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New Cogeneration System

at

Vuyyuru Sugar Unit

Project Proposal

02/09/2004

For K.C.P. Sugar and Industries Corporation Ltd.

Managing Director

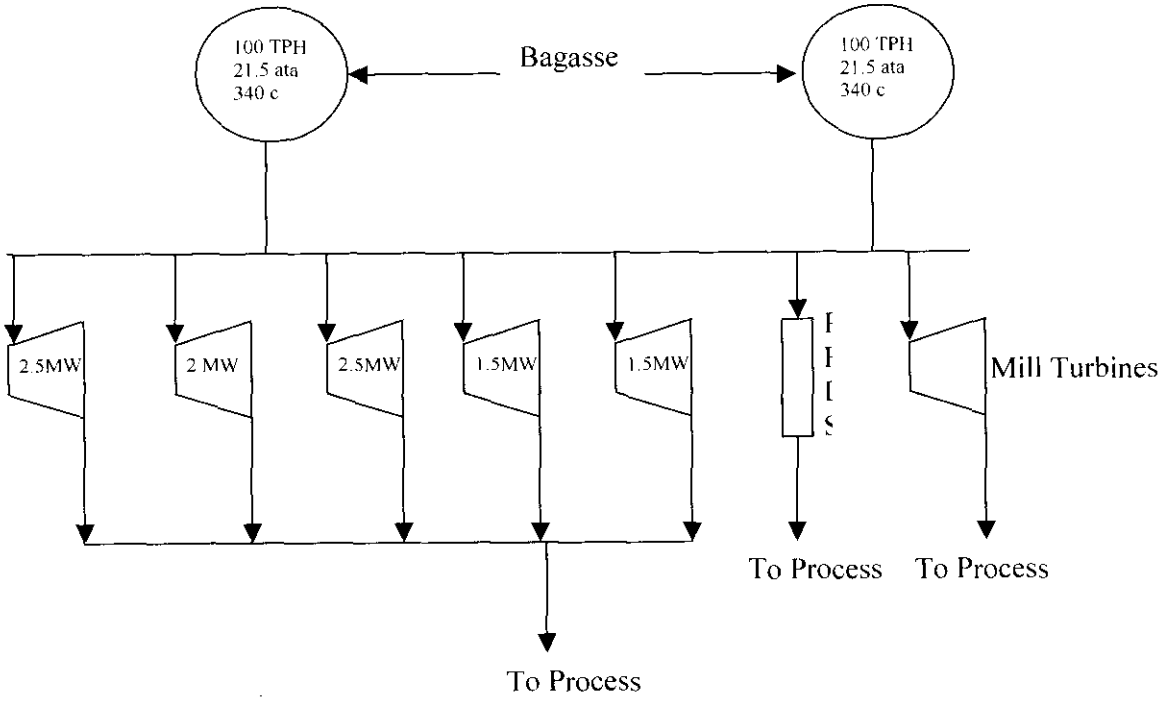
EXECUTIVE SUMMARY

The existing cogeneration system is currently operating along with the 8500 TCD sugar plant using bagasse. The steam and power generated is sufficient to meet the plant demand. The existing system is operating with a low pressure configuration of 21.5 ata. It is a known fact that efficiency of power generation increases with pressure. With the same quantity of available bagasse, it is possible to generate around 6 MW of surplus power by operating at a higher pressure of 43 ata. The existing boilers were originally designed for 43 ata and therefore can be upgraded easily to operate at the design pressure. High pressure operation can be achieved by replacing the existing low pressure turbines with high pressure turbines. The generated surplus power can be sold to APTRANSO under a power purchase agreement. This report gives the details of the cogeneration scheme proposed, the cost of the project and the financial analysis for the proposed project. It may be noted that this proposal aims to revive the cogeneration project that had been conceptualized and approved by the Board earlier (2001-02) and later deferred due to uncertainty in the Andhra Pradesh Government power purchase policy and the downturn in sugar industry. Further, the Board has authorized the Managing Director of the Company to take necessary action at appropriate time. With the release of APERC tariff order on power purchase from cogeneration projects and the bright prospect of carbon credits through Clean Development Mechanism (CDM), the cogeneration project can be re-looked for implementation, however with a lower installed capacity of 15 MW and exportable capacity of 5-6 MW.

EXISTING COGENERATION SET-UP

There are two steam generators operating in the plant. Both are with 100 TPH steam generation capacity with the outlet steam parameters of 43 ata and 400 deg.C. Both the boilers the inlet feed water will be 105 deg.C. However, both the boilers are presently operated at 21.5 ata to suit the existing TG configurations.

The sugar plant operates with five numbers power turbines operating with the inlet steam parameters of 40 ata and 400 deg.C and other mill turbines. The entire power requirements of the sugar mill is presently being taken care of by these TGs. All the turbines being backpressure type, the exhaust steam from these machines are taken to process. There is a Pressure Reducing and De-superheating Stations (PRDS) through which additional process steam is tapped.



KCP SICL Steam and Power Balance - Existing		
Parameter	**Unit**	**Existing**
Cane Crushed	TCD	7500
Bagasse percentage	%	27
Bagasse Generated (@ per Hr)	TPH	84.38
Bagasse Generated (@ per year)	T/yr	283500
Captive Energy Requirements		

Power	MW	5.40
Total Steam Required for Sugar Plant	TPH	144.00
Energy Generation Details		
Steam generation from 21.5 ata boilers (Two Nos. 100 TPH 43 ata rated steam output)	TPH	144.00
Steam to and from 5 Nos. TG Sets (Inlet as 21.5 ata & Outlet as 1.8 ata backpressure)	TPH	64.00
Steam to and from Mill TG Sets (Inlet as 21.5 ata & Outlet as 1.8 ata backpressure)	TPH	70.00
Steam to and from PRDS (Inlet as 21.5 ata & Outlet as 2.5 ata extraction)	TPH	10.00
Bagasse consumed in boiler	TPH	80.00
Power Generation from 5 Nos. Power TGs	MW	5.40
Balancing		
Total Steam Required	TPH	144.00
Total Steam Generated with the available bagasse	TPH	144.00
Bagasse required for generating the required steam	TPH	80.00
Bagasse Generated	TPH	84.38
Excess Bagasse	TPH	4.38
Excess bagasse for month	TONS	3150.00
Total Power Generation	MW	5.40
Captive Requirement	MW	5.40
Surplus to grid	MW	0.00

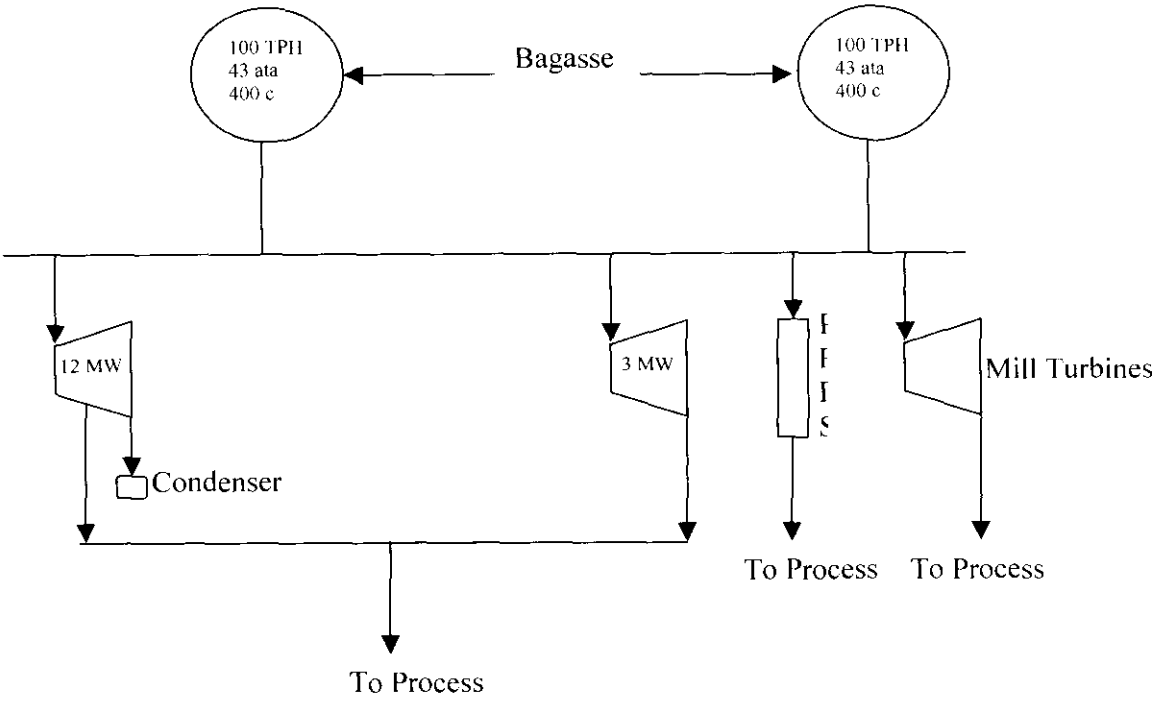
Note: The above balancing is for maximum capacity operation and may vary based on actual operational conditions.

PROPOSED COGENERATION SCHEME

The new equipment to be installed are two TGs, one 3 MW backpressure type with all its auxiliaries and another 12 MW extraction condensing type with all its auxiliaries. The new TGs will be fed from the existing two boilers of 43 ata pressure after upgrading the boilers with appropriate super heater coils. All the existing power turbines will be removed from the system.

As the Cogeneration Project was originally thought of in 2002 and approved, a 12 MW Siemens Steam turbine from Germany was imported subsequently. However, the implementation was deferred due to policy uncertainties and downturn in the sugar industry. The same 12.0 MW unused TG set can be used after proper servicing. All other equipments are indigenous in nature and therefore they will be procured domestically.

The power and steam balance in the proposed scheme is described below:



KCP SICL Steam and Power Balance - Proposed		
Parameter	**Unit**	**Proposed**
Cane Crushed	TCD	7500
Bagasse percentage	%	27
Bagasse Generated (@ per Hr)	TPH	84.38
Bagasse Generated (@ per year)	T/yr	283500

Captive Energy Requirements		
Power	MW	5.40
Total Steam Required for Sugar Plant	TPH	144.00
Energy Generation Details		
Steam generation from 43 ata boilers (Two Nos. 100 TPH 43 ata rated steam output)	TPH	168.00
Steam to and from 12 MW TG Set (Inlet as 43 ata & Outlet as 2 ata Extraction)	TPH	70.00
Steam Condensed in 12 MW TG set	TPH	10.00
Steam to and from 3 MW TG set	TPH	15.00
Steam to and from Mill TG Sets (Inlet as 21.5 ata & Outlet as 1.8 ata backpressure)	TPH	70.00
Steam to and from PRDS (Inlet as 21.5 ata & Outlet as 2.5 ata extraction)	TPH	5.00
Steam to and from Feedwater TG	TPH	8.00
Bagasse consumed in boiler	TPH	80.00
Power Generation from 12 MW and 3 MW TGs	MW	11.08
Balancing		
Total Steam Required	TPH	168.00
Total Steam Generated with the available bagasse	TPH	168.00
Bagasse required for generating the required steam	TPH	80.00
Bagasse Generated	TPH	84.38
Excess Bagasse	TPH	4.38
Excess bagasse for month	TONS	3150.00
POWER BALANCING		
Total Power Generation	MW	11.08
Captive Requirement	MW	5.40
Surplus to grid	MW	5.68

Note: The above balancing is for maximum capacity operation and may vary based on actual operational conditions.

The cogeneration plant will be able to export around 5-6 MW of power to the grid depending on the crushing and operating conditions.

CARBON CREDITS:

Since this being a cogeneration power project, it is eligible for availing Carbon Credits under the Clean Development Mechanism as it is classified as Biomass based power project. We are exploring the possibilities of availing carbon credits. As per public information, we may be able to derive a benefit of Rs.100 Lakhs per annum over a period of 10 years for this project. The carbon credit benefit will support for the economic viability of the project.

PROJECT COST

Total Project Cost		
Sl. No.	**Description**	**Cost (Rs. In. Lakhs)**
1	Land	0
2	Building & Civil works + Foundations	200
3	Mechanical Equipment	1175
4	Electrical Equipment	600
5	Total work cost	1975
6	Total prel. & pre-operative expenses less IDC (Consultancy charges, Site expenses, Start-up Expenses, Project Mgt. Cost, Travel, Front end fee etc.,)	65
7	Contingency @ 3%	60
	Total Project Cost	2100

FINANCIAL ANALYSIS

PROFITABILITY STATEMENT

OPERATING YEARS	1	2	3	4	5	6	7	8	9	10
PARTICULARS	**2005-06**	**2006 - 07**	**2007 - 08**	**2008 - 09**	**2009 - 10**	**2010 - 11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
ESTIMATES OF SALES										
NO. OF OPERATING DAYS	140	140	140	140	140	140	140	140	140	140
NET SALABLE POWER QUANTITY PER SEASON IN UNITS										
BELOW 55% PLF	10164000	10164000	10164000	10164000	10164000	10164000	10164000	10164000	10164000	10164000
ABOVE 55% PLF	4620000	4620000	4620000	4620000	4620000	4620000	4620000	4620000	4620000	4620000
TOTAL EXPORT										
SALE PRICE OF ENERGY/UNIT										
BELOW 55% PLF	2.790	2.790	2.810	2.830	2.852	2.877	2.905	2.937	2.933	2.562
ABOVE 55% PLF	1.285	1.335	1.395	1.455	1.517	1.582	1.650	1.722	1.798	1.877

PROFITABLILITY STATEMENT

RS IN LAKHS

ESTIMATED SALES:

SALES REVENUE FOR THE YEAR IN LAKHS										
BELOW 55% PLF	283.58	283.58	285.61	287.64	289.88	292.42	295.26	298.52	298.11	260.40
ABOVE 55% PLF	59.37	61.68	64.45	67.22	70.09	73.09	76.23	79.56	83.07	86.72
TOTAL SALES REVENUE	**342.94**	**345.25**	**350.06**	**354.86**	**359.96**	**365.51**	**371.49**	**378.07**	**381.18**	**347.12**

ESTIMATED EXPENDITURE:

REPAIRS AND MAINTENANCE	42.00	43.68	43.68	43.68	43.68	43.68	43.68	43.68	43.68	43.68
INSURANCE ON FACTORY ASSETS	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
SALARIES AND WAGES	5.50	6.05	6.66	7.32	8.05	8.86	9.74	10.72	11.79	12.97
ADMINISTRATIVE EXPENSES	8.00	8.40	8.82	9.26	9.72	10.21	10.72	11.26	11.82	12.41
DEPRECIATION	106.75	106.75	106.75	106.75	106.75	106.75	106.75	106.75	106.75	106.75
TOTAL EXPENDITURE	**183.25**	**185.88**	**186.91**	**188.01**	**189.21**	**190.50**	**191.90**	**193.41**	**195.04**	**196.81**

PROFIT	159.69	159.37	163.15	166.85	170.75	175.01	179.60	184.67	186.14	150.31
LESS: PROVISION FOR TAXATION	13.44	13.41	13.73	14.04	14.37	14.73	15.11	15.54	15.66	12.65
NET PROFIT AFTER TAXATION	146.25	145.96	149.42	152.81	156.39	160.28	164.49	169.13	170.47	137.66
COST OF PRODUCTION PER UNIT	1.24	1.26	1.26	1.27	1.28	1.29	1.30	1.31	1.32	1.33
COST OF SALE PER UNIT	1.24	1.26	1.26	1.27	1.28	1.29	1.30	1.31	1.32	1.33

INTERNAL RATE OF RETURN (IRR)

Rs. In lakhs

PARTICULARS		1	2	3	4	5	6	7	8	9	10
CAPITAL EXPENDITURE	-2100.00										
TERMINAL VALUE OF EQUIPMENTS**											907.49
OPERATING INFLOW (PAT+DEPRECIATION)		253.00	252.71	256.17	259.56	263.14	267.03	271.24	275.88	277.22	244.41
NET FLOW	-2100.00	253.00	252.71	256.17	259.56	263.14	267.03	271.24	275.88	277.22	1151.90
IRR (after Tax)	8.6%										

Sensitivity Analysis: IRR in various scenarios			
Parameters	**Normal Expenditure**	**10% Increase in Expenditure**	**10% Decrease in Expenditure**
At Estimated export	8.6%	8.4%	8.9%
At 10% higher export	9.8%	9.6%	10%
At 10% lower export	7.4%	7.2%	7.7%

EXECUTION OF THE PROJECT:

Once the proposal is approved, project implementation team shall be formed to initiate the necessary processes. Normally the project takes around 18 months from the time of ordering the equipments for commissioning the project.

For K.C.P. SUGAR AND INDUSTRIES CORPORATION LIMITED

S. Chidambaram

S. CHIDAMBARAM
DY. GENERAL MANAGER (FINANCE)
& COMPANY SECRETARY