PRE FEASIBILITY REPORT

Capacity enhancement of Sugar unit from 5,000 to 8,500 TCD and Cogeneration unit from 19.7 MW to 36.0 MW

M/s. Krantiagrani Dr. G. D. Bapu Lad Sahakari Sakhar Karkhana Ltd.

Kundal, Tal. Palus, Dist. Sangli,

Maharashtra - 416309

Prepared By

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May - 2017

1.0 Introduction

1.1 Identification of project and project proponent

This project is proposed by **M/s.Krantiagrani Dr. G. D. Bapu Lad Sahakari Sakhar Karkhana Ltd.**, (KDGDBLSSKL) formally known as Kranti Sahakari Sakhar Karkhana Ltd. The sugar factory is located at village Kundal, Tal-Palus, Dist- Sangli, Maharashtra. It is one of the progressive co-operative sugar factories in Maharashtra, set up in the year 1997.The factory is registered under the Government of Maharashtra Co-operative Societies Act as no. SAN/TGN/PRG/S-78/1997, dated 12/05/1997. The KDGDBLSSKL was established in dynamic leadership and freedom fighter late Shri Krantiagrani Dr. G. D. Bapu Lad and progressively worked since 1997. The first crushing was completed successfully in year 2002. Right now KDGDBLSSKL work under a visionary Chairmanship of Mr. Arun (Anna) Lad. Over the last 15 years, this factory has modernized and the co-product units like Cogeneration was set up subsequently. The present installed capacity of the sugar factory is 5000 TCD along with bagasse based cogeneration unit 19.7 MW. The management of the factory has undertaken extensive cane development activities in command area due to this there is increasing sugar cane area. As sugarcane plantation is in increasing in area of operation, the factory has decided to expand its crushing capacity from 5000 TCD to 8,500 TCD.

Because of increase in the crushing capacity, the production of byproduct like bagasse and molasses will also increase. Considering all these aspects and to gain more benefits from this industrial complex, the management of KDGDBLSSKL has decided to enhance the existing bagasse based cogeneration unit from 19.7 MW to 36 MW.

1.2 Project Setting

i) Since, the project is capacity enhancement of existing sugar, distillery and cogeneration unit, theKDGDBLSSKL management has decided to install the proposed units within the existing premises. The factory is holding adequate land for the proposed units. The factory is located on Kundal Vita road. It is located approximately 4 km far by road off State Highway No. 75. The geographical coordinates of the site are $17^0$08’04.88” N, $74^0$25’40.21” E and elevation is about 621 m. The present site is located at NE direction and 1.7 km far from the Yashwantrao Chavan Sagreshwar wild life sanctuary.

1.3 Highlights of the Project

Table 1.1: Project Highlights

1	**Name of the Proponent**	**M/s.Krantiagrani Dr. G. D. Bappu Lad SahakariSakharKarkhana Ltd.**,
2	**Location of the project**	village Kundal, Tal-Palus,Dist- Sangli, Maharashtra Tel no.02346-271601, 272075 Fax no. 02346-271602 Email: krantisugar@rediffmail.com , krantisugar.env@gmai.com
3	**Land**	Total land available with the factory = 126.5 acres. Existing + proposed Sugar and cogeneration unit≈4.0 acre including, boiler, bagasse storage yard etc..and for Greenbelt : existing 40 acres proposed 1.5 acres Total land for proposed expansion including green belt area 5.5 acres • No need of acquisition of land as the proposed project will be set up in existing factory premises only
4	**Project**	Capacity Enhancement of • Sugar unit from 5000 to 8,500 TCD • Cogeneration Unit from 19.7 to 36 MW
5.	**Product**	**A. Sugar Unit** (Production figures are based on operational capacity of 8,500 TCD) i) White Sugar: ~1063TPD (12.5% on cane) ii) Bagasse (generation 27.5% on cane): ~2337.5 TPD iii) Molasses (4% on cane): 340 TPD iv) Press mud (4% on cane): 340 TPD **B. Cogeneration Unit** Power generation (from 12 & 24 MW unit) = 36 MW (during crushing season) and 12 MW (during off-season).
6	**Operation days per annum**	• Sugar: Average 160 days and Maximum 180 days • Cogeneration - average 273 days
7.	**Main Raw Material**	**Sugar Unit** (based on operational capacity) • Sugar Cane: 8,500TPD • Lime: 14.5 TPD (0.17% Cane) • Sulfur: 4.25 TPD (0.05% Cane) **Cogeneration Unit: During season** • Bagasse as a fuel: 84.78 TPH **During Off-season** • Bagasse= 19.82 TPH
8.	**Water**	Sugar & Cogeneration

Requirement	• 284m^3/day during season (source: – Krishna River with permission from Tembhu lift irrigation Project Management Department.) • 1448.72m^3/day during off-season

1.4 Need of project and its importance to the country and region

India is one of the largest producers of sugarcane as well as sugar in the world. The sugar cane is a cash crop for farmers. There are about 564 installed sugar factories in India. Most of the sugar industries are located in rural areas providing employment to rural masses. Cooperative sugar factories from Maharashtra are the backbone of rural economy. These factories have contributed for the development of economy as well as infrastructure in rural areas, generated ample of employment opportunity to local people.

The project proponent is one of the cooperative sugar factories from the region of Maharashtra. The cultivation of sugar cane is increasing every year in the command area of the factory and it can anticipated growing gradually for next few seasons. In addition, the sugar factory is having plans to promote and support the cane development programme, in its command area.

Table 1.2: Expected cane availability for next five years

S. No.	Season	Sugarcane Area (Ha)	Yield (MT)	Sugarcane Available MT	Expected Crushing (MT)	Expected Sugar Recovery (%)
1.	2017-18	15,000	105	15,75,000	12,75,000	12.30
2.	2018-19	16,000	107	17,12,000	13,68,500	12.40
3.	2019-20	16,500	110	18,15,000	14,02,500	12.50
4.	2020-21	17,000	113	19,21,000	14,45,500	12.60
5.	2021-22	18,000	115	20,70,000	14,87,500	12.70

The above table infers that there will be ample sugarcane available in the command area of the KDGDBLSSKL. However, the crushing capacity could become a limiting factor to fulfill the cane crushing demand of local farmers. Therefore, the management of KDGDBLSSKL intends to develop its infrastructure to meet growing cane crushing demands. Hence, the sugar factory is installing a 3500 TCD unit to have installed cane-crushing capacity of 8,500 TCD. While doing this, optimum utilization of the available resource will be strived by using a renewable energy source of bagasse. Hence the management board of KDGDBLSSKL decided to installed new two numbers of boiler having capacity 70

TPH +130 TPH i.e total 200 TPH capacity along with new TG set capacity will be 12 MW +24 MW i.e. 36 MW

Bagasse-based cogeneration project is an effort for efficient use of available resources. Bagasse is a renewable and carbon neutral source of energy. It is carbon neutral fuel, which helps to control greenhouse gases (GHG) concentration in the atmosphere. Hence, the capacity enhancement of cogeneration unit is of great significance not only to the state and country but also to the global community.

1.5 Power

Need of power for sugar and cogeneration unit will be fulfilled by captive power generation, during crushing season as well as during off-season.

Table1.3: Power details: generation, captive power need and export

Particular	**Season** (in MW)	**Off-season** (in MW)
36 MW TG (Cogeneration)		
Power Generation from two numbers of TG set 12 MW + 24 MW = 36 MW	**36.0**	**12 MW**
Captive consumption		
Cogen auxiliary	3.06	1.02
Sugar Factory	7.08	Nil
Misc.	0.15	0.15
Total	**10.29**	**1.17 MW**
Surplus power to be exported to State grid	**25.71**	**10.83 MW**

1.6 Import vs. Indigenous production

The processes of manufacturing for sugar and cogeneration are simple and straight line, available indigenously. The technologies even for the pollution control/disposal are also available indigenously.

1.7 Export Possibility

The finished goods Sugar is having excellent potential of export. In addition, surplus power are to be be exported to the local grid.

1.8 Domestic / export markets

Domestic market for sugar is very large, since sugar is daily commodity. Sangli, Kolhapur, Karad, Solapur, Bengaluru, Goa etc. are the domestic markets. Power (electricity) will exported to the local grid of Maharashtra State Electricity Distribution Company Limited (MSEDCL).

1.9 Employment Generation

Proposed project will provide direct employment to about 35-40 persons will be for sugar/cogeneration unit. However, it has a great potential to generate large number of indirect employment.

2.0 PROJECT DESCRIPTION

2.1 Type of project

Proposed project is capacity enhancement of existing sugar factory from 5000 TCD to 8,500 TCD, cogeneration unit from 19.7 to 36 MW. Bagasse is a byproduct of sugar unit and has tremendous potential as a renewable source of energy. Hence, cogeneration unit is interlinked with sugar unit. Also, Molasses is another by-product from the sugar industry which will be used as raw material in the proposed new distillery. The project is placed under item 1 (d) –for cogeneration unit, 5 (j)-for sugar unit i.e. both project falls under 'B' category as per EIA Notification, 2006 (as amended in 2009) and will be appraised at state level.

2.2 Location with coordinate

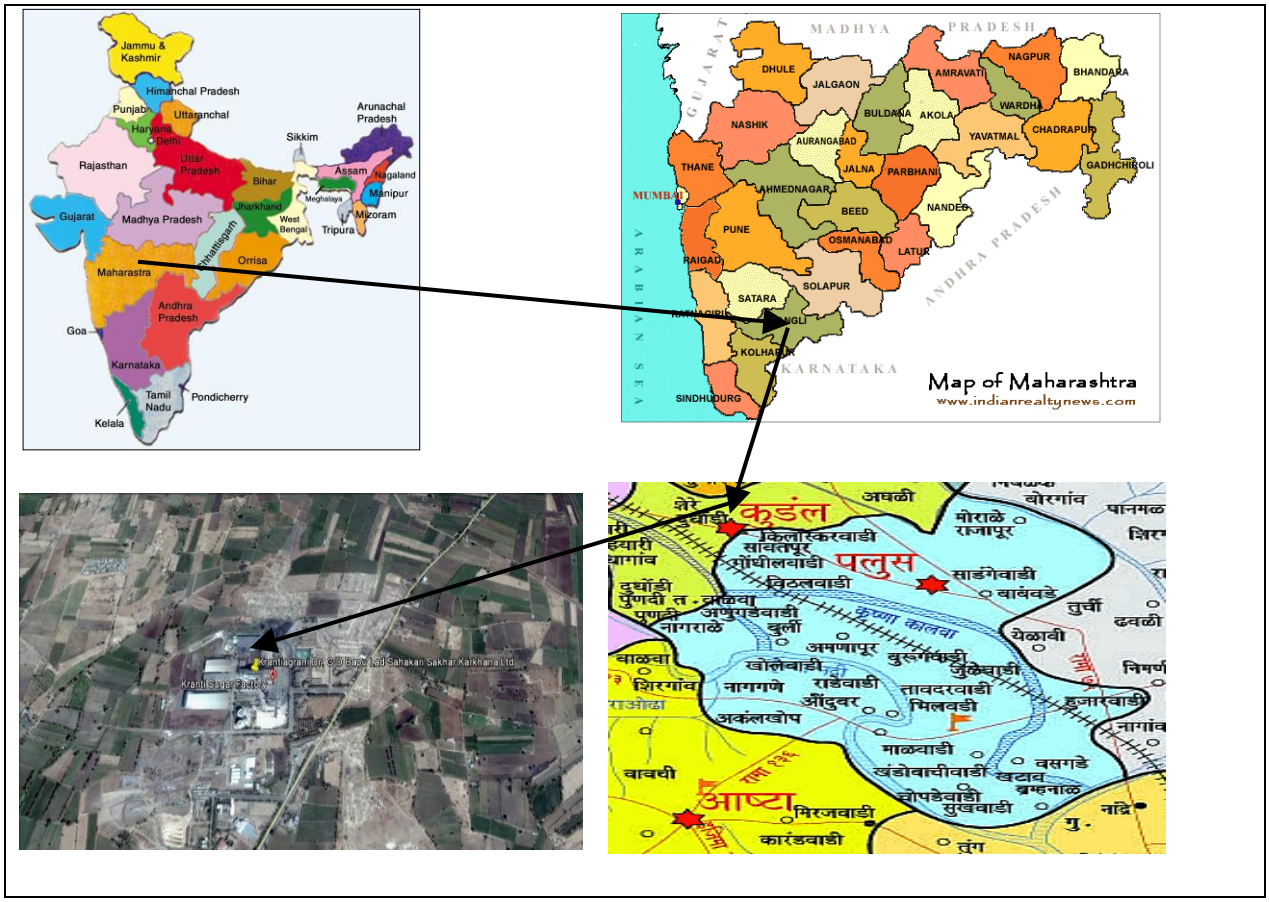

Figure 2.1: Location Map

Project coordinates: $18^0$47’42.46”N, $74^0$37’02.97” E.

Figure 2.2: Satellite Image of the project site

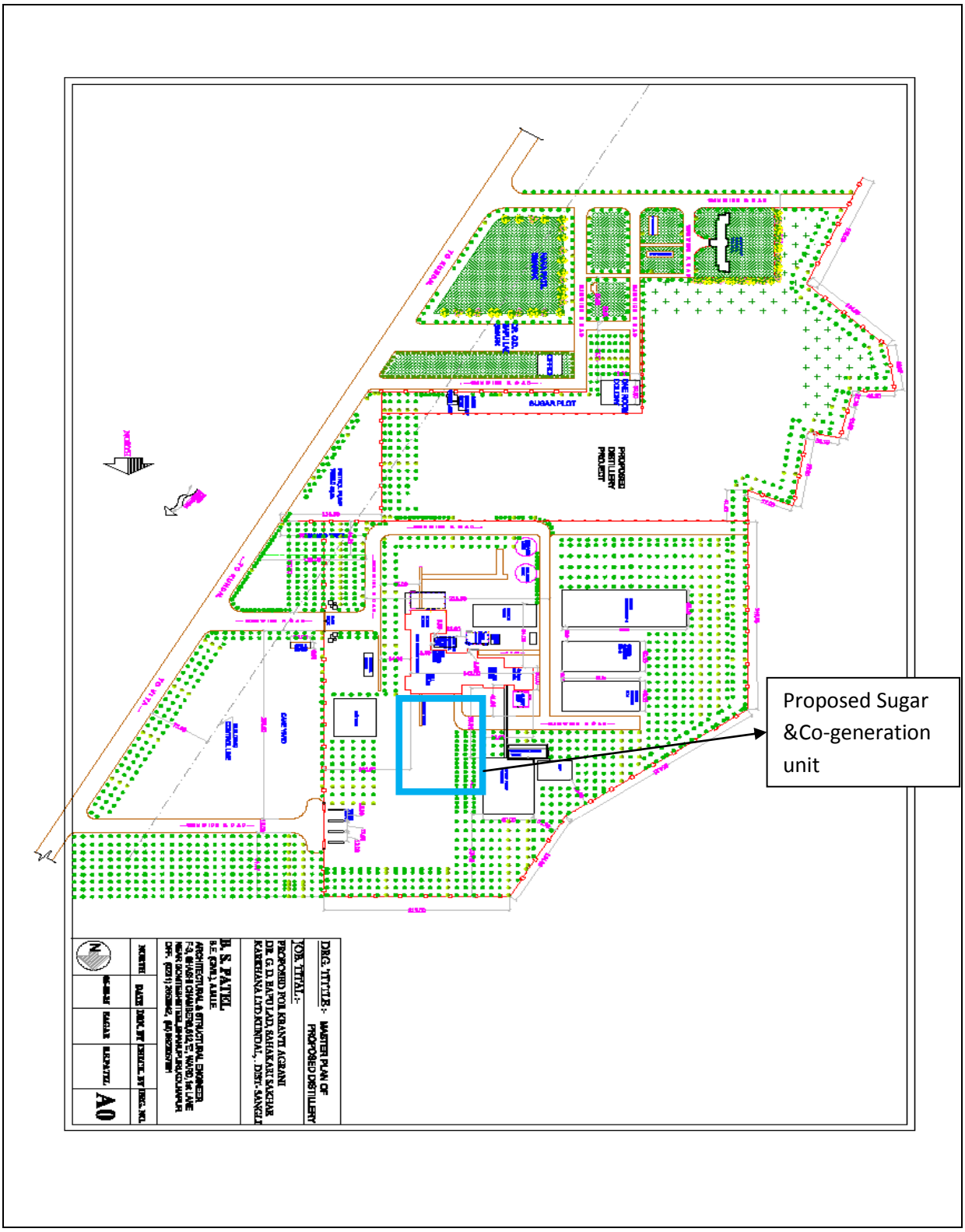

Figure 2.3: Project lay out showing proposed expansion activity

Details of alternative site consider and basis of selecting the proposed site

Alternative sites for the proposed project are not considere, because of following reasons.

ii) The project is capacity enhancement of existing units.

iii) The project proponents are having adequate land for the proposed capacity enhancement as well as ancillary units thereof such as storage, treatment, disposal units, etc.

iv) The present site is located at NE direction and 1.7 km far from the Yashwantrao Chavan Sagreshwar wild life sanctuary.

2.3 Size or magnitude of operation

After Capacity Enhancement installed capacities of the project units will be

- Sugar unit of 8,500 TCD and Cogeneration unit of 36 MW

2.4 Project description with process details

Process: A) Sugar

- **Extraction of Juice**

The sugarcane is passe through preparatory devices like knives for cutting the stalks into fine chips before being subjecte to crushing in a milling tandem comprising 4 to 6 roller mills. In the best milling practice, more than 95% of the sugar of cane is extracted into the juice.

- **Clarification**

The treated juice on boiling fed to continuous clarifier from which the clear juice is decanted while the settled impurities known as mud is sent to rotary drum vacuum filter for removal of unwanted stuff called filter cake. It is discarded or returned to the field as fertilizer.

- **Evaporation**

The syrup will again treated with sulphur dioxide before being send to the pan station for crystallization of sugar. Crystallization takes place in single-effect vacuum pans, where the syrup is evaporate until saturated with sugar. At this point “seed grain” is add to serve as a nucleus for the sugar crystals, and more syrup is add as water evaporates.

- **Centrifugation**

The massecuite from crystallizer is drawn into revolving machines called centrifuges. The perforated lining retains the sugar crystals, which may be washed with water, if desired. The mother liquor "molasses" passes through the lining because of the centrifugal force exerted and after the sugar is "purged" it is cut down leaving the centrifuge ready for another charge of massecuite.

- **Gradation & Packing**

The final product in the form of sugar crystal is dropped through pan section and this sugar is graded and picked in 50 kg bags. The grade of the sugar depends on the size of the crystal viz. Small (S) and Medium (M)

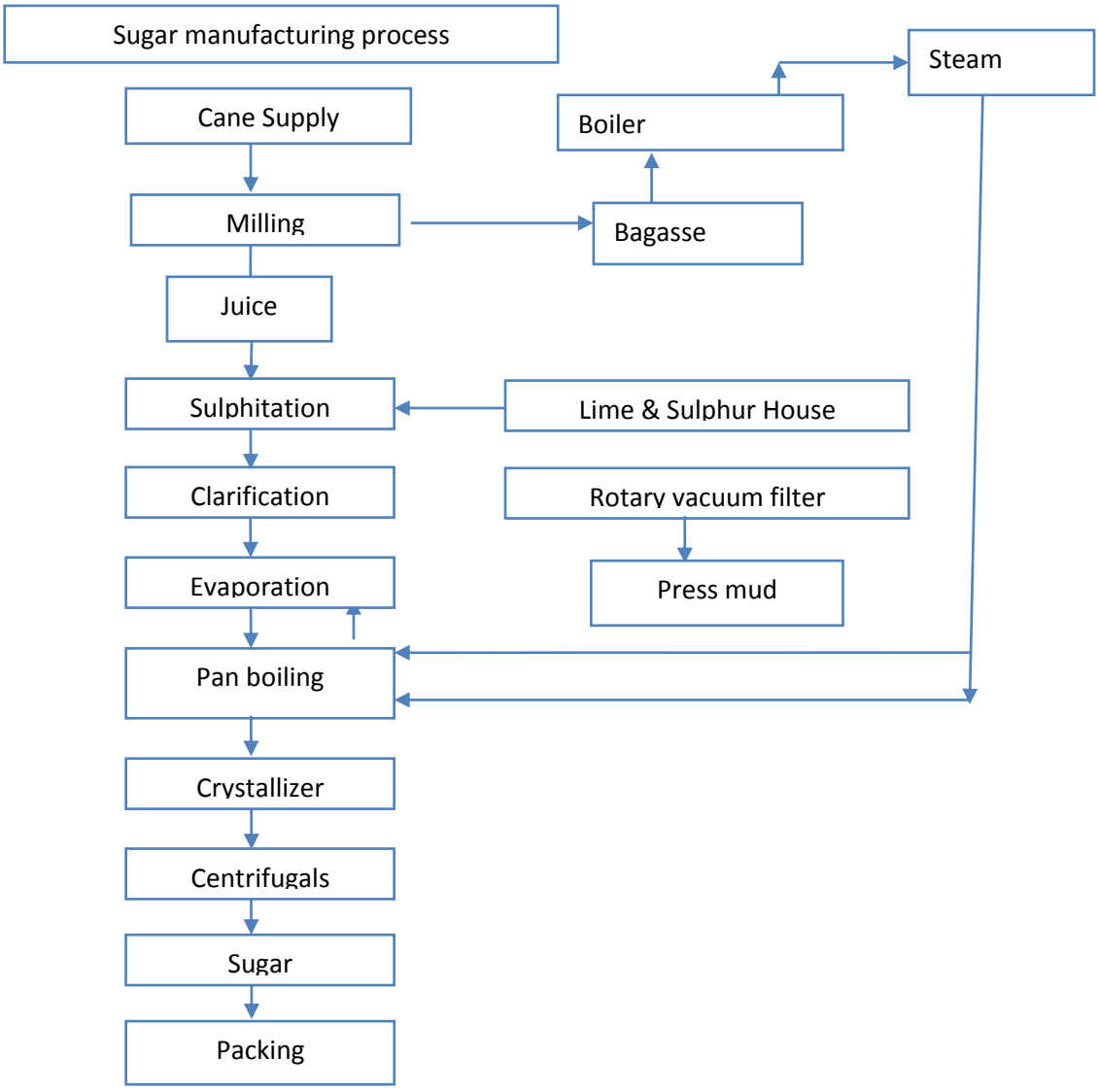

Figure 2.4: Flowchart Sugar Manufacturing Process

B) Co-generation

The proposed cogeneration, aims at improving the energy efficiency of the sugar factory significantly and enabling the plant t o generate surplus power from its cane crushing operation. This surplus power will be exported to the state electricity grid. Energy efficiency and the export of power to the grid are made feasible due to the availability of high pressure and high temperature steam and by the utilization of the available bagasse. The flow chart for generation of the power in cogeneration as shown in following figure

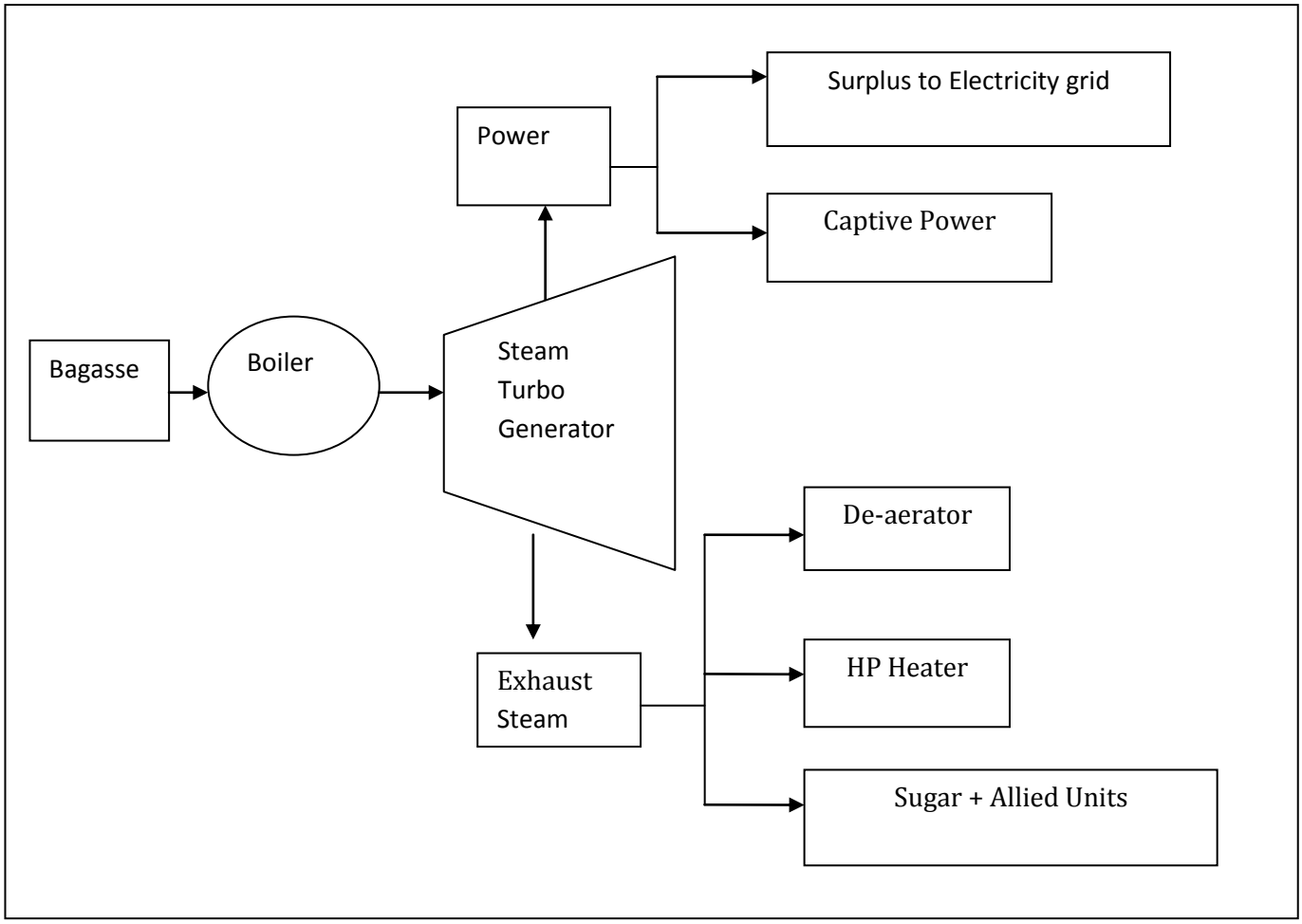

Figure 2.5: Schematic of Cogeneration process

2.5 Raw Materials for Finished Products

Raw materials for the proposed project will be available from the local market. Bagasse used as a fuel and molasses as raw material will be available from in-house only. Product wise raw material consumption is given below.

Table 2.1: Availability raw materials & finish good product and transport mode

Raw materials	Estimated quantity /day	Source market	Final product	Estimated quantity KL/day	Source market	Transport mode
Sugar Unit						
Sugar Cane	8,500 TPD	**Local**	**White sugar**	**~1062.5 TPD**	**Maharashtra India**	Truck Tractor Bullock cart
Lime	14.5 TPD	**Maharashtra, Karnataka, Rajasthan**				Truck Tractor
Sulfur	4.25 TPD	**Mumbai, Pune**				Truck
Cogeneration Unit						
For season*						
Bagasse	2034.72 TPD	**Own factory**	**Power**	**36 MW**	**Local grid**	**-**
Off-season						
Bagasse	475.68 TPD	**Own factory**	**Power**	**12 MW**	**Local grid**	**-**

2.6 Resource optimization / recycle and reuse envisaged in the project

In the proposed project, optimum utilization of the available resource is strived by the management, by using a renewable energy source of bagasse. Bagasse is a by-product of sugar factory, it will be used as a fuel for boilers that produces process steam. Bagasse-based cogeneration project is an effort for efficient use of available bagasse and steam to generate the power for to fulfill the captive need and export the surplus to the state grid.

2.6.1 Water Requirement and Its source

Necessary water requirement for the proposed project will be met from Krishna River. Water will be required for domestic, process and utility purpose. Daily fresh water requirement for the proposed expanded capacities of sugar & cogeneration unitwill be 284 cu.m.per day (during season) and for cogeneration during off-season will be of 1448.72 cu.m. per day

Table 2.2: Water balance/budget – Sugar and cogeneration unit during Season

A) WATER INPUT (requirement daily)	m^3/day
DM Water For Boiler feed (@195TPH)	4,680
Milling section (including washing)	2,400
Water For condenser/boiler parts cooling, Vacuum Pump & Others	1,247
Water For cooling tower Makeup (Total 4% on capacity of 2800 m3/hr)	2,688
Other Domestic Usage	50
Total Water Input	**11065**

WATER OUTPUT	
Steam Condensate @ 5% loss	4,446
Hot water from turbine and boiler parts	1,247
Evaporation & Losses (Cooling tower @4% and Boiler @ 5%)	2,634
Domestic Consumption	30
Excess condensate water from cane @70% on cane crushing	5,950
Effluent	850
Total Water Outputs	**15,157**

Recycle water streams (for sugar and cogeneration unit)

Steam Condensate	4,446
Hot water from turbine and boiler parts (after treatment)	1,247
TOTAL	**5,693**
Daily requirement is = 11065-5693=5375	
Excess condensate water (after treating in CPU) will be used to fulfil requirement of 5372 (=5950 -5372)	

CPU= Condensate polishing unit

After, recycle of 5372cu.m. of condensate water to sugar mill the excess condensate available = (5950-5372) = 578cu.m.

Fresh water requirement

- **For domestic purpose 50m3/day**
- **As DM feed water 234m3/day =**
- **TOTAL = 284 m3/day**

Excess condensate water will be available for recycle/reuse. It will be recycled/reused in proposed distillery unit during season as well as off-season (in cogen and distillery only).
Total available water = Treated water of ETP 850 cum/day + Excess condensate water 578 = 1428 m^3/day

- Used for Gardening and greenbelt ~ 686 cu.m. per day (Greenbelt area of ~ 20 acres)
- Seed plot and cane plantation area = 22 acres
- Water required for plantation and seed plot = 742cu.m/day

Table 2.3: Water Balance: Cogeneration during off-Season (Quantities in cum/day)

A) WATER INPUT (requirement daily)	m^3/day
DM Water For Boiler feed (@45.6 TPH)	1094.5
Water For condenser/boiler parts cooling, Vacuum Pump & Others	1,128
Water For cooling tower Makeup (Total 4% on capacity of 1400 m^3/hr)	1344
Other Domestic Usage	50
Total Water Input	**3,616.5**

WATER OUTPUT	
Steam Condensate @5% loss	1039.78
Hot water from turbine and boiler parts	1,128
Evaporation & Losses	1,344
Domestic Consumption and sewage	50
Effluent from boiler @ 5%	54.72
Total Water Outputs	**3616.5**

Recycle water streams (cogeneration unit)

Steam Condensate	1039.78
Hot water from turbine and boiler parts (after treatment)	1,128
TOTAL	**2,167.78**

Off-season water requirement will be = 3616.5 – 2167.78 =1448.72

CPU= Condensate polishing unit

Fresh water requirement

- For domestic purpose = 50 m^3/day
- As DM feed water = 54.72m^3/day
- Cooling tower make up = 1344 m^3/day
- TOTAL =60m3/day = 1448.72 m^3/day

Daily water requirement during off season will be the 1448.72m^3/day

2.6.2 Water permission and requirement of water

Table 2.4 Total annual water requirement after expansion

Sr. no	Water requirement	Running days	Water requirement per annum
1	During season 284 m^3/day	180	**51120** m^3
2	During of season 1448.72 m^3/day	93	**134730.96** m^3
3	**Total water requirement**	**273**	**1,85,850.96** m^3

Industry has water drawl permission from Krishna River about 4, 78,000 m^3/Annum. It showed that the industry has adequate water availability and fulfill the requirement including the expansion activity.

2.6.3 Power & Fuel requirement and Its source

The existing power requirement is sourced from existing 19.7 MW TG set. Existing 2 Nos. of two numbers of D.G. set of 320 KVA+ one number of 1010 KVA will be used as standby. A new 24 MW backpressure and 12 MW double extraction cum condensing (DECC) TG set will installed for meeting the power requirement of proposed expansion. The total power generated during average crushing season of 160 days will be 36 MW. After meeting the in-plant requirements for factory & Co-generation unit, the power exported to the grid will be 25.71 MW. And during off-season total power generated will be 12 MW out of which 10.83 MW will be exported to the grid. Bagasse is the main fuel which will be used for proposed cogeneration expansion, which is sourced from own sugar factory.

Table 2.5 Power and Fuel requirement

Sr. No.	Particulars	Requirement		Source
		Existing	After Proposed	
Power and Fuel (Sugar &cogeneration Unit)				
1.	Power Requirement	19.7 MW (Seasonal operation) **Captive:9.70** MW **Export:**10.0 MW	36 MW (Seasonal operation) **Captive:** 10.29 MW **Export:** 25.71 MW	In-house, Co-generation,
		Captive – 1.0 MW Export – 6.8 MW	12 MW (Seasonal operation) **Captive:** 1.17 MW **Export:** 10.83 MW	
2.	Bagasse	**During Season:**56.66 TPH **During Off-Season:** 16.66 TPH	**During Season:** 84.78 TPH **During Off-Season:** 19.82 TPH	In-house

2.7 Waste generation &disposal scheme

Quantity of waste to be generates & scheme for their disposal are given in following chart:

A. Liquid waste

Sugar and cogeneration unit

Estimated fresh water intake for sugar and cogeneration unit will be ~284 m^3/day. Regarding effluent generation about 690 m^3 per day. Treated effluent will be sent to sugar ETP and utilized for

gardening/irrigation. Condensate water will be treated in condensate polishing unit (CPU). Sugar condensate water will be reused in sugar as well as proposed distillery unit to minimize the fresh water intake. Hot water from various sources will be cooled in cooling pond and recycled to respective activity after reaching to ambient temperature. The factory is having ~20 acres plantation area where treated water will be utilized.

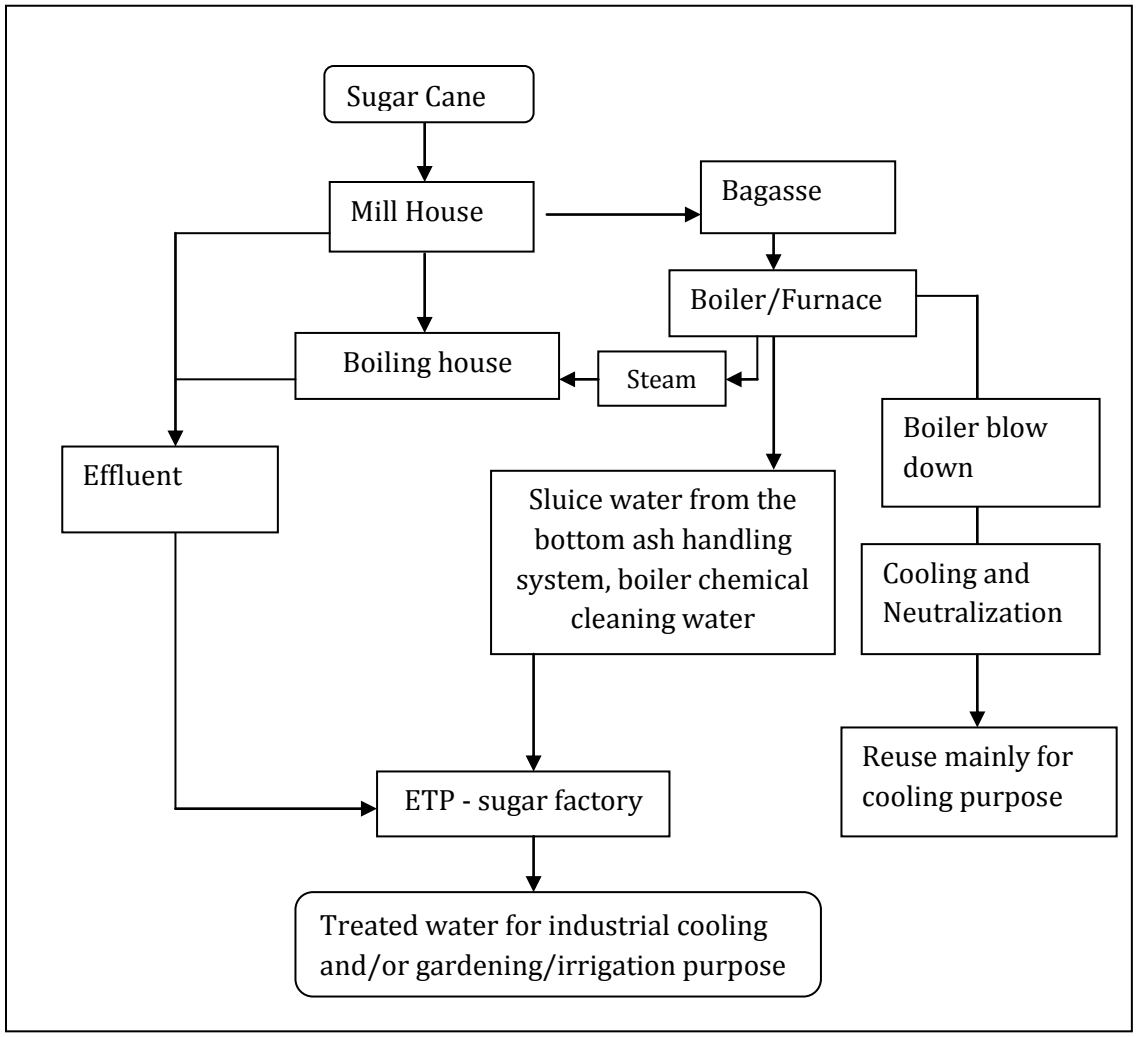

Figure 2.6: Flowchart for effluent generation from Sugar along with cogeneration unit

B. Solid waste

The proposed industrial activity at KDGDBLSSKL gives solid waste in the form of ETP sludge which is biodegradable and boiler ash. The solid waste will be sold as manure and for manufacturing of Briquette. The quantity and disposal technique is brief in following table

Table 2.6: Solid waste generation and disposal

#	Waste	Quantity/annum	Treatment	Disposal	Remark
1	Sugar ETP sludge	80 TPA	Disposal into land/soil	Sold to member farmer/own plot	Organic
2	Ash	Bagasse ash 7324 T during season + 885 T off-season = 8209 TPA	Disposal into land/soil	Used as a soil enriching material or sold to brick manufacturers.	Organic +Inorganic
3	Spent oil from DG and process	13 to 14 KL/A	Spent oil is burnt in boiler	Spent oil is burnt in boiler	Oily

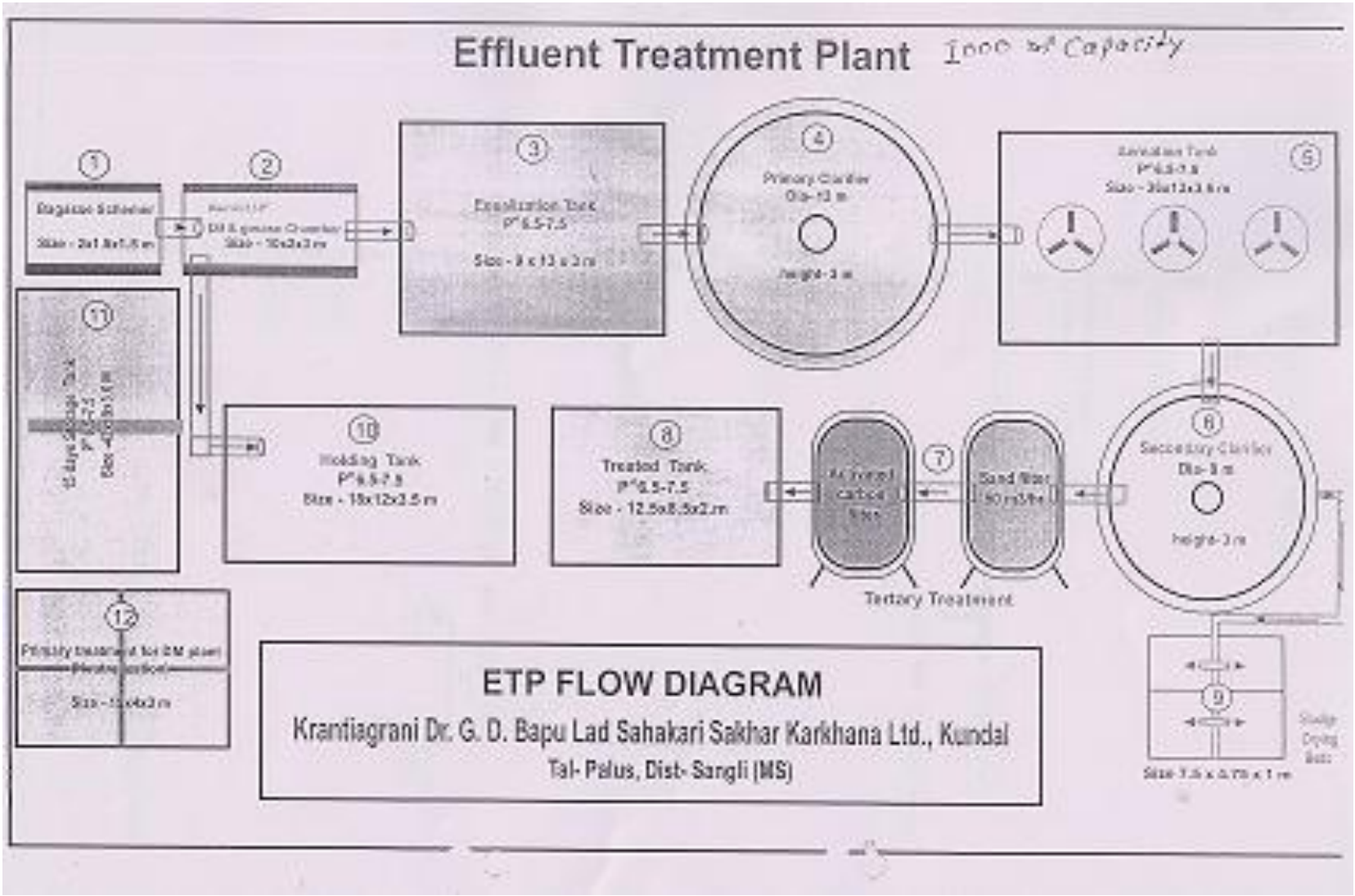

Figure 2.7: Schematic Diagram of Existing ETP

2.7 Air Emission & Control

Two boilers of capacity 35TPH and one number of 50 TPH are used in existing scenario with working pressure of 45 Kg/cm^2. Wet scrubbers system is attached to all the existing boilers. A new boiler of 70.0 + 130 TPH capacity with 110 Kg/cm^2 pressure will be installed in proposed scenario. Bagasse will be used as a fuel in proposed boilers. Electro Static Preceptor(ESP) system will be used as air pollution control device for proposed boilers.

There are existing two DG set of capacity 320 kVA and one number of 1010 kVA each with adequate stack height and acoustic enclosures.

2.8 Noise Control

Steam turbine generator will be the major noise source of the proposed project. Apart from that, noise is anticipated from pumps, motor drives, utilities etc. The plant and equipment will be specified and designed with a view to minimize noise pollution. The major noise producing equipment will be provided with sound proof devices and silencers. DG set will be provided with acoustic enclosures. Ear Plugs and ear muffs will be provided to the workers in utility section. Greenbelt will be developed.

2.9 Health and Safety Measures

Being a cooperative sugar mill KDGDBLSSKL is committed to the Health and Safety of all its employees. It strives to provide hygienic & safe work place and continually improve the effectiveness of Health & Safety system.

To meet these objectives the KDGDBLSSKL will;

- Comply with all relevant Laws, regulation, statutory provisions & codes of practice.
- Continually asses Risks & Hazards so as to evolve establish & upgrade hazard control measures, emergency preparedness, & risks mitigation and correct the deficiency identified in timely manner.
- Ensure safe handling, storage, use and disposal of all substance & materials which are classified as hazardous to Health & Environment.
- Create awareness in employees by providing appropriate training, motivation information's so as to create individual sense of duty, responsibility & participations & an institutionalize culture of continually improvement in Safety , Health & Environment matters.
- Make HOD responsible to communicate the safety policy to all concerned in his department.

- Make supervisors responsible or implementation of the safety precautions, use of safety devices, & the safety of the people.
- Empower employees at all levels to be responsible & accountable for their personal health & safety.
- Fire protection system shall be provided in accordance to the LPA regulations. The firefighting system shall consist of a hydrant network.
- Factory has already a fire protection system including electric driven pump, one diesel engine pump, and one jockey pump & Fire fighter vehicle.
- Portable fire extinguishers shall be provided in strategic locations in new construction area.

2.10 Schematic representation of the feasibility drawing which give information of EIA purpose

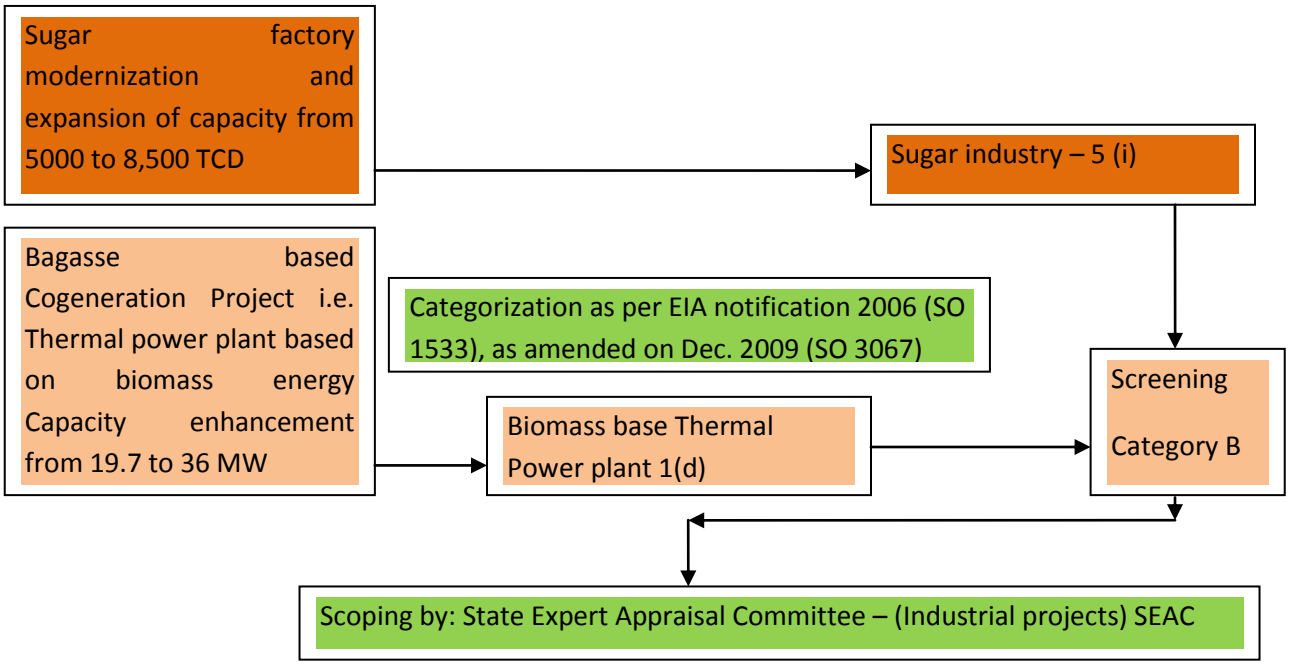

Figure 2.8: Schematic representation of the feasibility drawing which give information of EIA purpose

3.0 SITE ANALYSIS

3.1 Connectivity

The site is well connected by road, railway as well as air network. Site is located on the Kundal Vita road and KaradTasgaon state highway no. 75 is s approx. 4 km away from the site. Kirloskarwadi railway stationis approx. 4 km from the project site. The Kolhapur (approx. 60km) is the nearest air ports to the site.Sagereshwar wild life sanctuary is 1.7 km far from the site towards NW direction.

3.2 Land form, land use and ownership

The sugar factory is holding 126.4 acres of land. The land is flat, open and already under the industrial use (i.e. sugar factory and allied units). Available land with existing sugar factory is approx.126.4 acre out of which 4.0 acres of land provides for proposed expansion of sugar and cogeneration unit and its ancillary units. Factory is allotted 1.5 acre of land for expansion of existing green belt area.

3.3 Topography

The terrain is almost flat, no hills in the surroundings. The geographical coordinates of the area are $17^0$08'04.88" N, $74^0$25'40.217" E. The proposed site is 621 meter above the mean sea level.

3.4 Salient Features

The proposed project requires no additional land. Therefore, no social issues are involved. There won't be change in the land use pattern since the land is already used for industrial purpose. There is Yashwantrao Chavan Sagreshwar wild life sanctuary located at NW direction and 1.7 km far from the site. The project surrounding land is either fallow land or used for agricultural purpose. There are 56 villages in the study area 10 km radius. River Krishina and Yerala is approx. 7 km and 4 km far from the site respectively.

Table 3.1: Salient features of the project location

Roads	State Highway No.75 is approx. 4 km from the site
Nearest City/ Town	Kundal is approx. 2 km from the project site.
Railway Station	Kirloskarwadi railway station approx. 4 km from the site.
Air Port	Kolhapur airport is the nearest airport approx. 60 km from the site.
Taluka place	Palus is 6 km far from the project site
District place	Sangli is 35 km far from the project site
River	Krishna and Yerala river is approx. 7 and 4 km from project site resp.
Schools	Kranti International Public School, Kundal is in factory premises, Zila Parishad School is available in the village for primary education.
Colleges	Dr. G. D. Bapu lad Kala Mahavidyalayais at approx. 3km from project site.
Medical and health care centers	AshwiniHospital, and Primary Health Center Kundal is approx. 3.0 km from the project site.
Banks	Rajaram Bapu Patil Sahakari Bank is located at factory site, State Bank of India and other national bank is located at Palus is 6 km far from the project site.
Market places	Palus is a nearest market place at approx. 6 km from the project site.
Protected Area/ Sanctuaries/NP	No. Yashwantrao Chavan Sagareshwar wild life sanctuary is approx. at 1.7 km from the project site.
Industrial Area	Palus industrial area is approx 6 km from the project site.
CRZ applicability	Not applicable
Seismicity	Seismic Zone- III

3.5 Existing Infrastructure

The nearest residential area to the factory is at a distance of 2 km towards west. There is an agricultural and fallow land in the surrounding area of the site. Within 10 km Influence Zone, Sagareshwar wild life sanctuary is approx. at 1.7 km from the project site towards North West.

Table 3.2: Existing Infrastructure

Land	Total plot area with sugar industry is 126.4 acre. Land required for proposed expansion of sugar and cogeneration unit is about 4.0 acre. The greenbelt area is 40 acre additional 1.5 acre of green belt will be enhanced.
Water	Source: Krishna river
Power	Captive power supply
Road	State highway no. 75 approx. 4.0 km from the site
Fuel	Fuel required for steam generation will be bagasse, it will be obtained from own sugar factory.
Steam generator (boilers)	Existing Two number of boiler having capacity 35 TPH each and one number of having capacity 50 TPH will be replace with new two numbers of boiler having capacity 130 TPH and 70 TPH with working pressure 110 kg/cm^2

3.5.1 Raw Material: Sugar Cane

The viability of the proposed expansion of sugar unit as well as cogeneration unit depends on the availability of raw material i.e. sugar cane, bagasse. The following table describes the last five year sugar unit perforations of KDGDBLSSKL.

Table 3.3, describes the cane production of the operational area of the KDGDBLSSKL and the cane crushing performance of the KDGDBLSSKL for last five years.

Table 3.3: Production & crushing performance for last five years

Sr.	Particulars	Unit	2012-13	2013-14	2014-15	2015-16	2016-17
1.	Gross season days	No.	142	150	168	151	112
2.	Cane Crushed	Lakh MT	6,58,359	7,72,317	8,62,702	8,46,224	6,35,006
3.	Sugar Produced	Lakh Qtls	8,10,540	9,57,100	10,76,500	10,56,930	7,81,100
4.	Sugar Recovery	%	12.31	12.40	12.48	12.50	12.31
5.	Bagasse generation on cane	MT	1,81,092	2,14,400	2,38,790	2,33,507	1,76,953
6.	Molasses	MT	27,872	31,235	34,562	35,660	27,330
7.	Power	KWH	4,28,62,868	5,48,39,500	6,25,75,400	6,01,20,900	4,44,19,400

Table 3.4: Estimated cane production and sugar recovery for next five year

S. No.	Season	Sugarcane Area (Ha)	Yield (MT)	Sugar cane Available MT	Expected Crushing (MT)	Expected Sugar Recovery (%)
1.	2017-18	15,000	105	15,75,000	12,75,000	12.30
2.	2018-19	16,000	107	17,12,000	13,68,500	12.40
3.	2019-20	16,500	110	18,15,000	14,02,500	12.50
4.	2020-21	17,000	113	19,21,000	14,45,500	12.60
5.	2021-22	18,000	115	20,70,000	14,87,500	12.70

Table 3.5: Expected bagasse production for next five year

Sr. No.	Year	Total Bagasse production @ 28 % cane crushed (MT)
1	2017-18	3,57,000
2	2018-19	3,83,180
3	2019-20	3,92,560
4	2020-21	4,04,740
5	2021-22	4,16,500

Above table shows the raw materials potential that is sugar cane in the command area is sufficient. Whereas other raw materials like bagasse as a fuel for cogeneration unit will also available.

3.5.2 Irrigation and transportation facilities

The KDGDBLSSKL is located in the vicinity of Krishna and Yerala river (approx. 7 & 4.0 km from project site). Cane can be grown under well, bore well, lift and canal irrigation. Water conservation will be achieved by of water in existing process by condensate recycling.

Another important factor is proximity of State Highway (SH 75) and also network of state and local roads in the operating area of the KDGDBLSSKL. National Highway Pune Bangalore is of 22-24 km far from the project site.

3.5.3 Fuel

The availability of bagasse is mainly dependent upon the crushing of cane at sugar factory. The cane crushing data of the factory for five seasons i.e. 2010-11 up to 2014-15 has been provided in table no. 3.3. Factory has taken a huge efforts to improve the cane area and yield production hence the expected cane availability will increase, the expected cane availability is mentioned in table no 3.4

3.5.4 Water

At present sugar factory draw water from Krishna River, the permission letter attached at the end of the report as an Annexure-1. The water requirement for proposed project will be around 284m^3/day for sugar and cogeneration unit during seasonal operation, whereas 1448.72 m^3/day for cogeneration unit during off-seasonal operation.Water conservation will be achieved by recycling of water. Water from the reservoirs will be used for all plant and fire-fighting purposes diesel driven pump (capacity as per TAC recommendation) along with one electrical pump will be installed for supply to all fire hydrants and sprinklers.

3.5.5 Power

Power generation and consumption of the proposed project during seasonal and off seasonal operation will be as follows.

Table 3.6: Power details: generation, captive power need and export

Particular	**Season** (in MW)	**Off-season** (inMW)
36 MW TG (Cogeneration)		
Power Generation from two numbers of TG set 12 MW + 24 MW = 36 MW	**36.0**	**12 MW**
Captive consumption		
Cogen auxiliary	3.06	1.02
Sugar Factory	7.08	Nil
Misc.	0.15	0.15
Total	**10.29**	**1.17 MW**
Surplus power to be exported to State grid	**25.71**	**10.83 MW**

3.6 Soil classification

Soil formations in Sangli district have been predominantly influenced by the climate. The district has three distinct climatic zones. The western zone, which receives very heavy rainfall, has lateritic soils on up-ghats and reddish brown soils on hill slopes, the latter being developed on parent material of trap rock. The transition zone of Krishna valley has deep black soils of alluvial origin. The third is the eastern drier zone, which consists largely of granular black soils and poor shallow soils.

3.7 Social Infrastructure available

The present project is proposed by one of the leading and progressive cooperative sugar industry from western Maharashtra. During the period of establishment, the industry received a strong leadership in the form of freedom fighter Late Shri Dr. G.D. Bapu Lad. The industry are in progressive movement under a dynamic leadership of Honorable Chairman Shri Arun (Anna) Lad of KDGDBLSSKL.

The sugar factory has already initiated several activities for the development of the region. Some of the prime activities are as follows.

- The factory is providing medical aid to the employees and their dependents at very low cost
- It provides primary school educational facilities to the children of workers and stack holders
- It helps member farmers by supplying fertilizers, press-mud, vermicompost and the developed cane seeds and plants approved by VSI. The factory also arranges field demonstration to educate the farmers in sugarcane cultivation through application of scientific methods
- Factory took effort to increase the drip irrigation by providing financial and technical expert guidance to the farmer and stack holders. About 45% of sugar cane cultivated land converted under the drip irrigation since four year.
- Factory has developed full-fledged soil and water analysis laboratory at site and provides a soil and water analysis facility for the farmer at factory site in nominal charges.
- Factory has installed a weather station at site which provides an real time weather data and forecast to the farmer via SMS facility.

- It has also established ‘Krantiagrani Dr. G.D. Bapu Lad ’ (Credit society) at site for workers in the area of operation
- It has established a reselling training center at site to create the good reseller from the vicinity
- It provides insurance policy facilities for members and workers
- To facilitate better transport of sugarcane, the factory has undertaken major program to construct roads in its area of operation

4.0 PLANNING BRIEF

4.1 Planning concept

A project is proposed by one of a leading cooperative sugar mill from Sangli district. Due to expansion of sugar factory from 5,000 TCD to 8,500 TCD, it is anticipated that adequate amount of bagasse will get produced. Hence, Honorable, Board of Director of factory is able to enhance bagasse based cogeneration unit from 19.7 to 36 MW.

4.2 Facilities for Transport

KDGDBLSSKL is situated just 4.0 Km off the State highway 75. All the villages from the command area of KDGDBLSSKL are accessible by asphalted (*pucca*) road, operational year around. Hence, public transportation is available. State transport (ST) buses ply on schedule and connect almost all the villages of the command area.

4.3 Town and country planning / Development authority classification

The project is located at village Kundal Grampanchyat, Taluka Palus is the local authority. The Grampanchyat has issued "No Objection Certificates (NOC) "for this proposed project. The copy of the same is attached as an Annexure-2. Since, then the land is used for industrial purpose and will be used for the same purpose only.

4.4 Population projection

No population flux is projected because the sugar factory will employ candidates from local areas. Only for exceptional posts it may employ candidates from other areas. In that case existing colony have the facilities to accommodate the additional man power for the new activity.

4.5 Land use Planning

Sugar factory have total area of the plot is 126.4 acre. Out of which built up area of existing sugar and cogeneration is 6.9 acre. 40 acre land is greenbelt and internal road. Industry is required 5.5 acres of land for proposed expansion in sugar and cogeneration unit including green belt area.

4.6 Assessment of infrastructure Demand (Physical & Social)

The basic infrastructure such as roads, electricity, transportation, drinking water supply, health centers and hospitals, school, colleges, sanitation facilities are available in the vicinity. The proposed project is

not going to exert any unbearable load on any of these resources. In fact, the project could reduce the electricity load by generating 36 MW of power.

4.7 Amenities/ Facilities

Following amenities/facilities are available at sugar factory

- Guest house facility
- Petrol pump
- Canteen
- Medical facility
- Separate dedicated parking facility for goods vehicle and personal vehicles at site
- Provision of street light within premises as well as on approach road
- Rest room
- Security check post and round the clock security persons on duty
- Fire extinguishing facilities
- Housing colony for employees
- Drinking water and power supply to housing colony
- Diesel generator as a backup facility
- Fresh water and wastewater treatment plants
- Firefighter vehicle and ambulance facility provided for 24 X 7

5.0 PROPOSED INFRASTRUCTURE

5.1 Industrial Area

The proposed project will be carried out in the existing factory premises only. The total allocated land for the proposed project is 4.0 acres including 1.5 acre for green belt area.

5.2 Residential Area

The residential colony area allocated is 0.23 acre.

5.3 Greenbelt Area

The total greenbelt area provided is ~40 Acre will be enhance by 1.5 acres.

5.4 Social infrastructure

All type of infrastructure is already available in the vicinity.

5.5 Connectivity

State highway 75 and National Highway 4 as well as Zilla Parishad road infrastructure exist.

5.6 Drinking water management

KDGDBLSSKL draws water from Krishna River. It operates a special water treatment plant to supply the drinking water to factory as well as the staff colony.

5.7 Industrial waste management

The wastewater generated from industrial activity will be treated in effluent treatment plant (ETP) and Condensate Polishing Unit (CPU) and be used for irrigation, gardening and seed plant irrigation purpose. The effluent from sugar will be treated in existing ETP unit after upgradation and effluent from cogeneration unit will be mainly due to blow down of cooling tower; boiler and process. Hence, it won't be significant on COD or BOD or any polluting content, except high temperature, therefore, all collected effluent will be cooled and directly used for the irrigation purpose. The treated water shall be mainly reused for gardening and irrigation activity. The sanitary wastewater shall be disposed by using septic tank and soak pit system. Thus, due to proper treatment of effluent, disposal of treated water within the factory premises and recycling of it, the issue of wastewater is envisaged to be insignificant.

Table 5.1 Waste details: Generation and Disposal

#	Waste	Quantity/annum	Disposal
1	Sugar ETP sludge	80 TPA	Used as a soil enriching material
2	Ash	Bagasse ash 7324 T during season + 885 T off-season = 8209 TPA	Used as a soil enriching material & sold to brick manufacturers.
3	Spent oil from DG and process	13 to 14 KL/A	Spent oil is burnt in boiler along with bagasse.

5.8 Power Requirement and Source

Proposed cogeneration will generate the power which is the source for all industrials utilization as well as all subunits of sugar and allied units. The generation and consumption of power is as follows.

Table 5.2 Power details: Generation, Captive Power Consumption

Particular	**Season** (in MW)	**Off-season** (in MW)
36 MW TG (Cogeneration)		
Power Generation from two numbers of TG set 12 MW + 24 MW = 36 MW	**36.0**	**12 MW**
Captive consumption		
Cogen auxiliary	3.06	1.02
Sugar Factory	7.08	Nil
Misc.	0.15	0.15
Total	**10.29**	**1.17 MW**
Surplus power to be exported to State grid	**25.71**	**10.83 MW**

5.9 Rehabilitation and Resettlement (R & R) Plan

There will be no any issue of rehabilitation and resettlement (R & R) for the proposed project, since the required land is available with the factory.

5.10 Project Scheduled & Cost Estimates

Table 5.3: Project scheduled & cost estimate

1.	Date of start of construction (Anticipatory)	Dec. 2017.
2.	Date of completion (Anticipatory)	Dec. 2017.
3.	Proposed Project cost	Rs. 150 lakhs (Sugar and cogen project)
4.	EMP cost	Rs. 7.5 lakhs for sugar cogen unit

5.11 Analysis of proposal (Final Recommendations)

I) Benefits

- The sugar factory expansion will fulfill the pressing demand of farmers to crush all the available cane, so local farmer will get benefitted
- It will save the economic losses, due to present non availability of cane crushing facility. It will also indirectly save money by reducing the distant transportation of cane and thus reduce the environmental consequences due to it
- Shareholders are likely to get good rates for the cane
- No external electricity. Captive power from renewable energy source (i.e. bagasse)
- Press mud is the byproduct of the sugar unit used for preparation of compost which is initiate the organic farming and reduction of the chemical fertilizers utilization
- Bagasse is a by-product of sugar mill, will be used as a fuel for the proposed cogeneration plant. Thus, it will be effective utilization of the available resource. Secondly, steam generation will be done with improved efficiency. Therefore, it will require less fuel (bagasse).
- Use of bagasse as a fuel means reduction in Green House Gasses (GHG). Since, it reduces the consumption of fossil fuel for the generation of same amount of energy at some other place/s.
- The excess condensate, spray pond overflow and other non-polluting water will be provided for irrigation and gardening which will reduce fresh water requirement
- Sludge from ETP and ash from boiler are also a soil enriching materials
- Compatible architecture will be adopted and Land is already under industrial use. Trees will be maintained and not razed down. No Rehabilitation is involved.

- The process is straight line and the technology even for the pollution control/disposal are available indigenously
- Indirect employment to many since, the project will be exporting electricity to local grid
- The aggregate effect of the project is likely to boost the local economy
- Direct employment opportunities for local youths. The member farmers will get proper price to their sugar cane

II) Conclusion

a) Sugar unit expansion is essential so as to meet the cane crushing demand of local farmers.

b) Expansion of existing sugar and cogeneration are very necessary for effective utilization of excessive crop of sugar cane and bagasse

c) The local people including shareholder sugarcane growers are strongly willing for the project and have already given the permission to the management to develop and execute the proposed project.

d) Water, power, raw material and market is assured and found available with ease.

e) Full precautions will be taken for pollution control, resource conservation and environmental protection.

f) All the units are agro-based and hence promote sustainable development