit	₹ in lakh	35.23
4	Simple payback period	Months	7
5	NPV	₹ in lakh	108.02
6	IRR	%age	132.77
7	ROI	%age	30.77
8	DSCR	ratio	7.22
9	Process down time during implementation	week	2

The projected profitability and financial indicators shows that the project will be able to earn profit from replacement of conventional boiler with new energy efficient boiler.

ABOUT BEE SME PROGRAMME

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 25 selected SMEs clusters. Surat Textile Cluster is one of them. The BEE's SME Programme intends to enhance the energy efficiency awareness by funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up gradation through studies and pilot projects in these SMEs clusters.

Major activities in the BEE -SME program are furnished below:

Energy use and technology studies

The energy use technology studies would provide information on technology status, best operating practices, gaps in skills and knowledge on energy conservation opportunities, energy saving potential and new energy efficient technologies, etc for each of the sub sector in SMEs.

Capacity building of stake holders in cluster on energy efficiency

In most of the cases SME entrepreneurs are dependent on the locally available technologies, service providers for various reasons. To address this issue BEE has also undertaken capacity building of local service providers and entrepreneurs/ managers of SMEs on energy efficiency improvement in their units as well as clusters. The local service providers will be trained in order to be able to provide the local services in setting of energy efficiency projects in the clusters

Implementation of energy efficiency measures

To implement the technology up gradation projects in clusters, BEE has proposed to prepare the technology based detailed project reports (DPRs) for a minimum of five technologies in three capacities for each technology.

Facilitation of innovative financing mechanisms for implementation of energy efficiency projects

The objective of this activity is to facilitate the uptake of energy efficiency measures through innovative financing mechanisms without creating market distortion.

1 INTRODUCTION

1.1 Brief about the SME cluster

The products manufactured in Surat Textile Cluster are synthetic sarees and dress materials which are renowned in the country as well as abroad and have good domestic market. The main raw material used for the cluster units is grey cloth which is procured by local weaving units and agents. The cost of energy (electrical and thermal energy) varies between 12 and 15% of total manufacturing cost.

Majority of the cluster units are of integrated type, where the raw material “grey cloth” is processed in-house to the final product like sarees and dress materials. Most of the units of the cluster are working on Job basis, where the textile agents will provide design and grey cloth and the grey cloth is processed as per design provided by the clients. The energy cost is next to the raw materials cost**.**

Production process

The main process operation for dyeing and printing process of synthetic sarees and dress materials adopted in cluster units are as follows:

Fabric pre-treatment

The main purpose of the fabric pre-treatment process is to remove oil, grease and other materials and to whiten the grey cloth though bleaching. The various process adopted in pre-treatment are scouring, bleaching and shrinking process.

Dyeing

Dyeing is the process of imparting colors to the material through a dye (color). In which a dye is applied to the substrate in a uniform manner to obtain an even shade with a performance and fastness appropriate to its final use. This process is mainly performed in Jet Dyeing Machines and Jigger machines.

Dyeing of fabric is carried out in jet dyeing machines. The temperature of the solution is raised to 50℃. Concentrated dyestuff solution is prepared separately and is added to the liquor. After the addition of dyes, the temperature is raised to 130℃ and maintained for about 60 minutes.

After whitening/dyeing, the fabric is unloaded from the machine and taken to the folding and rolling machines for improving the width of cloth, which gets shrunk during the washing and dyeing process.

Printing

In Surat cluster three types printing methods are used. Most of the units are following the flat bed printing, rotary printing and some units follows hand printing. Hand printing is the old method to print the fabric. The flat bed printing has provision for printing 10 to 14 colors simultaneously. The color print paste prepared is fed onto the screens from which it is transferred to the fabric fed in. The fabric after print paste transfer is passed through a drying chamber at 145℃. The dried and printed fabric is taken for further processing.

Drying and Finishing

After printing, the drying process is performed in loop machine, where the temperature is maintained between 130℃ to 170℃ for better color setting. After passing through the loop machines, the printed fabric is washed in a series of normal water and hot water washing in the presence of chemicals for color setting. After completion of the washing process, the printed and washed fabric is subjected to heat setting process in Stenter and then pressing and finishing treatments.

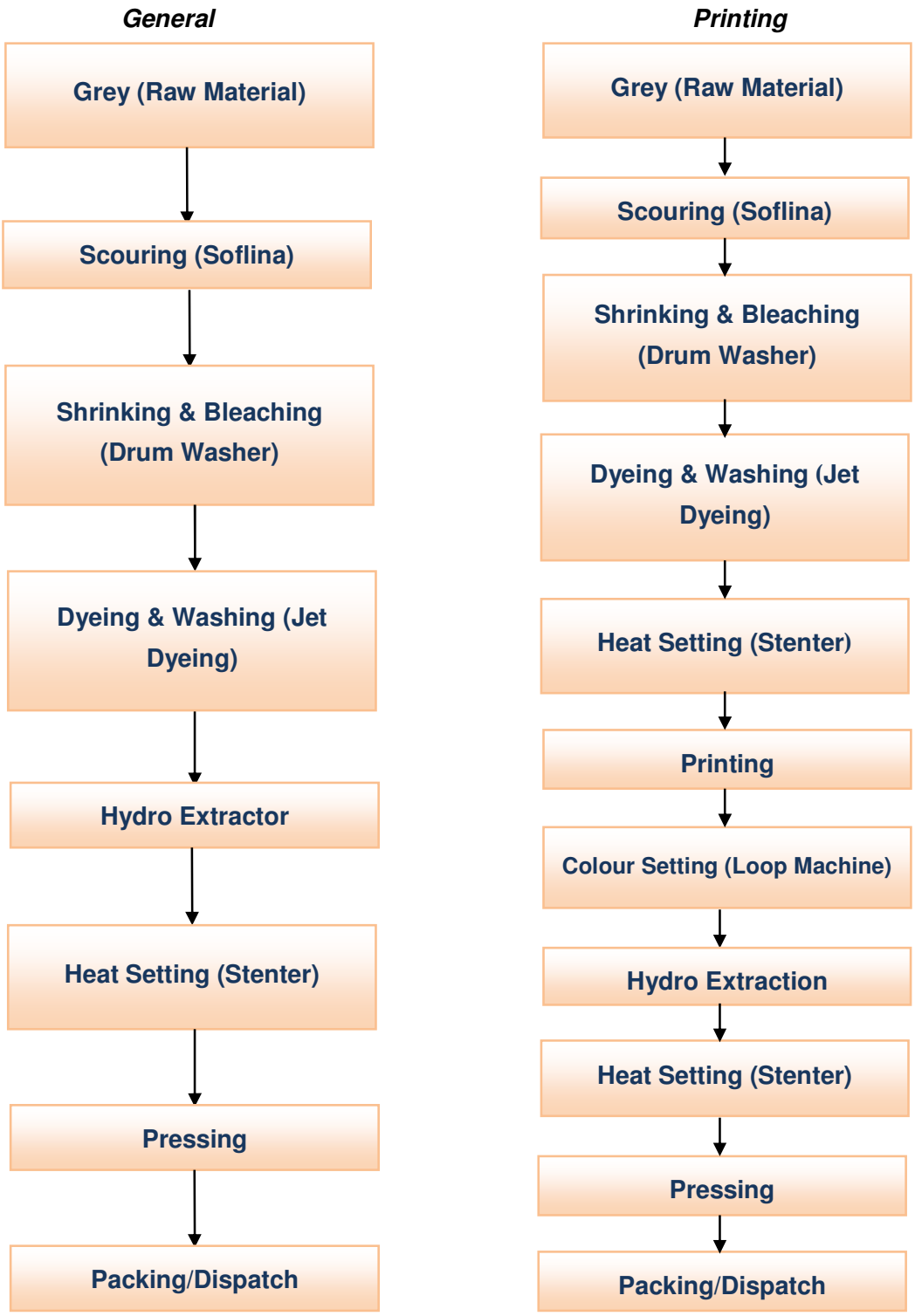


Figure 1: General process flowchart of a typical textile unit

1.2 Energy performance in existing situation

1.2.1 Fuel and electricity consumption of a typical unit

The main energy forms used in a typical unit in the cluster are electricity, coal/lignite and natural gas. Electricity is used for driving the prime movers of pumps, fans, stenter fans, ID and FD fans, conveyers, loop machines drives, lighting etc. Imported coal and lignite are used as fuel in boilers for steam generation whereas natural gas is used as fuel in electricity generation for stenter, printing and loop machines. The energy consumption of a typical unit in the cluster using local make pumps and having about 7 Jet machines is furnished in Table 1.1 below:

Table 1.1: Energy consumption of a typical unit (TRISHLA SILKS MILLS (P) LTD)

S.No	Details	Unit	Value
1	Coal/lignite consumption	tonne/year	2160
2	Grid electricity consumption	MWh/year	476
3	Natural gas consumption	million SCM/year	0.298
4	Production (quantity processed)	mts(In lakh)/year	66

1.2.2 Average production by a typical unit in the cluster

The average production in a typical unit is 66,00,000 meter of final product per year.

1.3 Identification of technology/equipment to be upgraded / changed

1.3.1 Description of current technologies

There are about 420 boilers used in entire cluster for steam generation. As per the detailed studies undertaken in various units of the cluster, efficiency of some of the boilers is found to be very low.

1.3.2 Its role in the whole process

Boiler is used for steam generation which is used in the machinery like Jet machines, Drum machines, and loop machines etc. for production of share and dress material.

1.4 Establishing the baseline

1.4.1 Design and operating parameters/fuel consumption

Present fuel consumption in the boiler (Trishla Silk Pvt. Ltd.) is about 7.85 tonne per day (Imported coal) and average final production is about 20,000 mts per day while boiler is operated for 24 hours in a day.

1.4.2 Fuel Consumption

Fuel consumption of present Boiler of three typical units in the Cluster is furnished in Table 1.2 below:

Table 1.2 Fuel consumption in different unit

S. No	*Name of the unit*	*Boiler Capacity (TPH)*	*Fuel consumption (Tons/day)*	*Efficiency of the boiler (% age)*
1	Trishla silk Mills Pvt Ltd	3	7.20	35.1
2	Vimlon Ptg Mills Pvt Ltd	3	11.50	31.3
3	Utsav Silk Mills	3	8.70	32.7

1.5 Barriers for adoption of new and energy efficient technology/equipment

1.5.1 Technological Barriers

The major technical barriers that prevented the implementation of the energy efficient boiler in the cluster are:

- Lack of awareness about the energy efficient boiler
- Dependence on local equipment suppliers, who doesn't have technical knowledge

1.5.2 Financial Barrier

- Lack of awareness of the losses and monetary benefit of energy efficient boiler
- Unit owners are not interested to invest on energy efficient project

1.5.3 Skilled manpower

Not applicable

1.5.4 Other barrier(s)

Information on the energy efficient technologies not available among cluster unit owners, though the suppliers are available locally, the information was not disseminated among cluster units.

2. TECHNOLOGY/EQUIPMENT FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1 Detailed description of equipment selected

2.1.1 Description of equipment

Equipment which has been selected for the project activity is new energy efficient boiler which will replace the inefficient existing boiler. The new energy efficient boiler has overall efficiency of more than 70%.

In Surat Textile cluster, Boilers installed in the selected units have low efficiency which is in the range of 30 to 35% only. So it is suggested to install energy efficient boilers. Details efficiency evaluation of boilers is provided in Annexure 1.

2.1.2 Technology/equipment specifications

Technical specifications of the new energy efficient boiler are furnished in Table 1.3 below:

Table 1.3 Technical specifications of the new energy efficient boiler

S.No.	*Particular*	*Details*
1	Type of Boiler	Horizontal Multi Tubular Fully Wet back Three pass smoke tube Boiler
2	Design, Fabrication	IBR 1950 with latest Amendments. inspection & testing code
3	Model	FWS-C
4	Evaporation Capacity	3000 Kg/hr (F&A 100°C)
5	Max. Working Pressure	150 PSI(g) / 10.54 Kg/cm2(g) (Safety valve set off)
6	Efficiency	70 %
7	Fuel	Coal
8	Gross Calorific Value	4500 kCal/kg
9	Mode of combustion	Mechanical Draught
10	Type of feeding	Manually through fire door

Further details are provided in the Annexure 8.

2.1.3 Justification & suitability of the equipment selected

The efficiency of the present boiler installed is of low (30 to 35%) while efficiency of the new boiler will be more than 70%. Hence, replacing the present Boiler with new energy efficient boiler will reduce fuel consumption and production cost. The Boiler selection is suggested according to the evaporation ratio and steam requirement in the process.

2.1.4 Superiority over existing technology/equipment

The new energy efficiency boiler is superior to the existing boiler for the following points:

- It will have less power consumption than the present boiler
- Fuel consumption is less when compared to the present boiler
- Efficiency of new efficient boiler is more than the present boiler

2.1.5 Availability of the proposed equipment

The technology/equipment identified for implementation is available in Hyderabad. Though, the local service providers are available, they don't have technical capability of fabricating the energy efficient designed boiler.

2.1.6 Source of technology/equipment

The technology is locally available at Surat textile cluster.

2.1.7 Service/technology providers

Details of service providers are in Annexure 7.

2.1.8 Terms and condition in sales

1.	Basis of Price	: Ex-Works, Trichy.
2.	Taxes and duties	: Extra as applicable at the time of dispatch / invoicing. At present rates applicable are,
	a) Central Excise Duty (CED)	: 10.3%
	b) Central Sales Tax (CST)	: 4 % without C form (or) 2 % against C form
3.	Packing & Forwarding	: NIL.
4.	Guidance of Erection and Commissioning	: NIL
5.	Transportation & Transit Insurance	: Buyer's Scope.
6.	Terms of payment	: 40% advance along with order Balance payment plus taxes and Duties 7days before readiness of boiler against proforma invoice.

7. Delivery period : Within 45-60 Days from the date of receipt of your technically & commercially clear Purchase order along with full payment.

2.1.9 Process down time during implementation

The actual process down time during implementation is 2 weeks and its breakup is provided in Annexure 6.

2.2 Life cycle assessment and risks analysis

The total operational life of the proposed energy efficient boiler is considered to be 12 years.

2.3 Suitable unit/plant size in terms of capacity/production

The suitable units for implementation of this capacity of boiler, where maximum 2 - 4 TPH steam required in the general production process.

3. ECONOMIC BENEFITS OF NEW ENERGY EFFICIENT BOILER

3.1 Technical benefits

3.1.1 Fuel savings per year

Fuel (coal/Lignite) savings by installing the proposed energy efficient boiler in place of existing boiler is estimated to be 927 tons per annum. This saving is estimated on the baseline prepared under the study of the units in the cluster.

3.1.2 Improvement in product quality

There is no significant impact on product quality ***directly and indirectly***.

3.1.3 Increase in production

The proposed equipment does not contribute to any increase in production ***directly or indirectly.***

3.1.4 Reduction in raw material consumption

No significant impact on the reduction of raw materials consumption ***directly or indirectly.***

3.15 Reduction in other losses

There is no reduction in other losses ***directly or indirectly.***

3.2 Monetary benefits

The monetary benefit due to installation of new energy efficient boiler is estimated ₹ 35.23 lakh per annum due to reduction in coal consumption.

3.3 Social benefits

3.3.1 Improvement in working environment in the plant

The replacement of inefficient boiler with energy efficient boiler will reduce the fuel consumption and will improve the work condition and environment as energy efficient boiler is designed to maintain the skin temperature equivalent to 15^0C + Ambient which result in less radiation losses.

3.3.2 Improvement in skill set of workers

The technology selected for the implementation is new and energy efficient. The training provided by equipment suppliers will improve the technical skills of manpower for better operation and maintenance; hence the technology implemented will create awareness among the workforce and improves the skill

3.4 Environmental benefits

3.4.1 Reduction in effluent generation

There is no significant impact in effluent generation due to implementation of the project.

3.4.2 Reduction in GHG emission such as CO_2, NO_x, etc

The major GHG emission reduction source is CO_2. The technology will reduce fuel consumption and hence emission reductions are estimated at 670 tons of CO_2 per annum due to implementation of the project activity.

3.4.3 Reduction in other emissions like SO_x

No significant impact on SO_x emissions.

4 FINANSIAL ANALYSIS OF NEW ENERGY EFFICIENT EQUIPMENT

4.1 Cost of equipment implementation

4.1.1 Cost of equipments

The total cost of plant and machinery is estimated at ₹ 19.54 lakh(₹ 17.4 lakh+₹ 2.14 lakh), which includes boiler, pumps, insulation, induced draft fan, chimney, electrical works and control panel with temperature controllers.

4.1.2 Other costs

The total cost of implementation of the energy efficient boiler is estimated at ₹ 19.93 lakh. The above cost includes cost of equipment / machinery, cost of fabrication (and/or) commissioning charges and the details are furnished below:

Table 4.1 Details of project cost

S. No.	Details	Cost (₹ in lakh)
1	Plant equipment and machinery and electrical works	19.54
2	Erection & Commissioning	0.39
3	Investment without IDC	19.74
4	Interest during implementation (preliminary & pre- operative expenses)	0.00
Total		19.93

4.2 Arrangement of funds

4.2.1 Entrepreneur's contribution

The entrepreneur's contribution is 25% of total project cost, which works out at ₹ 4.98 lakh.

4.2.2 Loan amount

The term loan is 75% of the total project, which is ₹ 14.95 lakh.

4.2.3 Terms & conditions of loan

The interest rate is considered at 10% which is SIDBI's rate of interest for energy efficient projects. The loan tenure is 5 years excluding initial moratorium period is 6 months from the date of first disbursement of loan.

4.3 Financial indicators

4.3.1 Cash flow analysis

Considering the above discussed assumptions, the net cash accruals starting with ₹ 26.35 lakh in the first year operation and increases to ₹ 139.34 lakh at the end of eighth year.

4.3.2 Simple payback period

The total project cost of the proposed technology is ₹.19.93 lakh and monetary savings due to reduction in fuel consumption is ₹ 35.23 lakh and the simple payback period works out to be 0.57 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10.00% interest rate works out to be ₹ 108.02 lakh.

4.3.4 Internal rate of return (IRR)

The after tax Internal Rate of Return of the project works out to be 132.77%. Thus the project is financially viable.

4.3.5 Return on investment (ROI)

The average return on investment of the project activity works out at 30.77%. The average DSCR is 7.22.

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

A sensitivity analysis has been worked out to ascertain how the project financials would behave in different situations like there is an increase in power savings or decrease. For the purpose of sensitive analysis, two scenarios are considered are.

- Increase in power savings by 5%
- Decrease in power savings by 5%

In each scenario, other inputs are assumed as constant. The financial indicators in each of the above situation are indicated along with standard indicators are shown in Table 4.2 below:

Table 4.2 Sensitivity analysis at different scenarios

Particulars	*IRR %*	*NPV*	*ROI*	*DSCR*
Normal	132.77	108.02	30.77	7.22
5% decrease in fuel savings	126.58	101.81	30.62	6.87
5% increase in fuel savings	138.93	114.22	30.91	7.57

4.5 Procurement and implementation schedule

The project is expected to be completed in 8-10 weeks from the date of financial closure. The detailed schedule of project implementation is furnished in Annexure 6.

Annexure

Annexure 1: Energy efficient evaluation

Trishla Silk Mills Pvt. Ltd.

Details	Unit	Value
Boiler Capacity	kg/hr	3000
Quantity of steam generated	kg/hr	1000
Boiler feed water temperature	^{0}C	30
Fuel Consumption	kg/hr	300
Calorific value of fuel	kCal/kg	6000
Enthalpy of steam	kCal/kg	661.4
Heat Input	kCal/hr	1800000
Heat output	kCal/hr	631400
Efficiency	%age	35.1

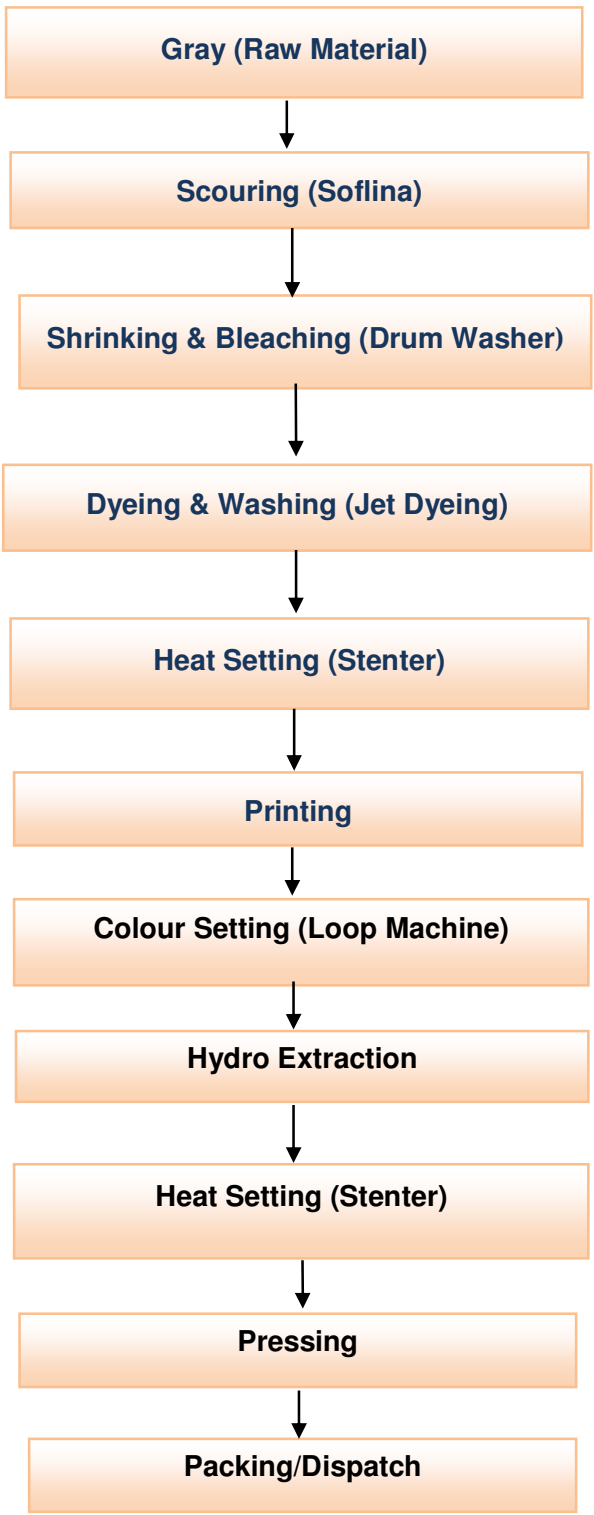
Utsav Silk Mills

Details	Unit	Value
Boiler Capacity	kg/hr	3000
Quantity of steam generated	kg/hr	700
Boiler feed water temperature	^{0}C	40
Fuel Consumption	kg/hr	333
Calorific value of fuel	kCal/kg	4000
Enthalpy of steam	kCal/kg	663.1
Heat Input	kCal/hr	1332000
Heat output	kCal/hr	436170
Efficiency	%age	32.7

Vimlon Dye & Ptg Mills Pvt Ltd

Details	Unit	Value
Boiler Capacity	kg/hr	6000
Quantity of steam generated	kg/hr	1520
Boiler feed water temperature	^{0}C	30
Fuel Consumption	kg/hr	440
Calorific value of coal	kCal/kg	6000
Calorific value of pet coke	kCal/kg	7800
Enthalpy of steam	kCal/kg	663.1
Heat Input	kCal/hr	3072000
Heat output	kCal/hr	962312
Efficiency	%age	31.3

Annexure 2: Process flow diagram

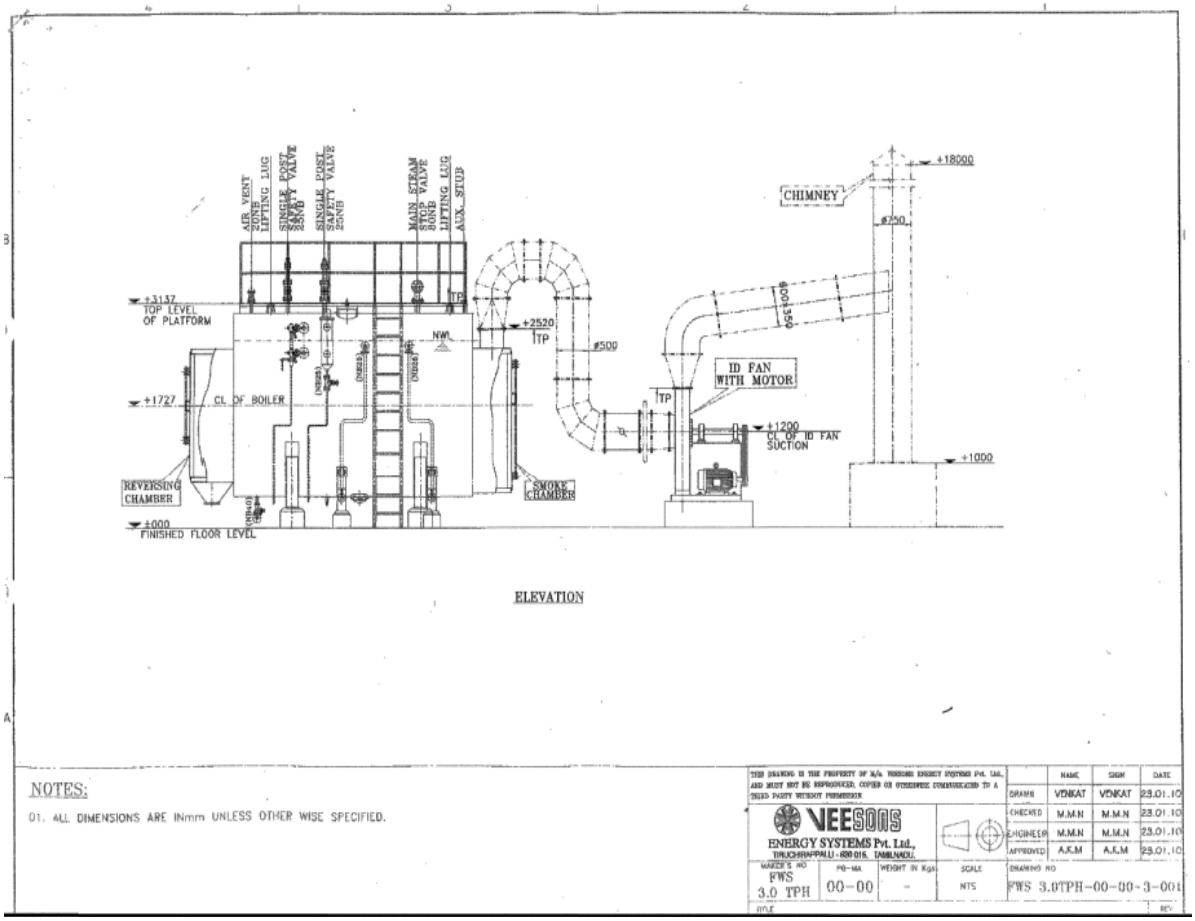


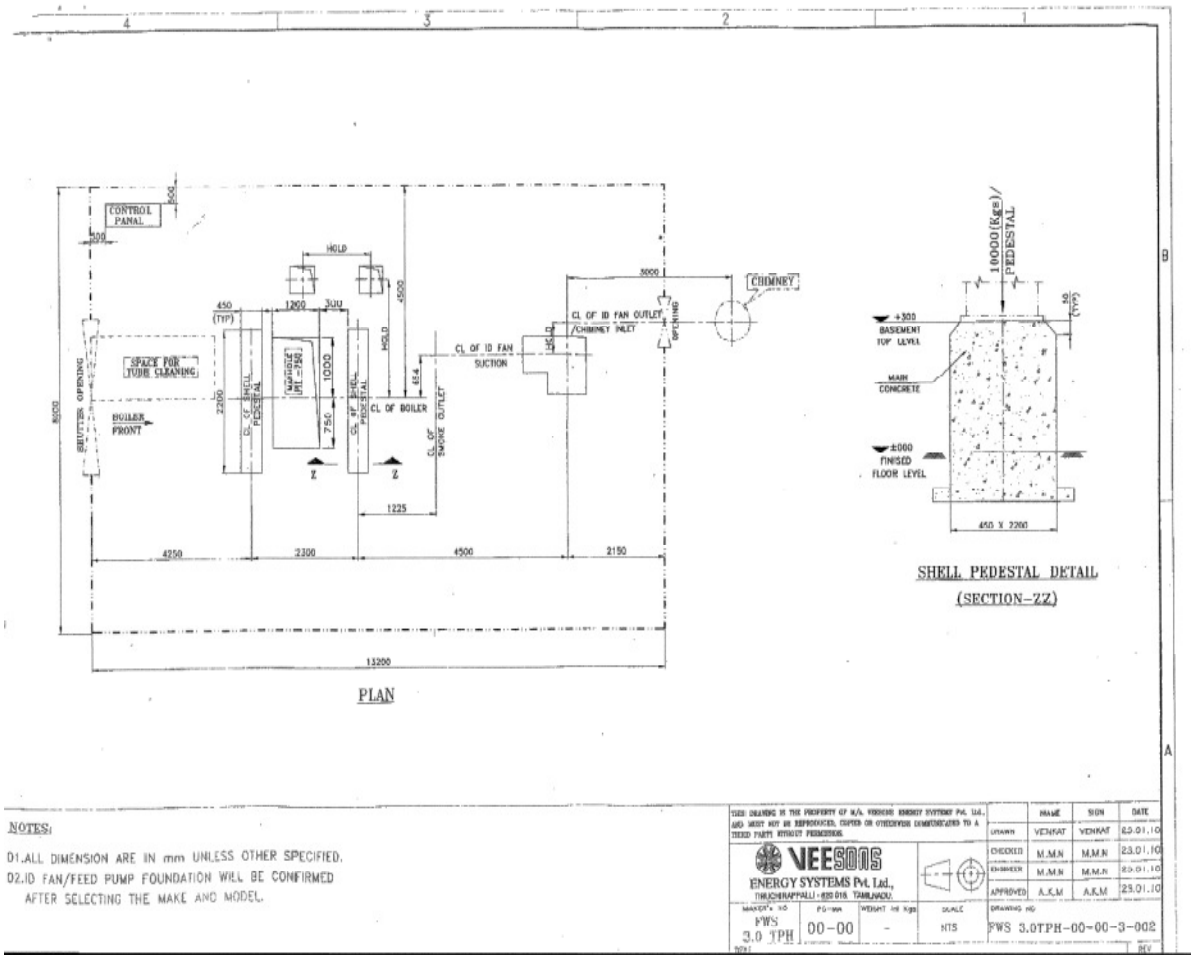
Annexure 3: Detailed Technology Assessment

Particular	*Unit*	*Value*
Boiler Capacity	kg/hr	3000
Quantity of steam generated	kg/hr	1000
Boiler feed water temperature	^{0}C	30
Fuel Consumption in existing boiler	kg/hr	300
Calorific value of fuel*	kCal/kg	6000
Enthalpy of steam	kCal/kg	661.4
Heat Input	kCal/hr	1800000
Heat output	kCal/hr	631400
Efficiency of existing boiler	% age	33.0
Efficiency of new energy efficient boiler (Design Data)	% age	70
Fuel consumption in new energy efficient boiler	kg/hr	151
Fuel saving per hours	kg/hr	149
Total operating hours per annum	Hrs	6225
Total Fuel (Coal) savings	Tonne/annum	927
Cost of fuel (coal)	₹ /tons	3800
Monetary savings	₹ in lakh/year	35.23
Investment required	₹ in lakh/year	19.93
Payback period	months	7

Assessment carried out for imported coal

Annexure 4: Drawings for proposed civil works




CONTROL PANAL
HOLD
CHIMNEY
SPACE FOR TUBE CLEANING
BOILER FRONT
SHUTTER OPENING
CL OF BOILER
CL OF ID FAN SUCTION
CL OF ID FAN OUTLET /CHIMNEY INLET
CL OF SMOKE OUTLET
4250
2300
4500
2150
13200
PLAN
10000(Kgs) / PEDESTAL
BASEMENT TOP LEVEL
MAIN CONCRETE
FINISED FLOOR LEVEL
450 X 2200
SHELL PEDESTAL DETAIL
(SECTION-ZZ)
NOTES:
01.ALL DIMENSION ARE IN mm UNLESS OTHER SPECIFIED.
02.ID FAN/FEED PUMP FOUNDATION WILL BE CONFIRMED AFTER SELECTING THE MAKE AND MODEL.
VEESONS
ENERGY SYSTEMS Pvt. Ltd.,
THUCHIRAPPALLI - 620 018 TAMILNADU
DRAWN VENKAT VENKAT 23.01.10
CHECKED M.M.N M.M.N 23.01.10
ENGINEER M.M.N M.M.N 23.01.10
APPROVED A.K.M A.K.M 23.01.10
FWS 3.0 TPH
00-00
NTS
FWS 3.0TPH-00-00-3-002

Annexure 5: Detailed financial calculations & analysis for financial indicators

Assumption

Name of the Technology	*New Efficient Boiler*		
Rated Capacity	*3000 kg/hr*		
Details	*Unit*	*Value*	*Basis*
Installed Capacity	Kg/Hr	3000	
No of working days	Days	310	@20 Hours Per Day
Shifts	No.	2	
Proposed Investment			
Plant & Machinery	₹ (in lakh)	19.54	
Erection & Commissioning	₹ (in lakh)	0.39	
Total Investment	₹ (in lakh)	19.93	
Financing pattern			
Own Funds (Equity)	₹ (in lakh)	4.98	Feasibility Study
Loan Funds (Term Loan)	₹ (in lakh)	14.95	Feasibility Study
Loan Tenure	years	5.00	Assumed
Moratorium Period	Months	6.00	Assumed
Repayment Period	Months	66.00	Assumed
Interest Rate	%	10.00%	SIDBI Lending rate
Estimation of Costs			
O & M Costs	% on Plant & Equip	4.00	Feasibility Study
Annual Escalation	%	5.00	Feasibility Study
Estimation of Revenue			
Coal Saving	Tons	927	
Cost	₹/Ton	3800	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	80.00	Income Tax Rules
Income Tax	%age	33.99	Income Tax

Estimation of Interest on Term Loan ***(₹ in lakh)***

Years	*Opening Balance*	*Repayment*	*Closing Balance*	*Interest*
1	14.95	0.90	14.05	1.35
2	14.05	2.20	11.85	1.31
3	11.85	2.80	9.05	1.06
4	9.05	3.20	5.85	0.77
5	5.85	3.40	2.45	0.44
6	2.45	2.45	0.00	0.07
		14.95		

WDV Depreciation

Particulars / years	*1*	*2*
Plant and Machinery		
Cost	19.93	3.99
Depreciation	15.94	3.19
WDV	3.99	0.80

Projected Profitability

Particulars / Years	1	2	3	4	5	6	7	8
Revenue through Savings								
Fuel savings	35.23	35.23	35.23	35.23	35.23	35.23	35.23	35.23
Total Revenue (A)	35.23	35.23	35.23	35.23	35.23	35.23	35.23	35.23
Expenses								
O & M Expenses	0.80	0.84	0.88	0.92	0.97	1.02	1.07	1.12
Total Expenses (B)	0.80	0.84	0.88	0.92	0.97	1.02	1.07	1.12
PBDIT (A)-(B)	34.43	34.39	34.35	34.30	34.26	34.21	34.16	34.10
Interest	1.35	1.31	1.06	0.77	0.44	0.07	0.00	0.00
PBDT	33.08	33.08	33.28	33.54	33.81	34.14	34.16	34.10
Depreciation	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
PBT	32.02	32.03	32.23	32.48	32.76	33.08	33.11	33.05
Income tax	5.82	10.16	11.31	11.40	11.49	11.60	11.61	11.59
Profit after tax (PAT)	26.20	21.87	20.92	21.08	21.27	21.48	21.50	21.46

Computation of Tax

₹ (In lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Profit before tax	32.02	32.03	32.23	32.48	32.76	33.08	33.11	33.05
Add: Book depreciation	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Less: WDV depreciation	15.94	3.19	-	-	-	-	-	-
Taxable profit	17.13	29.89	33.28	33.54	33.81	34.14	34.16	34.10
Income Tax	5.82	10.16	11.31	11.40	11.49	11.60	11.61	11.59

Projected Balance Sheet

₹ (In lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Liabilities								
Share Capital (D)	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98
Reserves & Surplus (E)	26.20	48.07	68.98	90.07	111.34	132.82	154.31	175.77
Term Loans (F)	14.05	11.85	9.05	5.85	2.45	0.00	0.00	0.00
Total Liabilities D)+(E)+(F)	45.23	64.90	83.02	100.90	118.77	137.80	159.29	180.75

Assets	1	2	3	4	5	6	7	8
Gross Fixed Assets	19.93	19.93	19.93	19.93	19.93	19.93	19.93	19.93
Less: Accm. Depreciation	1.05	2.10	3.16	4.21	5.26	6.31	7.37	8.42
Net Fixed Assets	18.88	17.83	16.77	15.72	14.67	13.62	12.56	11.51
Cash & Bank Balance	26.35	47.07	66.24	85.18	104.10	124.18	146.73	169.24
TOTAL ASSETS	45.23	64.90	83.02	100.90	118.77	137.80	159.29	180.75
Net Worth	2.82	2.38	1.82	1.17	0.49	0.00	0.00	0.00
Dept equity ratio	19.93	19.93	19.93	19.93	19.93	19.93	19.93	19.93

Projected Cash Flow:

₹ (In lakh)

Particulars / Years	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Sources									
Share Capital	4.98	-	-	-	-	-	-	-	-
Term Loan	14.95								
Profit After tax		26.20	21.87	20.92	21.08	21.27	21.48	21.50	21.46
Depreciation		1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Total Sources	19.93	27.25	22.92	21.97	22.14	22.32	22.53	22.55	22.51
Application									
Capital Expenditure	19.93								
Repayment of Loan	-	0.90	2.20	2.80	3.20	3.40	2.45	-	-
Total Application	19.93	0.90	2.20	2.80	3.20	3.40	2.45	-	-
Net Surplus	-	26.35	20.72	19.17	18.94	18.92	20.08	22.55	22.51
Add: Opening Balance	-	-	26.35	47.07	66.24	85.18	104.10	124.18	146.73
Closing Balance	-	26.35	47.07	66.24	85.18	104.10	124.18	146.73	169.24

Calculation of Internal Rate of Return ***₹ (In lakh)***

Particulars / months	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Profit after Tax		26.20	21.87	20.92	21.08	21.27	21.48	21.50	21.46
Depreciation		1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Interest on Term Loan		1.35	1.31	1.06	0.77	0.44	0.07	-	-
Salvage/Realizable value					-	-	-	-	-
Cash outflow	(19.93)	-	-	-	-	-	-	-	-
Net Cash flow	(19.93)	28.61	24.23	23.03	22.90	22.76	22.61	22.55	22.51
IRR	132.77%								

NPV	108.02

Break Even Point

₹ (In lakh)

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Variable Expenses								
Oper. & Maintenance Exp (75%)	0.60	0.63	0.66	0.69	0.73	0.76	0.80	0.84
Sub Total (G)	0.60	0.63	0.66	0.69	0.73	0.76	0.80	0.84
Fixed Expenses								
Oper. & Maintenance Exp (25%)	0.20	0.21	0.22	0.23	0.24	0.25	0.27	0.28
Interest on Term Loan	1.35	1.31	1.06	0.77	0.44	0.07	0.00	0.00
Depreciation *(H)*	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Sub Total (I)	2.60	2.57	2.34	2.05	1.74	1.38	1.32	1.33
Sales (J)	35.23	35.23	35.23	35.23	35.23	35.23	35.23	35.23
Contribution (K)	34.63	34.60	34.57	34.53	34.50	34.46	34.42	34.38
Break Even Point (L= G/I)	7.52%	7.44%	6.76%	5.94%	5.04%	4.00%	3.83%	3.88%
Cash Break Even {(I)-(H)}	4.48%	4.39%	3.71%	2.89%	1.99%	0.95%	0.78%	0.82%
BREAK EVEN SALES (J)*(L)	2.65	2.62	2.38	2.09	1.78	1.41	1.35	1.37

Return on Investment

₹ (In lakh)

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Total*
Net Profit Before Taxes	32.02	32.03	32.23	32.48	32.76	33.08	33.11	33.05	260.76
Net Worth	31.18	53.05	73.97	95.05	116.32	137.80	159.29	180.75	847.42
									30.77%

Debt Service Coverage Ratio

₹ (In lakh)

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Total*
Cash Inflow									
Profit after Tax	26.20	21.87	20.92	21.08	21.27	21.48	21.50	21.46	132.82
Depreciation	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	6.31
Interest on Term Loan	1.35	1.31	1.06	0.77	0.44	0.07	0.00	0.00	5.01
TOTAL (M)	28.61	24.23	23.03	22.90	22.76	22.61	22.55	22.51	144.14

Debt

Interest on Term Loan	1.35	1.31	1.06	0.77	0.44	0.07	0.00	0.00	5.01
Repayment of Term Loan	0.90	2.20	2.80	3.20	3.40	2.45	0.00	0.00	14.95
TOTAL (N)	2.25	3.51	3.86	3.97	3.84	2.52	0.00	0.00	19.96
Average DSCR (M/N)	7.22								

Annexure 6: Details of procurement and implementation plan with schedule/timelines

Details of procurement and implementation –Energy Efficient Boiler

S. No	Activity	Weeks				
		1 - 2	2 - 4	4 - 6	6 - 8	8 - 10
1	Collection of quotations and order finalization					
2	Designing by the supplier as per the requirement					
3	Fabrication at the equipment supplier workshop					
4	Delivery					
5	Commissioning , Trial runs and Insulation					

Break up of process down time

S. No.	*Activities*	*weeks*						
		1	*2*	*3*	*4*	*5*	*6*	*7*
1	Time required for dismantling or re-location of the existing boiler							
2	Civil works and curing							
3	Installation							
4	Commissioning, Trial & Insulation							

Note: The Process down time is considered for item 1,3 and 4 only. As the civil foundations and installation of water storage tanks and water distribution lines are layed during plant in operation.

Annexure 7: Details of technology/equipment and service providers

Equipment details	Source of technology	Service/technology providers
Energy Efficient Boiler	Hyderabad	**M/s Veesons Energy Systems Pvt.Ltd.** Mr.C.Raja / Branch manager, 406, Vijayshree Apartments Nagarjuna Nagar, Ameerpet, Hyderabad-500073, India, Phone No.040-39105039 Fax No.040-66625036

Annexure 8: Quotations or Techno-commercial bids for new technology/equipment

ISO 9001 BUREAU VERITAS Certification

VEESONS
ENERGY SYSTEMS PVT. LTD.
406, Vijayasree Apartments, Nagarjuna Nagar
Ameerpet, Hyderabad - 500 073
Tele : 040-39105039,Telefax : 040-66625036
e-mail:hyderabad@veesons.com

VESPL/HBD/Q/198/10-11
Date: 04.10.10

M/s.Zenith Energy Consultants Pvt Ltd
Masab Tank,
Hyderabad.

Kind Attn: **Mr.Krishna**

Dear Sir,

Sub: Your Requirement of boiler- Submission of offer- Reg.

We thank you for your interest you have shown in our range of products. Based on the discussions we had with you and further to the telecon had With you today ,as desired by you, we are pleased to submit our offer as per the following specifications

a.	Type of Boiler	: Horizontal Multitubular Fully Wet Back three Pass integral furnace package type.
b.	Evaporation Capacity	: 3000 Kg/hr & 4000 Kg/hr (F&A 100°C)
c.	Model	: FWS-C
d.	Max. Working Pressure (Safety Valve set off)	: 10.54 Kg/cm2(g) / 150 PSI(G)
e.	Fuel	: Coal

We hope that our offer will be in line with your requirement both commercially and Technically. We shall be pleased to furnish you any further information/clarification or call you for discussion on our offer any day convenient to you.

Thanking you and assuring you of our best attention and services at all times, we remain.

Yours faitihfully
for **Veesons Energy Systems Pvt Ltd**

C.Raja
Branch Manager
93909 27854.

BOILER ENGINEERS
HEAD OFFICE & WORKS :
C-14/2, Industrial Estate, Tiruchirapalli - 620 015.
Tel : 0431-2501010, 2501011, 2501012, 2501013, Fax : 0431-2501414.
e-mail : veesonsenergy@gmail.com, Tlx : 0455-374 VSNS IN

VEESONS

ANNEXURE – 1

MAIN SPECIFICATIONS

1.0.	Type of Boiler	: Horizontal Multi Tubular Fully Wet back Three pass smoke tube Boiler.
2.0.	Design, Fabrication, inspection & testing code	: IBR 1950 with latest Amendments.
3.0.	Model	: FWS-C
4.0.	Evaporation Capacity	: 3000 Kg/hr & 4000 Kg/hr (F&A 100°C)
5.0.	Max. Working Pressure (Safety valve set off)	: 150 PSI(g) / 10.54 Kg/cm^2(g)
6.0.	Fuel	: Coal
7.0.	Gross Calorific Value	: 4500 Kcal/kg
8.0.	Mode of combustion	: Mechanical Draught
9.0.	Type of feeding	: Manually through fire door

VEESONS

ANNEXURE – 2

PRICE SCHEDULE AND COMMERCIAL TERMS

4.0. PRICE SCHEDULE :

4.1. STANDARD SUPPLY

1.1.1. Supply of 'VEESONS' Horizontal Multitubular Fully wet back 3 pass smoke tube steam Boiler of Model FWS-M as detailed SCOPE OF SUPPLY in Annexure – 3.

for 3000 Kg/hr Rs.17,40,000/-

for 4000 Kg/hr Rs.21,81,000/-

2.0 COMMERCIAL TERMS :

2.1.	Basis of Price	: Ex-Works, Trichy.
2.2.	Taxes and duties	: Extra as applicable at the time of despatch / invoicing. At present rates applicable are,
	a) Central Excise Duty(CED) b) Central Sales Tax (CST)	: 10.3% : 4 % without C form (or) 2 % against C form
2.3.	Packing & Forwarding	: NIL.
2.4.	Guidance of Erection and Commissioning	: NIL.
2.5.	Transportation & Transit Insurance	: Buyer's Scope.
2.6.	Terms of payment	: 40% advance along with order. Balance payment plus taxes and Duties 7days before readiness of boiler against proforma invoice.
2.7.	Delivery period	: Within 45-60 Days from the date of receipt of your technically & commercially clear Purchase order along with full payment.
2.8.	Validity	: Our offer is valid for 30 days from the date offered, afterwards subjected to market fluctuations.

VEESONS

ANNEXURE – 3
SCOPE OF SUPPLY

Horizontal Multi-tubular Fully wet back three pass Mechanical draught smoke tube boiler.

01. MAIN BOILER

1.1. Boiler consists of shell, flue and smoke tubes assy. Necessary valves and fittings, mountings and man holes as per IBR requirements.
1.2. Platform, handrails and Ladder
1.3. Lining of Boiler with Refractory Bricks.
1.4. Fire Bar Assembly and Supports.

02. AUXILLARIES

2.1 Feed water Pump With Motor – 2 Assy
2.2 ID Fan with motor – 1 Assy.
2.3 FD Fan with motor – 1 Assy.

03. PIPING WORKS

3.1 IBR Piping between boiler and feed water pumps	– 2 Nos.
3.2 Blow Down line up to blow down valve	– 1 No.
3.3 Drain lines for Water level gauges	– 2 Nos.
3.4 Drain line for Automatic Water level Controller	– 1 No.
3.5 Air Entry Duct from FD Fan to inbuilt furnace	– 1 Assy.

04. VALVES AND FITTINGS

4.1 Main steam stop valve	: 1 No.
4.2 Air vent valve	: 1 No.
4.3 Feedline NRV	: 2 Nos.
4.4 Feedline Globe Valve	: 2 Nos.
4.5 Blow down valve	: 1 No.
4.6 Syphon tube with threaded flange	: 1 set.
4.7 Isolation valve for steam pressure gauge	: 1 No.
4.8 Water level gauge with protection glass assy	: 2 Nos.
4.9 suction strainer	: 1 No.
4.10 Isolation valve for AWLC	: 2 Nos.
4.11 Drain valve for AWLC	: 1 No.
4.12 Vertical check valve	: 2 Nos.

Note : 40 NB AND BELOW VALVES ARE FORGED STEEL VALVES

05. INSTRUMENTS, CONTROLS AND SAFETIES

5.1 Automatic Water Level Controller	– 1 Assy.
5.2 Single post Safety Valve	– 2 Nos.
5.3 Main steam pressure gauge	– 1 No.
5.4 Fusible plug	– 2 Nos.
5.5 Pressure Switch	– 1 No.

06. **ELECTRICALS**

Fully prewired Electrical Panel Board - 1 Assy.

ANNEXURE - 4

EXCLUSIONS

1.1 Chimney and flue gas ducting from Boiler to chimney

1.2 Any HRU/ Dust collector.

1.3 Water Treatment plant, Water storage tank and inter connecting water piping upto feed pump.

1.4 Insulation of boiler.

1.5 Transport and Transit Insurance.

1.6 Piping - Steam, Blowdown and drain, and its supports.

1.7 Unloading, erection of boiler and accessories and IBR formalities at site.

1.8 All civil and necessary foundation work for boiler and other accessories.

1.9 All electrical works including supply of power, control cables and cabling works.

1.10 Any other items which are not specifically mentioned in supplier's standard scope.

VEESONS

ANNEXURE - 5

PERFORMANCE CRETERIA AND BATTERY LIMITS :

PERFORMANCE CRITERIA

FUEL :

The output and other performance parameters of the boiler specified in this offer hold good only if fuel of the following specification is charged to the boiler. Any variation in the specifications of fuel will alter the performance parameters.

Gross Calorific Value : 4500 Kcal/kg (Max Moisture content 10 % by weight)
(Coal)

WATER :

The performance parameters of the boiler under this offer are based on filtered and treated water of the following quality being available.

SPECIFICATION OF FEED WATER TO BOILER :

Residual hardness as CaCo3	ppm	:	5 Max.
pH Value		:	8.5 to 9.5
Oil content	ppm	:	Nil
Oxygen (O2)	ppm	:	Nil
Free Co2	ppm	:	Nil
Bound Co2	ppm	:	5 Max.
Total dissolved solids	ppm	:	400 Max.

SPECIFICATION OF WATER IN BOILER :

Total hardness as CaCo3	ppm	:	5 Max.
Alkalinity	ppm	:	15 to 20 % TDS
pH value		:	10.5 to 11
Sodium sulphite (Na2 So3)	ppm	:	50 Max. (Undissolved)
P2 O5	ppm	:	15 to 30
Oxygen (O2)	ppm	:	Nil
Total dissolved solids	ppm	:	Less than 3500

To enable us to submit an offer for water treatment system it is essential to have either your sample of raw water or its analysis.

VEESONS

BATTERY LIMITS

Steam

- Upto outlet Flange of Main steam stop valve
- Upto outlet Flange of Air vent valve
- Upto outlet Flange of Safety Valve

Water

- From suction Flange of feed water pump

Drain

- Upto water level gauge glass drain cock
- Upto AWLC Drain

Blow down

- Upto outlet of blow down valve

Fuel

- From inlet of fire door in Furnace

Flue Gas

- Upto outlet of Boiler.

MAKES OF BOUGHTOUT ITEMS

FAN	:	M/S.ADROIT / M/S.VEESONS
MOTORS	:	M/S.CROMPTON / KIRLOSKAR / ELGI.
FEED PUMP	:	M/S.GRUNDFOS / KSB
BLOWDOWN VALVE	:	M/S.LEVCON/UTAM
WATER LEVEL GAUGE	:	M/S.RUSHAS / UTAM / SHARP
SAFETY VALVE	:	M/S.FAINGER
MSSV	:	M/S.UTAM / M/S.SHARP / RUSHAS
STEAM PR.GAUGE	:	M/S.FIEBIG / H-GURU
NON RETURN VALVE	:	M/S.EXPERT.
AWLC	:	M/S.MALHOTRA /ENGINEERING DEVICES
FORGED STEEL VALVES	:	M/S.HYDRO TECH / UTAM /SHARP
PRESSURE SWITCH	:	M/S.INDFOS / SANMUR

NOTE : VEESONS SHALL HAVE OPTION TO SUPPLY BOUGHT OUT ITEMS OF ANY MAKE AS MENTIONED ABOVE.

Bureau of Energy Efficiency (BEE)
(Ministry of Power, Government of India)
4th Floor, Sewa Bhawan, R. K. Puram, New Delhi – 110066
Ph.: +91 – 11 – 26179699 (5 Lines), Fax: +91 – 11 – 26178352
Websites: www.bee-india.nic.in, www.energymanagertraining.com

Zenith Energy Services Pvt. Ltd
10-5-6/B, My Home Plaza, Masab
Tank HYDERABAD, AP 500 028
Phone: 040 23376630, 31,
Fax No.040 23322517
Website: www.zenithenergy.com

India SME Technology Services Ltd
DFC Building, Plot No.37-38,
D-Block, Pankha Road,
Institutional Area, Janakpuri, New Delhi-110058
Tel: +91-11-28525534, Fax: +91-11-28525535
Website: www.techsmall.com