

Prefeasibility Report

90 KLPD Molasses Based Distillery

At Sr. no. 164 to 170 & 85, Bedkihal, Tal. Chikodi, Karnataka.



Venkateshwara Power Projects Ltd

Bedkihal, Tal. Chikodi, Karnataka.

Regd. Office- Mahadik Petrol Pump

Shiroli (Pulachi), Tal. Hatkanangale, Dist. Kolhapur



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CONTENT

Sr. No.	Items	Page no.
1.	Executive summary	2
2.	Introduction of the project	2
3.	Project description	4
4.	Site analysis	10
5.	Planning in brief	12
6.	Proposed infrastructure	13
7.	Rehabilitation and resettlement plan	14
8.	Project schedule and cost estimate	14
9.	Analysis of the proposal	14

1. Executive summary

Venkateshwara Power Projects Limited is a sugar factory with cogeneration and one of the units under the business group called “Mahadik Business Group”. The other group activities like milk diary, petroleum, transport, LPG & auto Engineering is based in Kolhapur District. The sugar factory is in North Karnataka and close to the Maharashtra Border as well as to Kolhapur. The Sugar factory in operation since 2001 and cogeneration is under operation since 2004. The factory is having a crushing capacity of 4500 TPD and cogeneration of 13 MW.

Venkateshwara Power Projects Ltd. is now desirous to establish a molasses based 90 KLPD Ethanol distillery at village A/p. Bedkihal, Tal. Chikkodi Dist. Belgaum, Karnataka, to support the Central Government’s initiative and policy of blending ethanol in petrol.

2. Introduction

2.1 Project proponent

Mahadik Business Group of Shirol (P), Kolhapur is in the different lines of business since last 25 years. The group has got strong asset base at Kolhapur, Mumbai. The management is controlled by a single family. The views of owners are commercial and professional.

The founder Mr. M. R. Mahadik is the well-known personality of the Kolhapur. He has a very well connected socially in and around Kolhapur. He is Ex-MLC of Maharashtra for the last 12 years. His son Mr. Amal Mahadik is MLA currently. Mr. Mahadik’s social and political work is appreciated in the region.

Mr. Swroop Mahadik, son of Mr. Mahadik, a mechanical Engineer is looking after Venkateshwara Power Projects Limited as a Managing Director. He is attached with this industry since its establishment and is techno-commercially sound.

The co-founder of the Group Mr. Rajan Shinde, a commerce graduate is the Executive Director of the company. He has a wide experience and plays a leading role in the expansion of the different activities of the group.

2.2 Nature of the project

Venkateshwara Power Projects Limited proposed to establish a molasses based 90 KLPD distillery, molasses is one of byproducts of sugar industry which is used to produce rectified spirit/alcohol for making liquor

and fuel. The main raw material for distillery is molasses. Some chemicals in small quantity and Yeast are help in fermentation.

2.3 Need of the Project

Industry overview

Molasses is one of byproducts of sugar industry which is used to produce rectified spirit/alcohol for making liquor and fuel. Traditionally, molasses has been used in India to produce rectified spirit and alcohol of higher than 95% purity for producing liquor for human consumption and for producing various chemicals. However, with technological developments in the recent past, molasses has been effectively used to produce bioethanol for blending with petrol as a fuel.

Global scenario

Brazil is the second largest producer of ethanol globally after U. S. While U.S. produces ethanol from corn, Brazil manufactures ethanol from sugarcane. Brazil has mandatory blending ratio of ethanol in gasoline ranging from 18% to 25%. The blend rate was as high as 25% before September 2011 and was reduced to 20% due to drop in cane output hence affecting the ethanol production. Currently, flex-fuel cars, which can use either ethanol or blended gasoline, in Brazil account for about 53% of the total car fleet and around 90% of the new vehicles' sales. The proportion of the flex-fuel cars are expected to cross 80% by 2020. Currently, the Brazilian light vehicle fleet has been increasing by 6.7% y-o-y since 2003 with currently 90% of the new vehicles being flex-fuel cars. Thus, there exists an increasing demand in Brazil for ethanol which is encouraging for the sugarcane industry.

Indian scenario

India has 330 distilleries, which produce over 4 billion liters of rectified spirit (alcohol) a year. Beyond total distilleries, about 120 distilleries have the capacity to distillate 1.8 billion liters (an additional annual ethanol production capacity of 365 million liters was built up in the last three years) of conventional ethanol per year which is sufficient to meet requirement for 5% ethanol blending with petrol.

Government policy

In 2006, GOI mandated 5% ethanol blending with petrol (EBP) programme to directly benefit the sugarcane farmers by assuring the sugar industry a stable and reasonable return for the molasses and then passing a significant part of the same to the farmers. But since then the programme has been struggling to take off despite the fact that the Cabinet Committee on Economic Affairs (CCEA) in November 2009 directed that a

financial penalty be imposed on oil marketing companies for their failure to reach targets. In November 2012, the CCEA has made it mandatory for Oil marketing companies (OMCs) - Bharat Petroleum, Hindustan Petroleum and Indian Oil Corporation - to blend 5% ethanol with petrol. This is likely to reduce the fuel import bill and lower India's dependence on fossil fuel as the ethanol prices are lower than petrol. OMCs have been blending ethanol with petrol for the past two years but the policy was partially implemented in absence of any clear directive. The committee, headed by the Prime Minister, has also approved market-based pricing of the biofuel, opening the market for ethanol producers - mostly sugar companies. This shall result in an increased demand for ethanol by OMCs.

The national bio-fuel policy, approved by the Government of India, has plans for a 20% ethanol blending programme by 2017 from the current mandated 5% blending & recently increased to 10%, to reduce India's dependence on fossil fuel imports.

2.4 Demand & supply gap

The gap between the availability of alcohol and the requirement by the industry has been widening. The existing requirement of alcohol by the industries is around 450 Crore liters annually at 10% fuel ethanol blending, industrial alcohol and potable alcohol and the production is around 285 Crore liters. The trend is increasing as the blending increases.

2.5 Employment generation due to project

Factory will be appointing required manpower and has already appointed key top management positions for the purpose. It is most essential that the experienced and well-qualified manpower is employed right from the project development / implementation period, through advertisement or through head hunting exercise, particularly for the top and key positions. The total man power required for the proposed distillery is around 70 no.

3.0 Project Description

3.1 Type of the project

The proposed project involves fermentation of molasses for producing rectified spirit/ENA/absolute alcohol. Factory proposes to follow the process for alcohol production viz. fermentation, multi pressure distillation, spent wash evaporation followed by slop fired boiler.

3.3 Details of the alternate sites

Proposed project will be located in existing sugar factory premises. Hence, no alternate sites have been examined.

3.4 Size and magnitude

Size and magnitude of the project is given in Table 1.

Table 1: Project in brief

Sr. No.	Particulate	Description
1.	Name of the proponent	Venkateshwara Power Projects Limited
2.	Project	90 KPLD molasses based distillery
3.	Location of the project	Sr. No, 167 to 170 & 85, village Bedkihal, Tal Chikodi, District Belagaum, Karnataka.
4.	Land requirement	16129 sq. m.
5.	Product	ENA 90 KLPD/ rectified spirit 91.4 KLPD/ absolute alcohol 90.00 KLPD
6.	Operation days	300 days
7.	Raw materials	Molasses 385 TPD
8.	Total water requirement	879 CMD (After recycling)
9.	Electricity requirement (Operational)	1695 kWh
10.	Steam	20 TPH
11.	Fuel	Indian coal: 62.84 TPD
12.	Boiler	32 TPH
13.	DG	Two DG sets of capacity 250 kVA
14.	Effluent treatment system (capacity)	Condensate polishing unit will treat waste water generated from spent lees, cooling tower blow and boiler down, process condensate. Spent wash will treated by multi effect evaporator followed by slope fired boiler.
15.	Man power	70 skilled and unskilled
16.	Total project cost	93.35 cr.
17.	Total cost for EMP	2.59 Cr

3.5 Process description

The process of converting molasses to RS can be divided into following sub sections:

- Feed preparation and weighing
- Yeast propagation and fermentation
- Multi-pressure distillation

3.5.1 Feed preparation and weighing

Molasses stored in a storage tank is first weighed in a tank with load cells so that accurate quantity can be fed to the fermentation section. The weighed molasses then transferred from tank to the dilutor in fermentation section where it is diluted with water and fed to the Fermenter.

3.5.2 Yeast propagation and fermentation

The Yeast from slant is transferred to shaker flasks and grown to the required volume. This “genetically marked” yeast strain is then further propagated, under aseptic conditions, in yeast culture vessel. These vessels are equipped with educators which are designed to achieve enhanced efficiencies through better sugar / yeast contact by shearing and mixing, efficient oxygen transfer etc.

The ready yeast “seed” is then transferred from culture vessel to fermenter. The molasses is diluted by process water. The glucose in the Feed media gets converted to ethanol, in each of the four fermenters operating in continuous mode. A plate heat exchanger (PHE) and a circulation pump are provided to each fermenter, which will continuously re-circulate the fermenting wash through PHE for maintaining the Fermenters at 30⁰C. The nutrients, biocide, acid and anti-foam agents are fed to the fermenters as per process requirement. The CO₂ liberated during fermentation is sent to CO₂ Scrubber for recovery of ethanol otherwise being lost in vent.

The fermented wash is then sent to the clarification tank equipped with Lamella Separator. The settled sludge is sent to sludge washing tank for recovery of alcohol.

3.5.3 Multi-pressure vacuum distillation

The fermented wash is fed to CO₂ stripper column to remove CO₂ gas present in wash. Alcohol is stripped off water in stripper column. The top vapours [alcohol + water] are fed to beer heater & condenser. Distillate from beer heater & condenser is pre-heated by steam condensate and spent lease before being

fed to rectifier column. In rectifier column RS is taken out from top tray. The impure spirit from top of CO₂ stripper column, rectifier column, fed to fusel oil column. The final impure spirit cut is taken out from the fusel oil column and partly alcohol is recycled to rectifier column. The alcohol containing fusel oil from rectifier column is fed to fusel oil column.

Rectification column works under pressure. The CO₂ stripper, stripping column, works under vacuum and fusel oil column works under atmospheric condition.

The top vapors from rectifier column are condensed in stripper reboiler. The alcohol water vapors from stripping column are partly sent to CO₂ stripper bottom for heating. The rectifier column and fusel oil column gets heat from steam. The Distillation process is operated through programmable logic controller (PLC).

- **Dehydration**

Rectified spirit at Azeotropic concentration is pumped by feed pump. This pump takes care of the entire backpressure of the system. The pump is in stainless steel material of construction for wetted parts complete with flameproof motor and mechanical seal.

The rectified spirit will first pass through feed preheater, which will pass through vaporizer cum super heater which will convert the rectified spirit feed to superheated alcohol vapor stream ready to feed to the Molecular sieve bottles. The degree of superheat is control via a temperature control loop and the flow rate to the plant is control via flow control loop. The superheated vapors will pass through a sieve bottle, which is already regenerated, and pressurize to working pressure via bleed flow from an operating sieve bottle. After the drying cycle the flow will be shifted to the next sieve bottle, which is ready after duly regenerated and pressurize. This sequence minimizes the rate of rise and fall of pressure through the molecular sieve. Thus minimizing the attrition of the sieve beads. The sieve column after completion of drying cycle is evacuated to remove the adsorb water through an evacuation system via a condenser.

The mixture of alcohol and water is preheated by anhydrous alcohol vapor in PHE before being feed to recovery column, which enriches the stream back to azeotropic composition. The bottom of recovery column gets heat from partly by condensing anhydrous alcohol vapor in PHE. The anhydrous alcohol vapors condensed in product cooler. A flow indicator indicates the rate of anhydrous alcohol going to the anhydrous alcohol receivers.

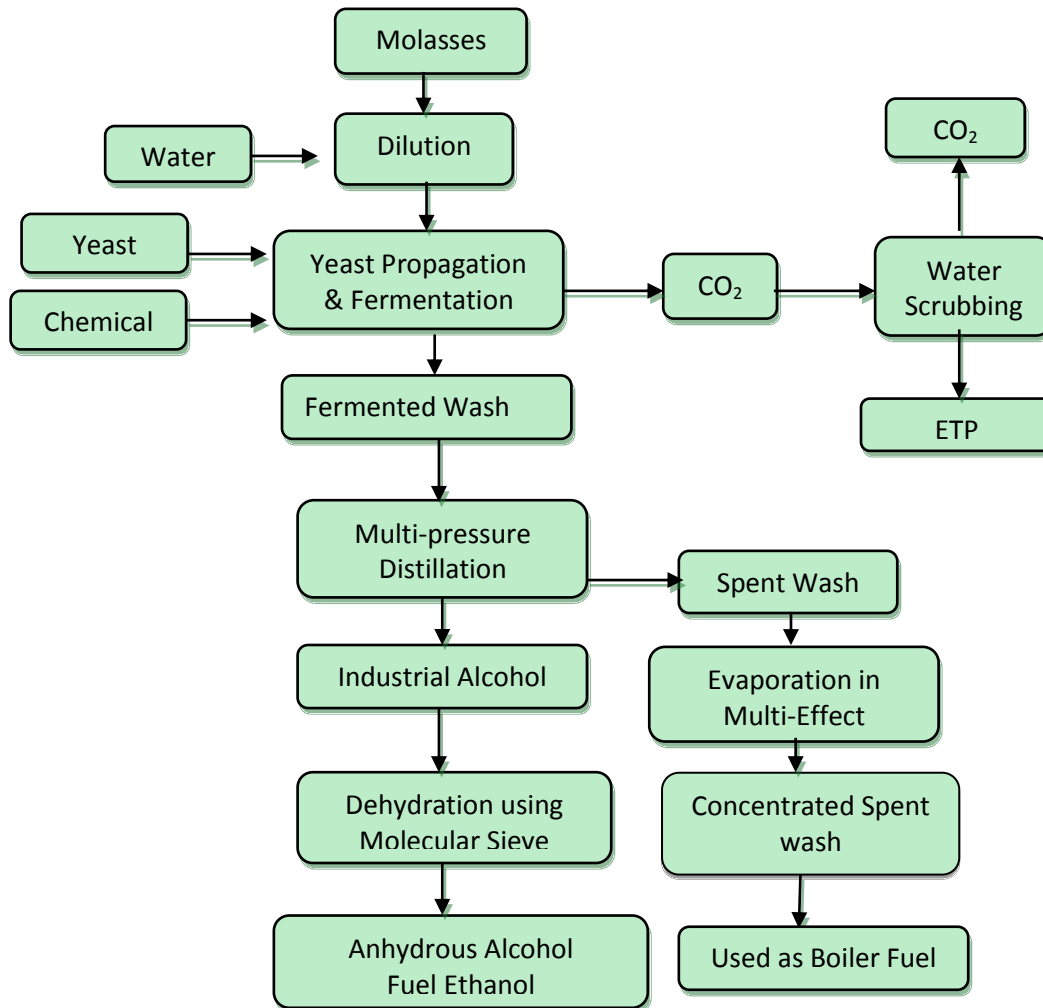


Figure 2: Process flow chart

3.6 Raw material required

The following will be the raw material requirement.

Table 2: Raw material required

Sr. No	Name	Quantity	Source	Mode of Transport
1.	Molasses	360 TPD	Own sugar factory and other sugar factories	MS Tankers
2.	Coal	62.84 TPD	Tonns/day	Near local market
3.	Nutrients N, P	60-70 kg/day	Local market	Surface transport using Trucks/Tempo

3.7 Resource Optimization / recycling and reuse

Spent wash generated during the process of distillation will be treated in multiple effective evaporators to

Concentrate and use in boiler as a fuel. The condensate generated during the process of Multiple Effective Evaporators will be reused in the process consequently decreasing the net water requirement.

3.8 Availability of Water

Water requirement for the proposed project will be 879 CMD. Source of water for the proposed project will be Sadalga Barrage on Doodhganga River. Water harvesting techniques will be used to increase ground water levels.

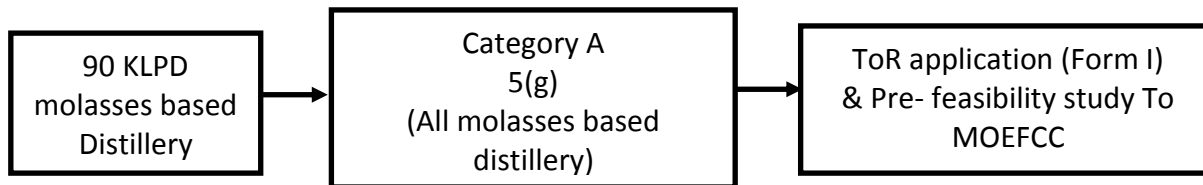
3.9 Quantity of waste generated

Wastes generated during whole process are described in below Table 3.

Table 3: Quantity of waste generated

Sr. No.	Aspect	Pollutant Quantity	Treatment
1.	Waste water	900 KLD Spent wash	Spent wash concentration (through MEF) and concentrated Spent wash burnt in incineration boiler.
2.	Air Emission	SPM ₁₀ , SPM _{2.5} , SOx and NOx	Electrostatic precipitator (ESP).
3.	Solid	<ul style="list-style-type: none"> • Yeast sludge 3.375 TPD • Ash from coal 1 TPH • Ash from spent wash 1.36 TPH 	Sludge (Yeast and ETP) will be dried and used as fertilizer or it will be incinerated along with spent wash in the boiler. Ash will sell to brick manufacturer.

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



4. Site analysis

4.1 Site connectivity

Details of connectivity towards proposed site is given below

Road	State highway -97 is adjacent to proposed site.
Railway	Ghatprabha railway station: 48.84 km
Air	Belagavi airport: 74 km

Nearest town/city	Tehsil Chikodi 15.72 km Belagavi: 74 km
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4.2 Land form, land use and land ownership

The proposed project will be located in existing sugar factory premises and land is for industrial use. The total land is in possession with management.

4.3 Topography

The topography of the land is flat without any undulations. Topo-sheet is attached separately with ToR application.

4.4 Existing land use pattern

The existing land is used for industrial purpose and comes under Karnataka industrial development corporation. Doodhganga River is flowing at a distance of 4.45 km in North and Vedganga River 3.87 km in West direction from the project site. There is no forest land, wild life sanctuary and an eco-sensitive area comes in 10 km radius of the proposed project location.

4.5 Existing Infra structure

Proposed plant will be located in the existing sugar factory premises. Hence the maximum resources like water, power and road connectivity are available.

4.6 Soil classification

The soil at the site is black soil.

4.7 Climatic condition

The variation in the maximum temperature during the year ranges from 27⁰C to 35.7⁰ C and minimum from 13.9⁰ C to 20.6⁰ C.

The normal rainfall in the district decreases from more than 1859 mm in Khanapur taluka in the southwest, to less than 491 mm in Raybag taluka towards northeasterly direction. Those areas, that receive less than 750 mm annual rainfall are classified as semi-arid and thus drought prone.

4.8 Social infrastructure available

Social infrastructure like community center, hospital and electricity is available in Bedkihal.

5. Planning in Brief

5.1 Planning Concept

The proposed molasses based distillery will be manufacturing rectified spirit/ENA/absolute alcohol/ impure spirit viz. fermentation, multi pressure distillation, spent wash evaporation through MEE. Concentrated spent wash will be used as fuel in boiler.

5.2 Population projection

The proposed activity will generate total 70 skilled and unskilled employee opportunities. No influx, migration of population is expected as labor shall be deployed from the local villages.

5.3 Land use planning

Land use planning of the proposed project is given below,

Proposed distillery area: 16129 sq. m.

Proposed green belt area: 5323 sq. m. (33% of total plot area)

Layout of proposed distillery is given in Annexure I

5.4 Amenities/Facilities

Facilities like canteen, rest rooms and recreation facilities will be provided for the proposed project.

6.0 Proposed infrastructure

6.1 Industrial area

The major plant & machinery required for the proposed project is as given below

Sr. No	Name
1.	Fermentation section
2.	Distillation section
3.	Steam condensers
4.	Air compressor
5.	Incineration Boiler
6.	Storage section
7.	Multiple Effect Evaporation Section
8.	Raw water treatment plant
9.	Fire protection equipment's
10.	Laboratory instruments
11.	Condensate polishing unit

12. Electrostatic precipitator

6.2 Residential area

Facilities like canteen, rest room and indoor games facilities will be provided in the proposed project. Local labor from nearby villages will be hired in project activity. Existing housing colony of sugar factory will be used for proposed distillery staff.

6.3 Green belt

Total 5323 sq.m. (33% of total area) of green belt will be developed in proposed project premises.

6.4 Social Infrastructure

Factory will identify the need of the villagers and execute the CSR activity.

6.5 Connectivity

Site is well connected with by state highway-97, Sankeshwar – Sadalga.

6.6 Drinking water management

Drinking water will be supplied through with proper water treatment system.

6.7 Sewerage system

Domestic waste water generated will be treated in septic tank followed by soak pit.

6.8 Industrial waste management

Spent wash generated from the distillery will be treated in multiple effect evaporators to concentrate and use as fuel in spent wash fired boiler.

6.9 Solid waste management

- Yeast sludge mixed with spent wash and incinerated in the boiler or used as manure.
- Ash generated will be given to brick manufacturers.
- Sludge from ETP will be used as manure.

6.10 Power requirement

Total power required of proposed project during operation phase is 1695 kWh and would be generated through the incineration boiler (32 TPH).

7.0 Rehabilitation & resettlement plan

No rehabilitation or resettlement plan is proposed as proposed plant will be located in the existing sugar factory premises.

8.0 Project schedule and cost estimate

The total cost of the project is estimated about Rs. 93.35 crores. The project cost estimates include all expenses to be incurred towards the entire project for Land & land development, civil, building / structure, plant & machinery, preliminary & pre-operative and other expenses, contingencies @ 2% on building, plant & machinery, margin money of working capital. Environment management cost for the proposed project will be around 2.59 crores

9.0 Analysis of proposal

Proposed project will help to increase the socio-economic status of the local people as well as provide the stability to the existing sugar factory. Proposed project will provide following benefits,

- This industry will provide RS, ENA and anhydrous alcohol which will earn & save foreign exchange in the potable alcohol cadre as well blending in petrol.
- Project will create direct & indirect employment opportunities within the surrounding region.
- With the implementation of the proposed project, the socio-economic status of the local people will improve substantially.
- Proposed activity will help in upliftment of the social status of the people in the area.
- Primary health center will also come-up and the medical facilities will certainly improve due to the proposed project.

Annexure I

Plant Layout

