

**SUSTAINABLE ENVIRONMENTAL NORMS- A PRIME
RESPONSIBILITY OF COOPERATIVE SOCIETY - A STUDY IN SHREE
CHHATRAPATI SHAHU COOP. SUGAR FACTORY, KAGAL**

Chaichi Devi*

Research Scholar, NIT Meghalaya, National Institute of Technology Meghalaya,
Bijni Complex, Laitumkhrach, Shillong-793003 Meghalaya, India

*Corresponding author

ABSTRACT

The waste management in every industry is of major concern in today's world. There are various technologies adopted to minimize the waste generation and to recover resources out of it. Sugarcane industries alcohol distilleries are put at the top of "Red Category" industries having a high polluting potential. The spent wash generated by distillery unit of sugar industry is having high value of Biological oxygen demand (BOD) and Chemical oxygen demand (COD) posing a serious pollution threat. To mitigate this problem various advanced treatment processes are employed in sugar industry to meet various environmental norms. In this study emphasis is given on the current technologies existing in Shree Chhatrapati Shahu Sahakari Sakhar Karkhana Ltd., KAGAL, Kolhapur to understand the gap in implementing the various environmental standards laid down by Maharashtra Pollution Control Board(MPCB). The salient features like waste processing, wastewater treatment and other environmental issues are analysed from various data and literature provided. The biogas plant installed in the factory has the potential to generate 1.5 MW i.e. 1500 units/hr of electricity. The study reveals that Chhatrapati Shahu Sahakari Sakhar Karkhana Ltd., KAGAL, Kolhapur is able to meet the environmental standards as per norms.

Keywords: Cooperative Sugar industry; Waste management; Environmental Standards; Biogas plant

1. INTRODUCTION

One of the most important environmental problems faced by the world is management of wastes. Industrial processes create a variety of pollutants; which are difficult and costly to treat. Waste characteristics and levels of pollutants vary significantly from industry to industry. Now-a-days

emphasis is laid on waste minimization and revenue generation through byproduct recovery. The major objective of pollution prevention is to cease the waste generation whereas waste minimization aims at reduction in volume or toxicity of hazardous wastes by various processes involved for waste modifications and the byproduct recovery by the manufacturing process which has a potential for revenue generation. The waste management in sugar industry to meet the less pollutant impact on environment is required. As per the Central Pollution Control Board, Ministry of Environment & Forests (MoEF), Government of India has put Sugarcane industries alcohol distilleries at the top of "Red Category" industries having a high polluting potential. Alcohol distilleries of the sugar industry generates large volumes of spent wash with high BOD (45,000 – 60,000 mg/L) and COD (80,000–120,000 mg/L). Therefore the industry should look forward for adaptation of appropriate technology and suggestions from the environmentalist.

Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, KAGAL, Kolhapur, Maharashtra, India obtained Industrial

License: January 1977 registered as Cooperative society under Maharashtra State Co-op Act: Feb 1977. It was converted into Multi-state Cooperative Society since May 2006.

Consent to Renewal for Distillery Unit under RED category under Section 26 of the Water (Prevention & Control of Pollution) Act, 1974 & under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981 and Authorization under Rule 5 of the Hazardous Wastes (M, H & T M) Rules 2008 is considered. The consent is hereby granted subject to the following terms:

The spent wash should be stored in impervious tanks. The spent wash tanks should have proper lining with HDPE and should be kept in proper condition to prevent ground water pollution. As per the CPCB recommendation and undertaking given by the company, storage should not exceed 30 days capacity. Applicant shall ensure availability of adequate filler material such as press mud, bagasse, agricultural, biological waste as required for effective composting system.

Composted material shall meet the following specifications:

Moisture ...30 to 35%

C/N ...Below 17

Nitrogen ... 1.5 to 2%

Phosphorous ...1.5 to 2%

Potassium ... 3 to 4%

Conditions under Water (P&CP), 1974 Act for discharge of effluent shown in Table 1 .

Table 1: Conditions for Discharge of effluent

Description	Permitted Quantity of discharge(CMD)	Disposal
Trade effluent	417	On land for irrigation
Domestic effluent	38	On land for irrigation

Note: Adapted from Environmental Impact Assessment studies report 2014, Distillery project, Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, Kagal, Maharashtra.

Deepak Kanhere, Pune based engineer has supported a very simple and viable eco-friendly solution on this waste generation problem. Due to extended monsoon there was a heavy production of sugarcane and hence the cane harvesting schedule also got extended. With the increase in sugar production significantly, the problem of excessive molasses which is a byproduct of sugar arose. When the director of cooperative department permits sugar mills to enhance their capacity they should also consider the disposal or storage issue of the excessive molasses produced by these sugar mills. One can understand their own profitability and economics involved in the molasses based distilleries. Through the process of methanogenesis there are many cogeneration plants running on spent wash which is a byproduct of these distilleries and are generating electricity on Biogas (Deepak Kanhere,2011)

What to do with this excess molasses? This question was raised in an article published by Agro One; looking at the figures in the article Deepak Kanhere is providing a suitable and sustainable eco-friendly option available for the said problem.

No. of sugar mills in Maharashtra is 161. Whereas Indisposed molasses available is 1.2 millions M.T. Referring these figures he suggested that every sugar mill has to dispose 7400 M.T. of molasses per annum. This simply means disposal of 20 M.T. of molasses a day is a concern to every sugar mill.

This illustrates further as mentioned below.

- 1 kg of molasses produces 500 liters of Bio gas.
- 20 M.T. of molasses will produce approx. 10,000 M3 of Biogas every day.
- 12 M3 of Biogas requires generating 1 KW of electricity.
- Considering the daily production of 10,000 M3 of Biogas, approx.0.75 MW electricity can be generated by single sugar mill in one day.

- In a whole year one sugar mill can produce approx. 135 MW of electricity that to in a completely decentralized form.

The benefits of recovery of by-products are given as below:

1. The slurry disposed by the Biogas plant is excellent liquid manure for organic farming which will further reduce the Salivation effect on land.
2. Since daily production of Bio-gas is above 10,000 M³ the same is entitled for Carbon Credit Certification. (C.C.C.) worth Rs. 2.5 crore per annum.
3. The revenue generated through C.C.C. is every year vis-à-vis subsidy is one time only.
4. The entire plant is eco-friendly and the electricity generated by the sugar mills in a year will resolve the power shortage issue of Maharashtra state up to certain extent.
5. With these economics and viability there is no need to beg for any financial support to the government.

2. METHODOLOGY

For the analysis of this case study the data and literatures are collected from different secondary sources. Different research papers and Environmental Impact Assessment report for the distillery project of Shree Chhatrapati Shahu Cooperative Sugar Factory have been studied. The Maharashtra Pollution Control Board guidelines for sugar industry are being analysed for implementation. Also interview was done with environmental officer and different officials of various sections like biogas plant, distillery unit, cogeneration plant etc.

3. DISCUSSION

The various environmental standards met by Shree Chhatrapati Shahu Cooperative sugar factory have been analysed. The various environmental aspects regarding waste characteristic, wastewater management, green belt provision etc. are the salient features of the sugar industry.

The amount of spent wash (distillery wastewater) generated in Shree Chhatrapati Shahu Cooperative sugar factory is 500 m³. The Ph was 4-4.5, COD was 150,000 mg/l and BOD was 70,000mg/l. Biogas plant was established in April 2014. Total cost of the biogas plant was 6 crores. After the installation of biogas plant now digested effluent is released. The compost after biogasification has been improved in quality regarding NPK composition. It takes 45-50 days to prepare the compost. The digested effluent is now having COD around 250mg/l and BOD is less than 100mg/l which is as per MPCB guidelines. 50 metric tons of bagasse is saved every day. To the molasses to maintain Ph sulphuric acid is added in the distillery unit. To neutralize this acidic condition lime is added to the spentwash. The cow dung for the biogas plant for methanogenesis

is supplied by their farmers. M.M. Enviro projects pvt.ltd. has established the biogas plant. Compost is sold at Rs. 600/ton. Now the biogas plant applying for **Carbon Credit** is in the category of methane reduction.

Baggage obtained as by product in the industry can significantly contribute to satisfy the thermal and electrical demands of the industrial process. Biogas plant is consuming 1,800 units of electricity per day. Whereas 450,000 units are generated by the cogeneration plant. Exporting to state electricity board around 250,000 units at Rs. 6 per unit.

During the installation of distillery unit a green belt is proposed in the plant premises. 30Ha. land was afforested which is common between distillery and sugar factory. Width of the green belt along the plant boundary is 1.5 m. whereas width of road and avenues is 1m. Various indigenous and exotic species were proposed shown in Table 2 . Survival rate of the plants are 100%.

Table 2: Details of various species of plants during green belt development in the industry

SL. No.	TYPE	NUMBER
1	Subabhool	3640
2	Medimedia	1055
3	Casia	594
4	Vad	90
5	Nilgiri	1655
6	Limb	531
7	Sishav	435
8	Babool	589
9	Rain trees	159
10	Shivan	101
11	Silver Oak	126
12	Rain Keswar	3
13	Sag	3421
14	Suru	163
15	Cashewnut	283
16	Guava	137
17	Mango	162
18	Coconut	130
	TOTAL	13274

Note: Adapted from Environmental Impact Assessment studies report 2014, Distillery project, Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, Kagal, Maharashtra.

Cane agriculture can be practiced with a minimum consumption of chemical products and highly compatible with the environment and soil conservation most importantly, improved soil fertility conservation, lower consumption of herbicides and the possibility of using part of the residues as fuel, animal feed or raw material. The alternatives to chemical fertilizers are including recycling of the industrial bio waste like press mud and the liquid effluents as irrigation water. Likewise, irrigation of cane fields with the vinasse obtained as a waste from alcohol distilleries is a generalized practice in Brazil. These practices, handled with adequate control, not only solve the problem of how to dispose of liquid wastes but also make an important contribution of both the organic and mineral materials required by the soil. (Proceedings of the Cuba/FAO International Sugar Conference). Initially the water source for the Sahu Sugar Plant was Kaneri dam which was 9km. away. Then the source was from Kalmaudi dam since 1991 which was located 70 km. away. In recent time the source of water is Dudhganga river since 1993 around 3Km. away. There is difference in water consumption in different seasons according to sugarcane production. The treated effluent is discharged in 2 to 3 acres of their own farm for sugarcane seeds. Now 2,500 to 3000 acres is under irrigation schemes. These rivers are – Dudhganga, Vedaganga and Chikotra. These are sponsored schemes. Total project will cost 30 crores.

4. CONCLUSION

The study has given emphasis on the current technologies existing in Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, KAGAL, Kolhapur to understand the gap in implementing the various environmental standards. Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, KAGAL, Kolhapur is able to meet the environmental standards as per norms. Now the biogas plant has the potential to generate 1.5 MW i.e. 1500 units/hr of electricity. The desired level of performance can be obtained by any technology when it is operated at right environment. The monitoring of biogas plant if under observation everyday and the data is generated in a computerised programme daily. There was no any technical defect arose since the installation of the biogas plant and the maintenance cost is very low though installation of biogas plant was late adopted. As the compost technology is employed for the distillery sludge the sugar factory is economically benefitted. The sugar factory is meeting the effluent discharge limit for irrigation purpose in their own sugarcane fields and the effluent after post biogasification used for irrigation as per crop requirement and soil conditions is effective in crop productivity. This is a sustainable practice. Thus if every sugar factory of our country is able to exploit all the advanced technologies to recover by products which are commercially valued then various problems like pollution will be mitigated and the whole nation will be economically flourished.

Since with the current technologies in Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, KAGAL is not creating any environmental issues in their surrounding area they can enhance

their production capacity by maintaining the environmental standards in future by adopting advanced eco-friendly technologies. Other sugar industries of this region can look up to the technology prevailing in Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, KAGAL to make their production sustainable and economical.

Another possible alternative is to utilize bagasse as a possible renewable source of raw materials which can replace wood in many aspects. In Cuba which is a hub of sugarcane this is practiced since many years. There are various bagasse board factories in Cuba. This can give rise to small scale entrepreneur along with sugar production. This can combat the ever increasing demand for conservation of forest. The product from bagasse requires lesser technology than the wood products

REFERENCES

Ganesan,S., Natarajan A., Karuppiah P.S., Kandhasamy P.,& Balamuthu K.(2010).Recycling of Distillery Sludge from Sugarcane Industry Using Bioresource Technology. *Journal of Applied Sciences Research*, 6, 218-223

Padayachee , N.(2010).Environmental challenges facing the sugar manufacturing industry. *Proc S Afr Sug Technol Ass*, 83, 365 – 372

Report on Assessment of grain based fermentation technology, waste treatment options, disposal of treated effluents, Central Pollution Control Board, Central Zonal Office, Bhopal.(2001).

Proceedings of the Cuba/FAO International Sugar Conference. (1999)

Environmental Impact Assessment studies report.(2014).Distillery project, Shree Chhatrapati Shahu Sahakari Sakhar Karkhana. Ltd, Kagal, Maharashtra.

Maharashtra Pollution Control Board Consent to renewal for distillery unit under RED category.

<http://biogasapplication.blogspot.in/2011/02/possible-solution-for-sugar-industries.html>

<http://www.fao.org/>