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A CASE STUDY OF CO-GENERATION PROJECT OF RAJARAMBAPU CO-OPERATIVE SUGAR FACTORY RAJARAMNAGAR, DIST- SANGLI

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ABSTRACT

This paper present "A Study of Cogeneration Project of Rajarambapu Sugar Industry Islampur". Cogeneration plants provide both process heat and electrical power from common fuel. State government of Maharashtra support sugar for starting and developing cogeneration project. Government provides 5% of the capital expenditure on cogeneration project while the factory concerned puts in an equal amount. Rajarambapu sugar industry consume their bagass to run their mills during season and generate steam to run the boilers and turbines, they generate power to run their plants. In 2017-18 Rajarambapu Sugar Industry get 5768 lakh amount from electricity. Expenses of cogeneration production was 5 cror rupees for per MW .They have produce more electricity through high pressure turbine and steam.

Keywords: *bagasse,cogeneration, turbines, electricity*

Introduction:-

Co-generation of bagasse is one of the most attractive and successful energy projects that have already been demonstrated in many sugarcane producing countries such as Mauritius, Reunion Island,India and Brazil. Combines heat and power from sugarcane in form of power generation offers renewable energy options that promote sustainable development, take advantage of domestic resources, increase profitability in the Factory, and cost-effectively address climate mitigation and other environmental goals. State government of Maharashtra support sugar for starting and developing cogeneration project. Government provides 5% of the capital expenditure on cogeneration project while the factory concerned puts in an equal amount.

According to World Alliance for Decentralized Energy (WADE) report on Bagasse cogeneration, bagasse-based cogeneration could deliver up to 25% of current power demand requirement in the world's main cane producing countries.

State government of Maharashtra support sugar for starting and developing cogeneration project. Government provides 5% of the capital expenditure on cogeneration project while the factory concerned puts in an equal amount. This paper present study of cogeneration project of Rajarambapu co-operative sugar factory, Rajaramnagar (Tal-Walwa, Dist- sangli, State – Maharashtra, India) and their success of electricity production. Rajarambapu sugar Factory consume their bagasse to run their mills during season and generate steam to run the boilers and turbines, they generate power to run their plants. In 2017-18 Rajarambapu Sugar Factory get 5768 lakh amount from electricity. Expenses of cogeneration production was 5 cror rupees for per MW .They have produce more electricity through high pressure turbine and steam.

Objective of Study:

- To Study concept of cogeneration
- To study cogeneration project of Rajarambapu sugar factory,Rajaramnagar.
- To find out electricity production by cogeneration project of Rajarambapu sugar factory, Rajaramnagar.

Research Methodology:-

Researcher use secondary data for his study.i.e.books,annual reports and different websites.

Cogeneration:-

Cogeneration or Combined Heat and Power(CHP) is the use of a heat engine or power station to generate electricity and useful heat at the same time. Cogeneration is more efficient use of fuel because otherwise wasted heat from electricity generation is put to some productive

use. Combined heat and power recover otherwise wasted thermal energy for heating. This is also called combined heat and power district heating. Small CHP plant are an example of decentralized energy. The supply of high-temperature heat first drives a gas or steam turbine powered generator. The resulting low-temperature waste heat is then used for water or space heating. At smaller scales typically below 1MW a gas engine or diesel engine may be used.

Need for Cogeneration

- Cogeneration helps to improve the efficiency of the plant.
- Cogeneration reduce air emissions of particulate matter, nitrous oxides, sulphur dioxide, mercury and carbon dioxide which would otherwise leads to greenhouse effect.
- It reduces cost of production and improve productivity.
- Cogeneration system helps to save water consumption and water costs.
- Cogeneration system is more economical as compared to conventional power plant.
- optimizes ecological and economical benefits in the empower generation

Advantages of combined Heat & Power:- CHP is an integrated system that harnesses wasted energy in traditional power generation. It offers a wide range of advantages including financial, efficiency, ecological and legislative.

1)Financial BenefitsReduces energy costs: A single system can offer energy savings of up to 40% offering a permanent reduction in energy costs.

Zero cost outlay options available: For larger scale systems zero capital funding options are available so that you can finance the system cost effectively.

Enhanced Capital Allowances Eligible: Tax can be claimed back on procurement of large and small-scale CHP systems for use in commercial buildings or district heating schemes.

Renewable Obligation Certificate Compliant: Biomass and other sustainably fuelled CHP systems may qualify for Renewable Obligation Certificates which function in a similar fashion to the feed in tariff – providing an income from your system dependant on run hours (metered)

Renewable Heat Incentives

Heat pumps (Ground Source & Air Source), Solar Thermal and biomass CHP systems are eligible for renewable heat incentives – financial incentives designed to increase the uptake of renewable technologies.

2)Environmental Benefits

Reduced CO2 and S02 Emissions

CHP systems reduce CO2 emissions with biomass and biogas CHP being essentially carbon neutral.

Helps New Construction Meet Carbon Legislation Compliance.

Carbon legislation compliance in construction is greatly helped by CHP systems thanks to the energy savings and environmental benefits of the systems.

Reduces Transmission Losses from the Grid

CHP systems help to reduce loss from the grid by providing a regular and consistent supply of energy.

3)Efficiency Benefits Increases Energy Security.

CHP systems can operate entirely off grid or supplement larger energy demands. This provides exceptional energy security.

Fuel Choice Benefits

CHP systems can work on a wide variety of fuels including biomass pellets, biogas, natural gas and other fuel types.

4) Legislative and New Building Benefits

Helps with Part L Compliance

Helps meet CRCEES targets

CHP systems help you meet the CRC Energy Efficiency Scheme targets.

Helps new buildings avoid the Climate Change Levy. The climate change levy applies to industrial, commercial, agricultural and public service sectors and applies to electricity, gas and solid fuel consumption.

CHP can use the thermal heat which is traditionally wasted in power stations enabling energy savings of up to 40%.

CHP is a recognised sustainable way of generating electricity which can be sold back to the National Grid or used within a private wire network to supply homes and businesses.

CHP used in community energy schemes can assist with planning applications and consent, as well as assisting to meet regional carbon emission targets and support energy reduction strategies.

CHP generation also contributes towards reducing CO2 emissions against standard plant room boiler use and obtaining electricity from conventional coal fired power stations.

Disadvantages of Combined Heat and Power

The main disadvantages of combined heat and power are that it is capital intensive and that it is not a sustainable energy source unless used with renewable fuels.

Disadvantages

1) **Not Suitable for All Sites** :-CHP systems are only suitable for sites where there is a need for heating and hot water systems. For larger scale systems heat and power demand need to remain fairly consistent for maximum efficiency. This particularly applies to heating which is powered continuously on larger systems.

2) **Financially Intensive**:-The initial costs for a CHP system can be high without funding. Which can make it prohibitive for smaller scale (non-domestic) installations.

3) **Not Necessarily Environmentally Friendly**:-Not all CHP systems run on environmentally friendly fuels. Though at Helec we always recommend systems run on environmentally friendly or sustainable fuels.

Cogeneration Project of Rajarambapu Sugar Factory Rajaramnagar :-

From last three year Rajarambapu Sugar Factory running cogeneration project. Their target is creation of 1000 MW electricity production. For this purpose they sanctioned 56 lakh share capital from government. They achieved their target. Rajarambapu Sugar Factory have create 9 cror 87 lakh 61 thousand KWH unit electricity.

Advantages of cogeneration through adoption of new technology:-

Under unit 1 they establish cogeneration project.They selected high pressure boiler with working pressure for this project. The capacity of this boiler has 140 tonne for per hour and 110 K.G working pressure. 28 MG blidcome backpressure turbine of high pressure has also selected.

1) 140 tonne peer hour capacity and 110 KG/C.M2 high pressure boiler:-

This boiler produce high pressure steam for 28 MG turbine. High temperature and high pressure steam produce more than old low pressure boiler. Following table shows the comparison between ratio of Low and High pressure.

Sr.No	Boiler	Steam to Fuel Ratio	Tempreature
1	Low pressure Boiler(32KG/CM2)	1.85	385 degree C
2	High Pressure Boiler (110KG/CM2)	4.86	540 degree C

2) 28 MW Turbine Set:-

High pressure and High temperature steam use for 28 MW turbine in 140 tonne peer hour capacity and 110 KG/C.M2 high pressure boiler.

The following table shows that, high pressure turbine get high temperature than low pressure turbine.

Sr.No	Turbine	Steam to Power Ratio	Temperature
1	Low pressure Turbine (32KG/CM2)	10.00	385 degree C
2	High Pressure Turbine (110KG/CM2)	4.86	535 degree C

3) E.S..P (ElectroStatic Presipitetor):- This system has used for high pressure boiler. In this system flied ash of high pressure boiler has collected. This ash collecting in ash silo through ash handling system and it used for compost fertilizer for farming.

4)V.F.D.Drive:-

V.F.D Drive used for boiler,i.e.for all fans, boiler feed water pump. Cooling water pumps ,cooling water fans, air compressors etc.

Income from Cogeneration Project of Rajarambapu Sugar Factory Rajaramnagar:-

In last two year Rajarambapu Sugar Factory run cogeneration project successfully. They have used modern technique machinery and also up gradation of staff and get memorable success through cogeneration project. Following table shows income from cogeneration project from last two years.

Sr.No	Particular	2016-2017	2017-2018
1	Production of Electricity per tonne	79.57	96.2
2	Electricity used by sugar factory in per tonne	7.53	6.88
3	Electricity export in per tonne	44.30	61.84
4	Total electricity produced by sugar factory (Unit)	45385045	98761673
5	Total Export of electricity (Unit)	25269000	63601308.75
6	Plant load factor	91.18	85.59
7	Total Income from export of Electricity (amount in Lakh)	4075.643	1693.023
	Total income from Electricity(amount in Lakh)	5768.666	

Conclusion:-

Rajarambapu Sugar Factory get various advantages of cogeneration .They operate automatically all machinery and using less manpower through cogeneration project. High pressure turbine is grater than low pressure turbine in the department of electricity production.Indusry control air pollution through ESP system. ESP system destroyed fly ash.300 Kg steam made in high pressure boiler in per tonne bagasse. In last two year Rajarambapu Sugar Factory get 5768 lakh rupees income from their cogeneration project.

Abbreviations

Wade = World Alliance for Decentralized Energy,

MW = Mega watt

CHP = combined Heat & power

Co – 2 = Carbon dioxide

SO-2 = Sulphar dioxide

KG = kilo gram

ESP = Electro static presipitetor

KWH = kilo watt per hour

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2) Report of department of cogeneration of Rajarambapu Sugar Factory

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