Case Study:
Energy Efficiency and CDM Project in Lao Brewery Co.Ltd,.

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Energy Efficiency in Lao Brewery Co.,Ltd.

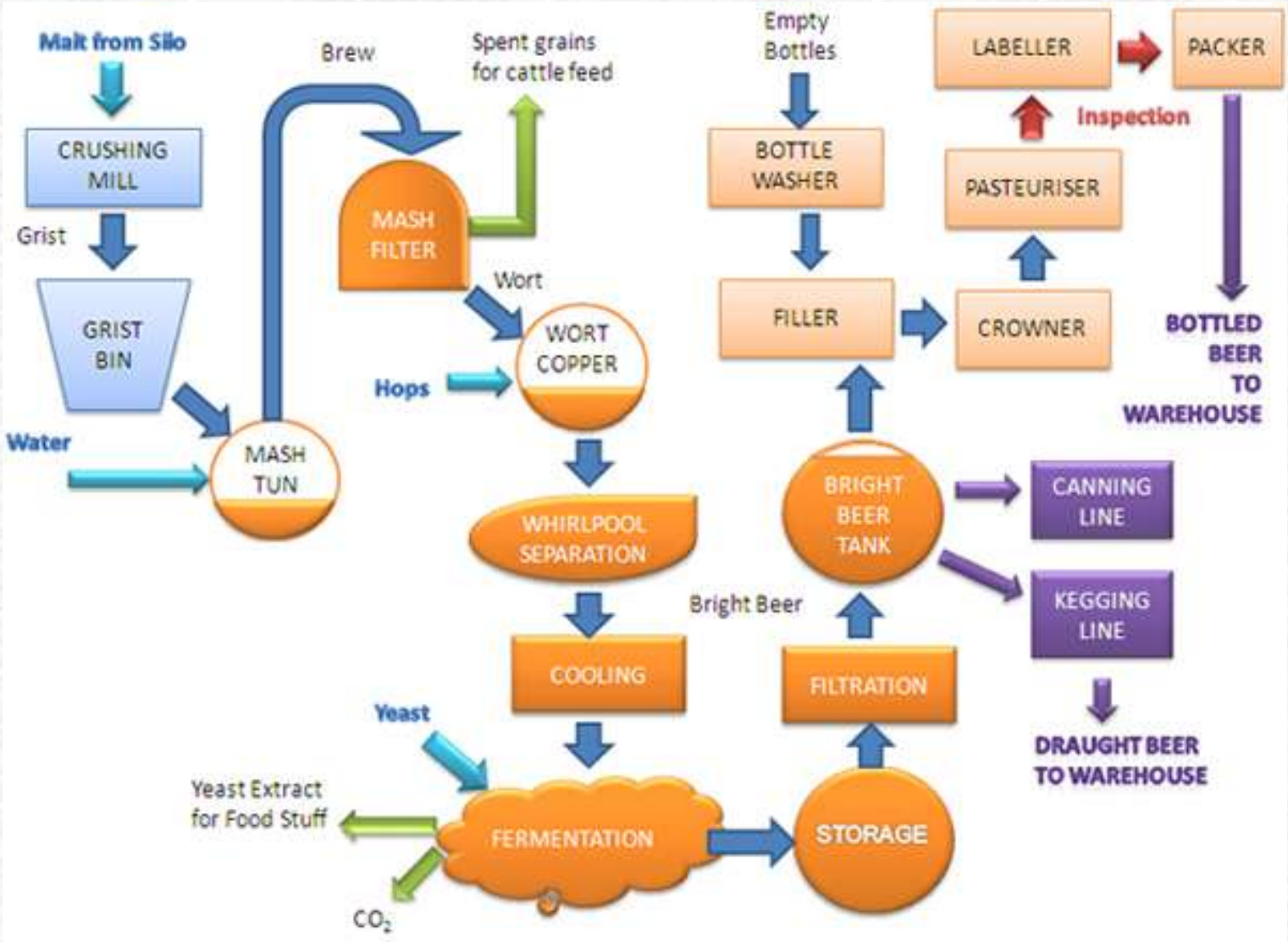
Production

Electrical Energy Consumption: 14million kWh
Fuel Oil Consumption: 2.8 million Tons
Production: 160 million liters
(Year 2009)

ISO 14001:2004

ISO 9001:2008

Process Diagram



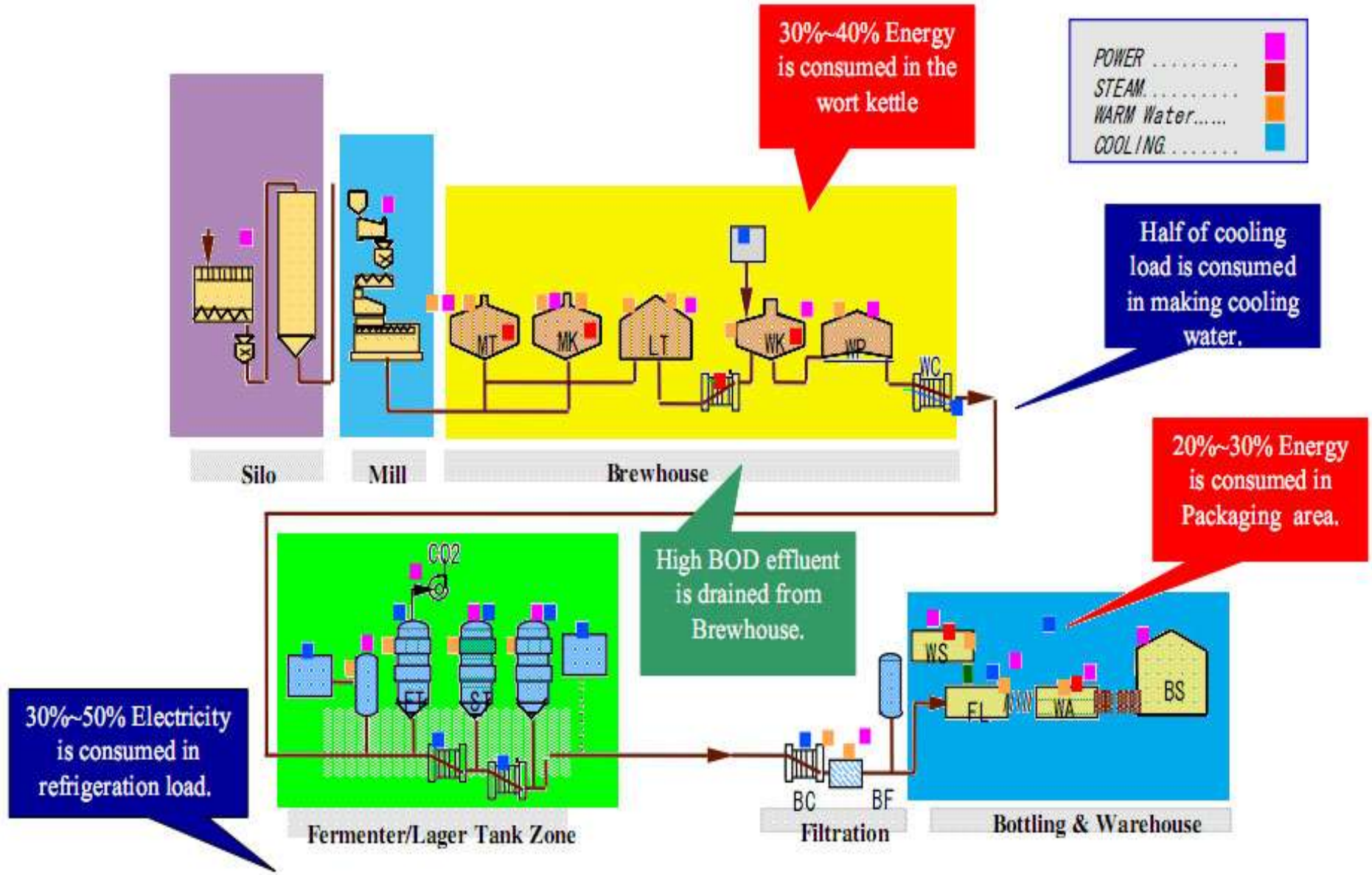
Energy Efficiency Project in Lao Brewery Co.,Ltd.

- The proposed project aims at improving energy efficiency and will be implemented at a single industrial facility, i.e., the LB's beer brewery in Vientiane. The project consists of two components as follows:
- ☆Project Component #1: Installation of Vapour Re-Compression (VRC) system in brewhouse and heat-pump system in pasteurizing process
- ☆ Project Component #2: Installation of biogas boiler
  - The VRC system and heat-pump system in the pasteurizing system would reduce fuel consumption by recycling waste heat with advanced technology. On the other hand, the biogas boiler that utilizes biogas
- (methane) coming from the wastewater treatment system displaces fuel consumption of the existing boilers.

Energy Utility Equipments

	Capacity	Power
Transformer :		6,900 kVA
Cooling system plant :	2,768,700 kcal /hr.	3,220 kW
Boiler plant :	26 ton /hr. (9 ton/hr Stand by)	192 kW
Air compressor plant :	1960 Nm^3/hr.	223 kW
CO2 plant :	905 kg /hr	138 kW
Air conditioning system :	3,071,000 Btu/hr	
Diesel Generator :		1,000 kVA
Water treatment : 172 m^3/hr		155 kW
Waste water plant :	3200 m^3/day	315 kW
Brew house :	350*2 hl/brew	188 kW
Filtration plant :	300 hl/hr	101 kW
Packaging line 1 :	20.000 bph	320 kW
Packaging line 2 :	24.000 bph	424 kW
Packaging line 3 :	24.000 bph	1,038 kW
Drinking Water :	24.000 bph	886 kW
Energy Saving System : VRC , Heat pump, Biogas		250 kW

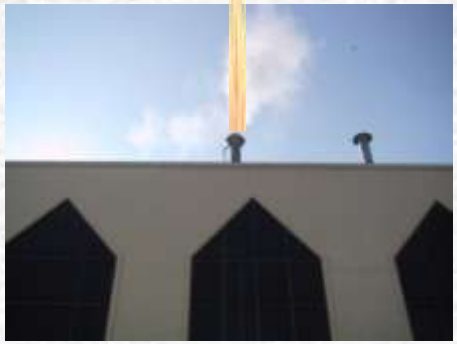
Utility Consumption in Brewery



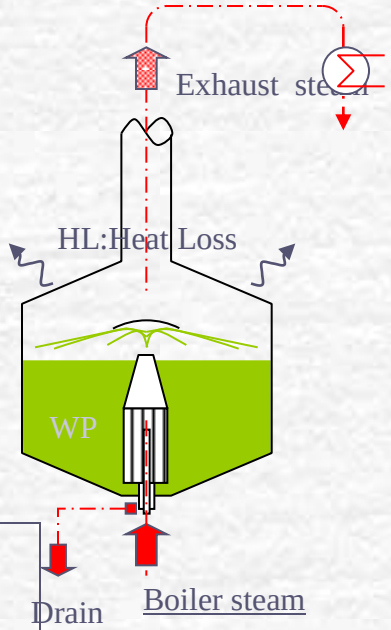
Energy Efficiency Facilities Installation in Lao Brewery Co., Ltd.

Vapor Recompression System

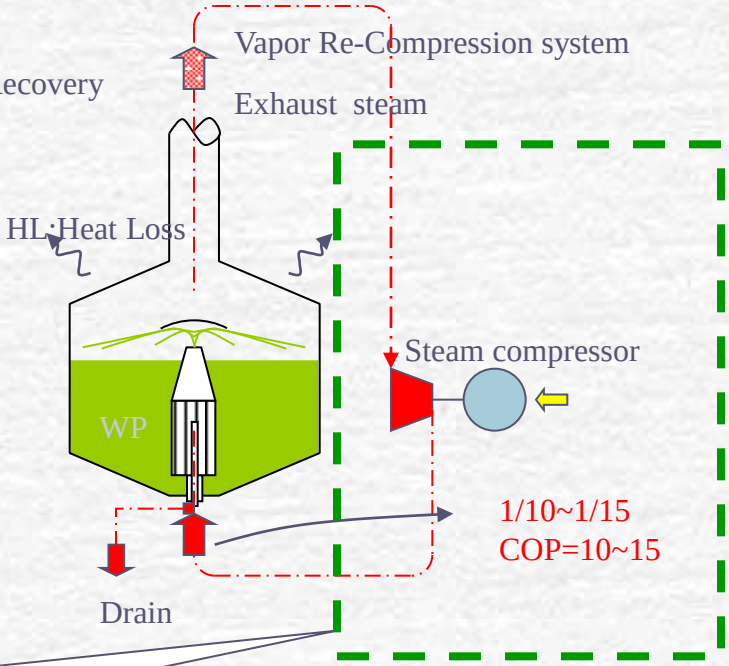
Baseline:
Discharging the
Exhaust Steam



Conventional heat recovery system



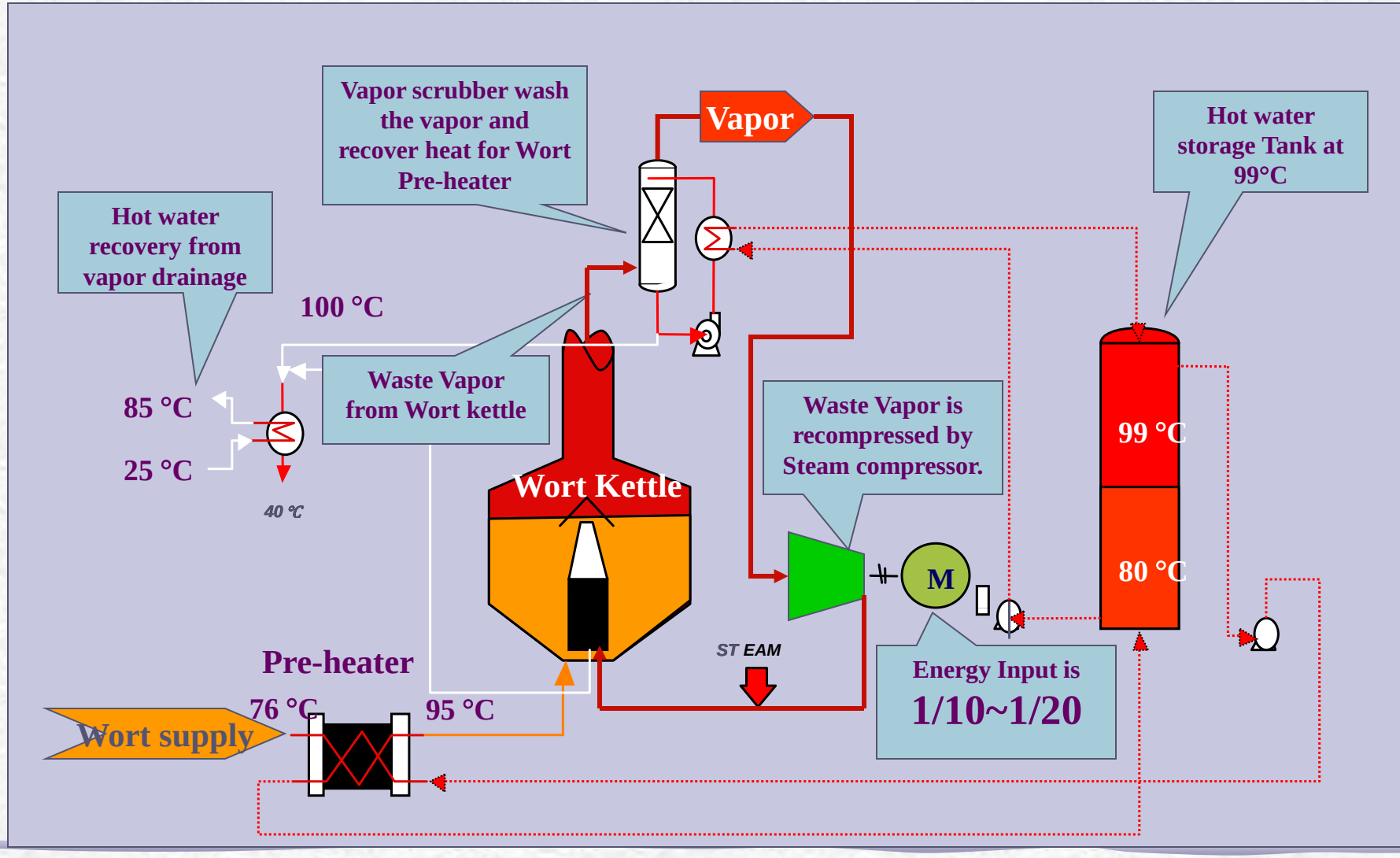
VRC system



※ This system was developed for energy saving with the aid from Japanese Government

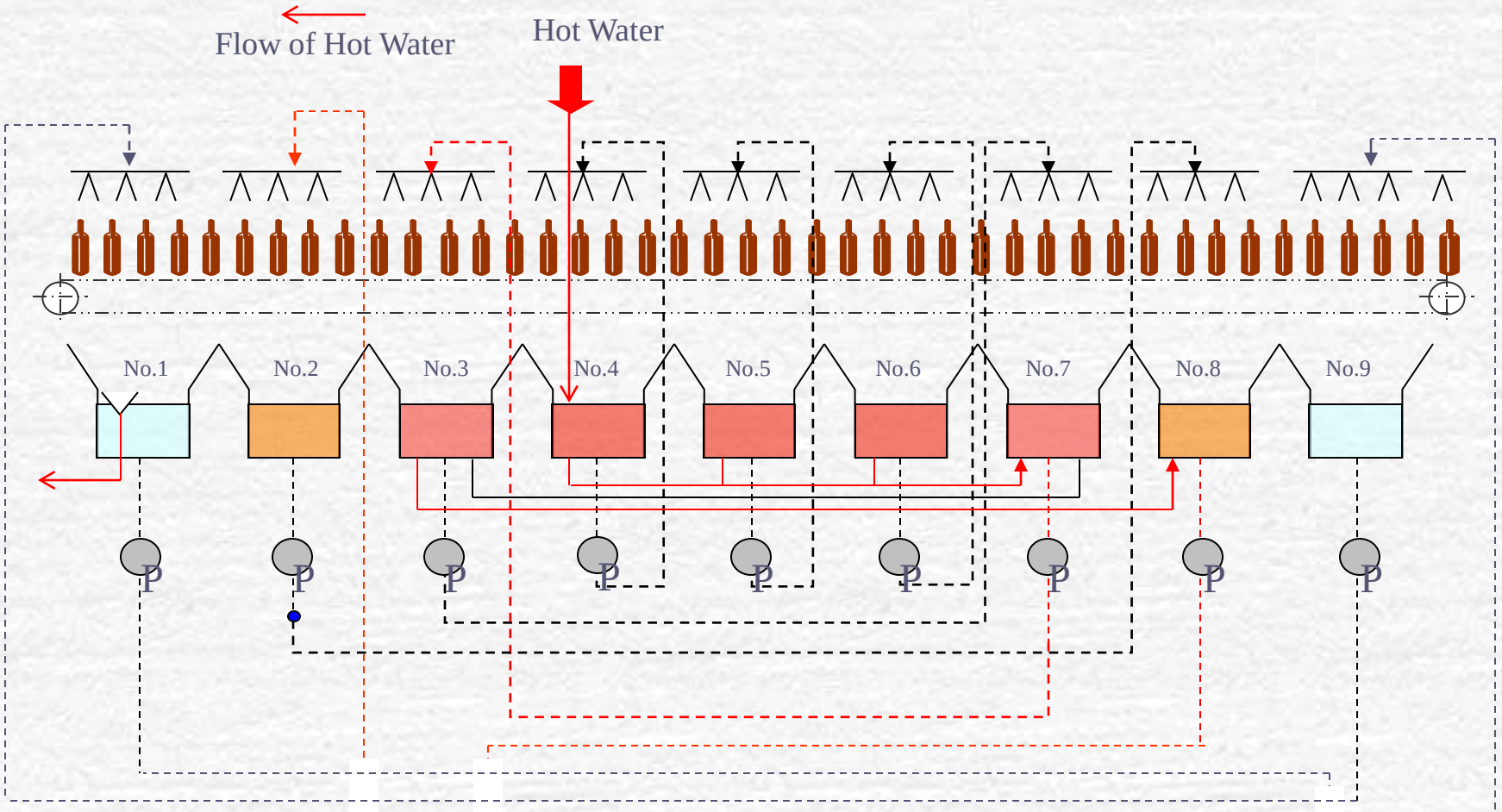
Project activity :
Saving steam by reusing the discharged steam

VRC System

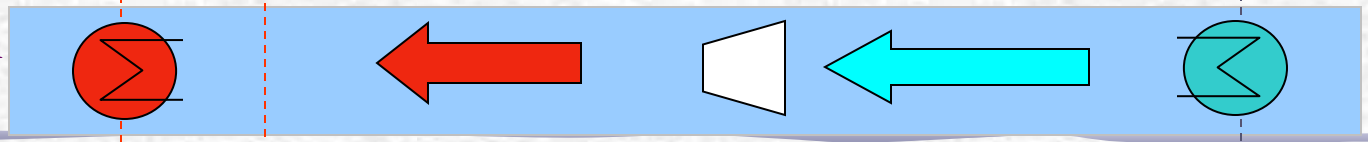

Vapor scrubber wash the vapor and recover heat for Wort Pre-heater
Vapor
Hot water storage Tank at 99°C
Hot water recovery from vapor drainage
100 °C
Waste Vapor from Wort kettle
85 °C
25 °C
40 ℃
Wort Kettle
Waste Vapor is recompressed by Steam compressor.
99 °C
80 °C
M
ST EAM
Energy Input is 1/10~1/20
Pre-heater
76 °C
95 °C
Wort supply

VRC

Heat Pump Efficient Pasteurising System



Heat Pump System

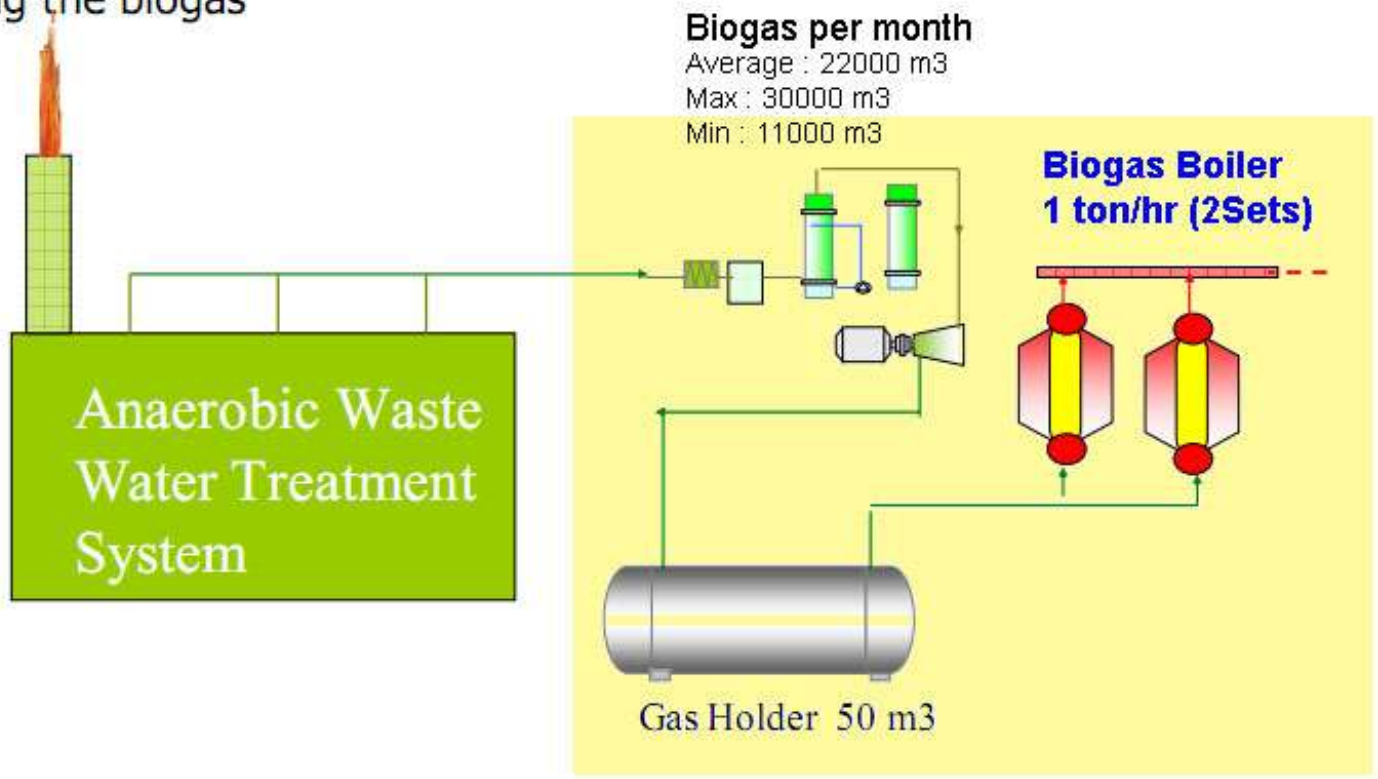


Project activity : Saving steam by heat pump system for Pasteuriser

Efficient Pasteurising System

Biogas Boiler system

Baseline :
Flaring the biogas

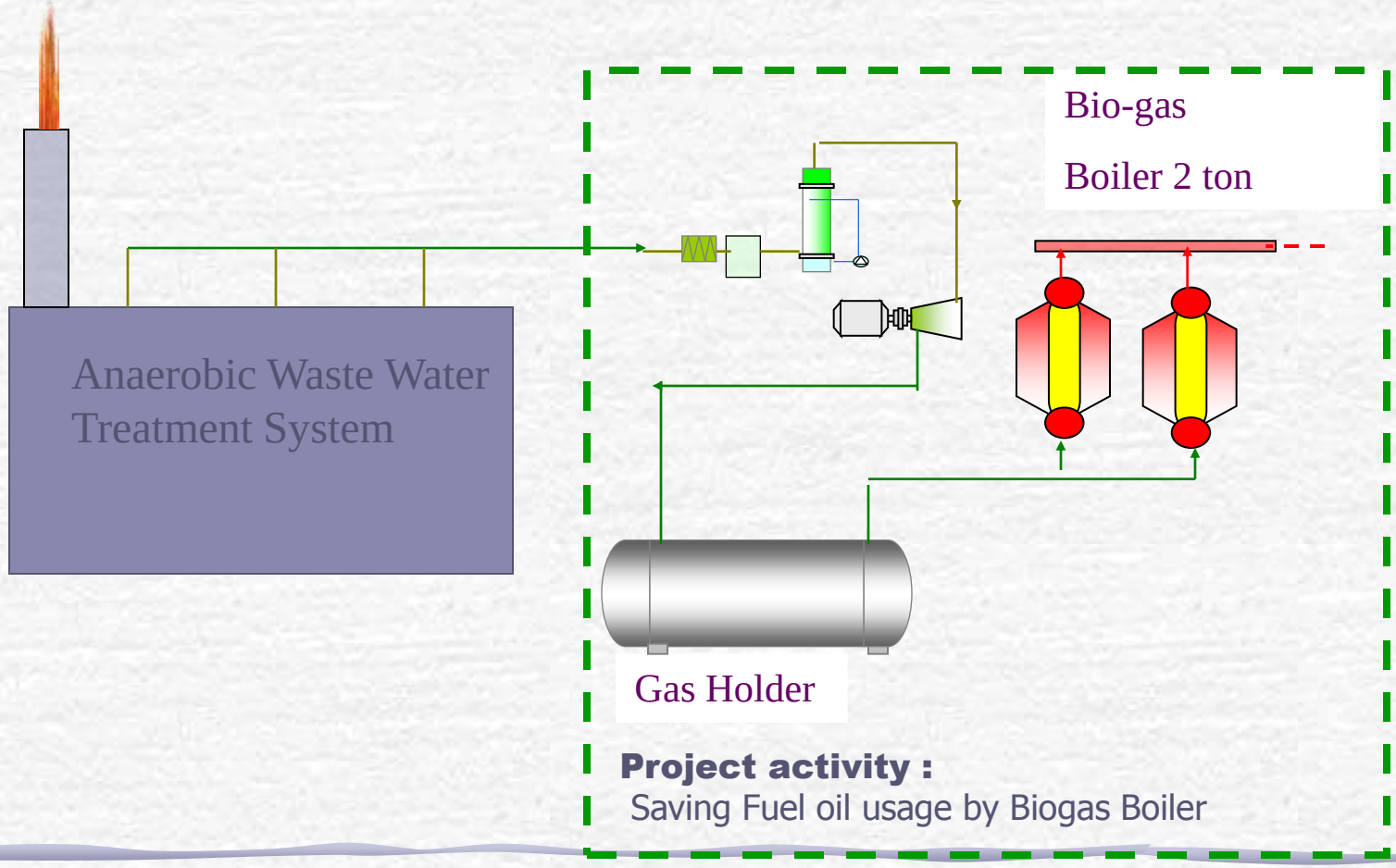


Project activity: Saving fuel oil usage by biogas boiler
Average 23 ton ; Max 26 ton ; Min 13 ton per month

Biogas Plant system

Baseline :

Flaring the biogas



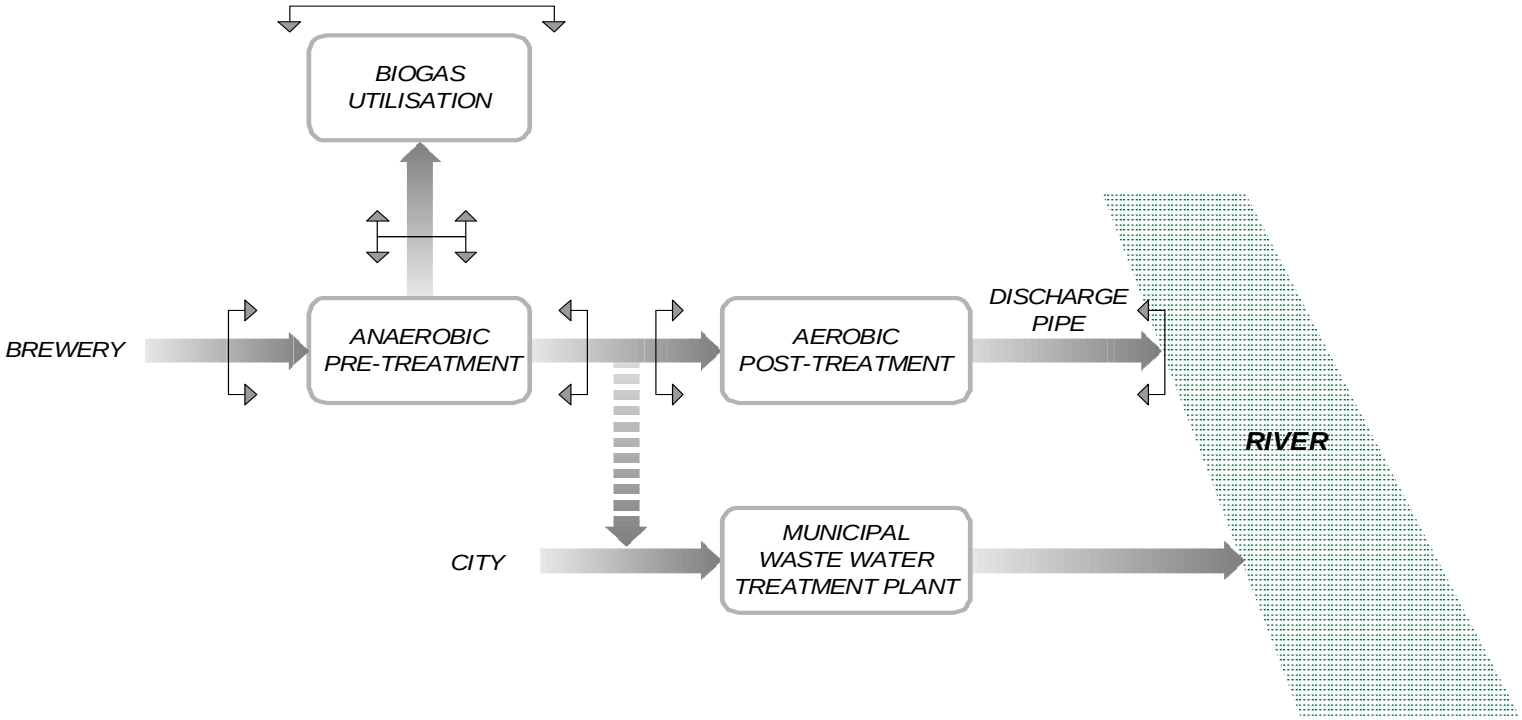
Project activity :

Saving Fuel oil usage by Biogas Boiler

Biogas Plant

Biogas Plant

Synergies in treatment



Production volume and Estimated Energy Saving System.

1. Average fuel consumption before energy saving system was installed :

3.13 kg – oil / hl (average Jan – Oct / 2006)

2. Expected consumption rate in year 2007

2.39 kg – Oil / hl (average Jan – May / 2007)

3.Prouction volume in year 2007 : 1,300,000 hl / year

4.Fuel saving : 1,300,000 hl *(3.13 – 2.39)kg –oil / hl = 962,000 kg – oil/year

a) Fuel Cost Saving : 962,000 / 0.99 * 4,700 /10,600 = US $ 430,856

b) Running Cost : USD 2.572 (average Jan – May)*12M *0.9(90%) = US $ 27,778
(70 % Power factor)

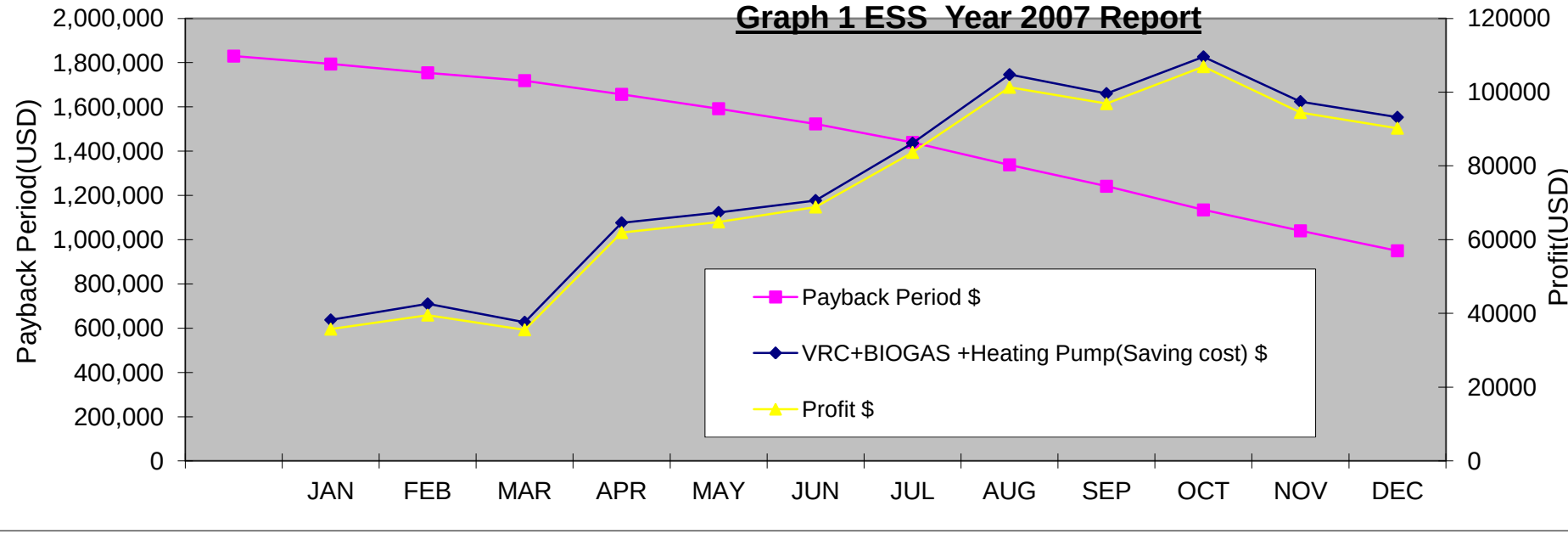
c) Broken bottle saved : US $ 21.083 (average Jan – May) *12 M * 0.9(90%) = US $ 227,696

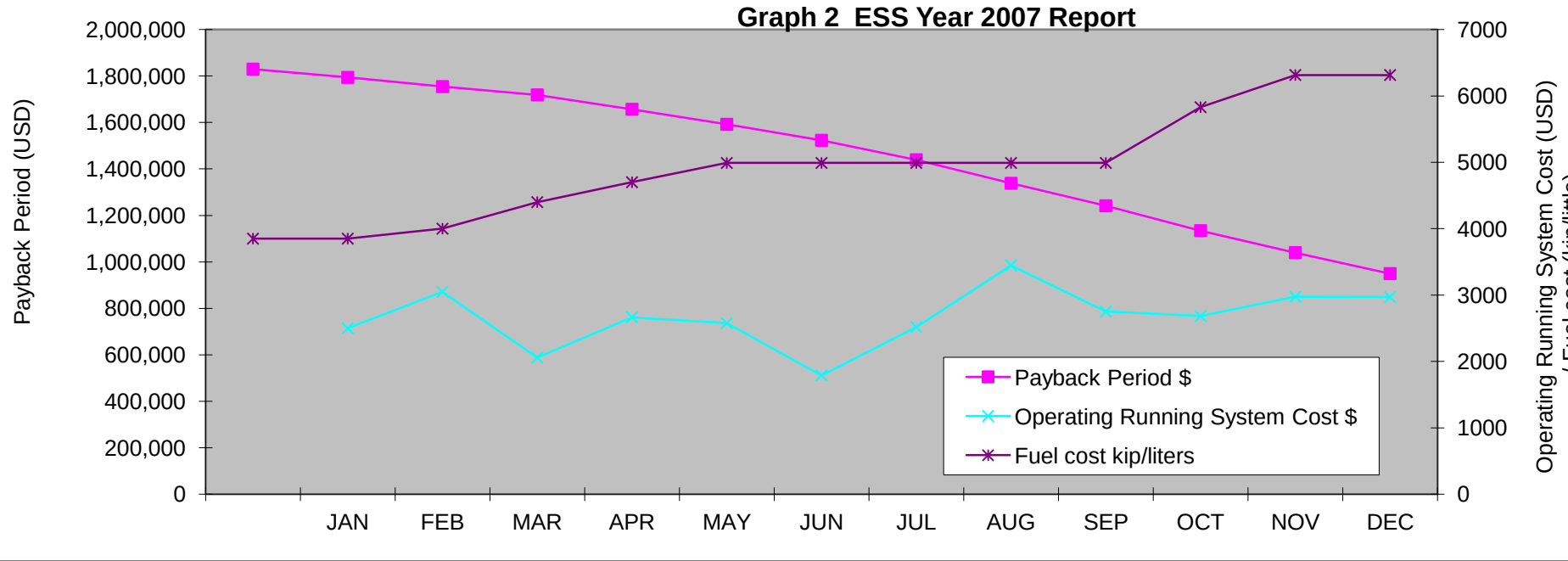
d) Water Saving : US$ 1.648 (average Jan – May) * 12 M * 0.9(90%) = US $ 17,798

Annual saving : a) + c) + d) – b) = US $ 648,572 / year

Payback period : US $ 1,829,600 (total investment) / US $ 648,572 = 2.8 year

Payback Period of Three Facilities of Saving Energy





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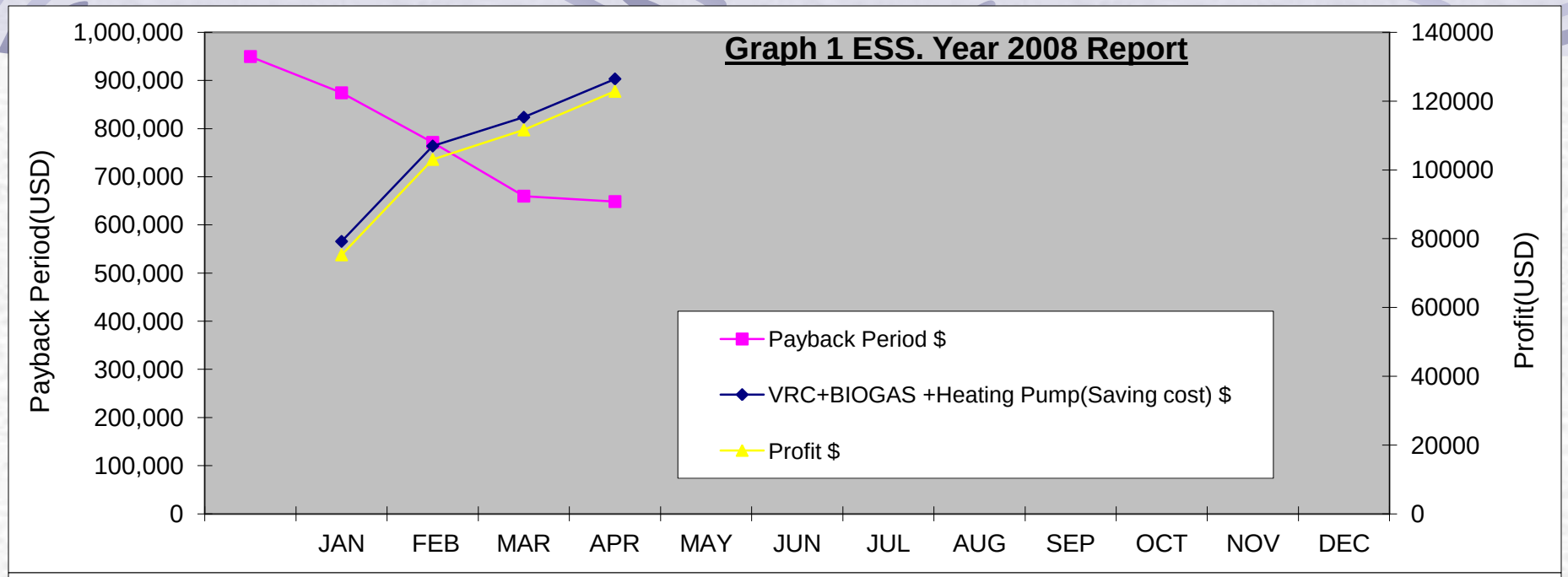
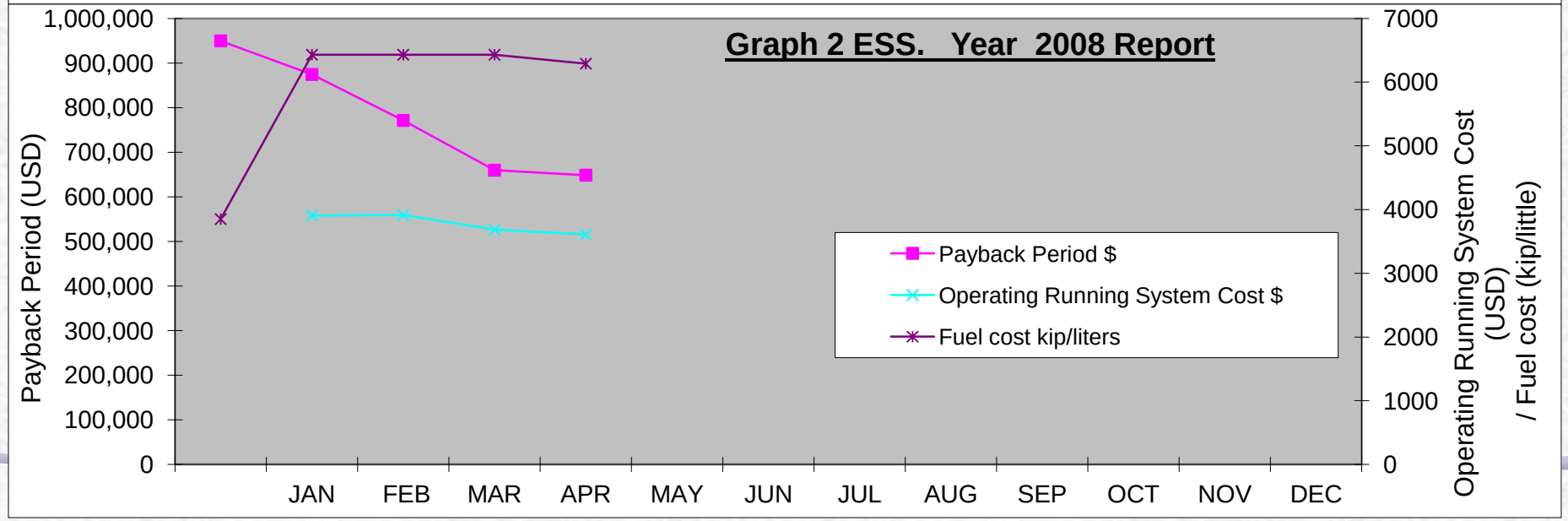
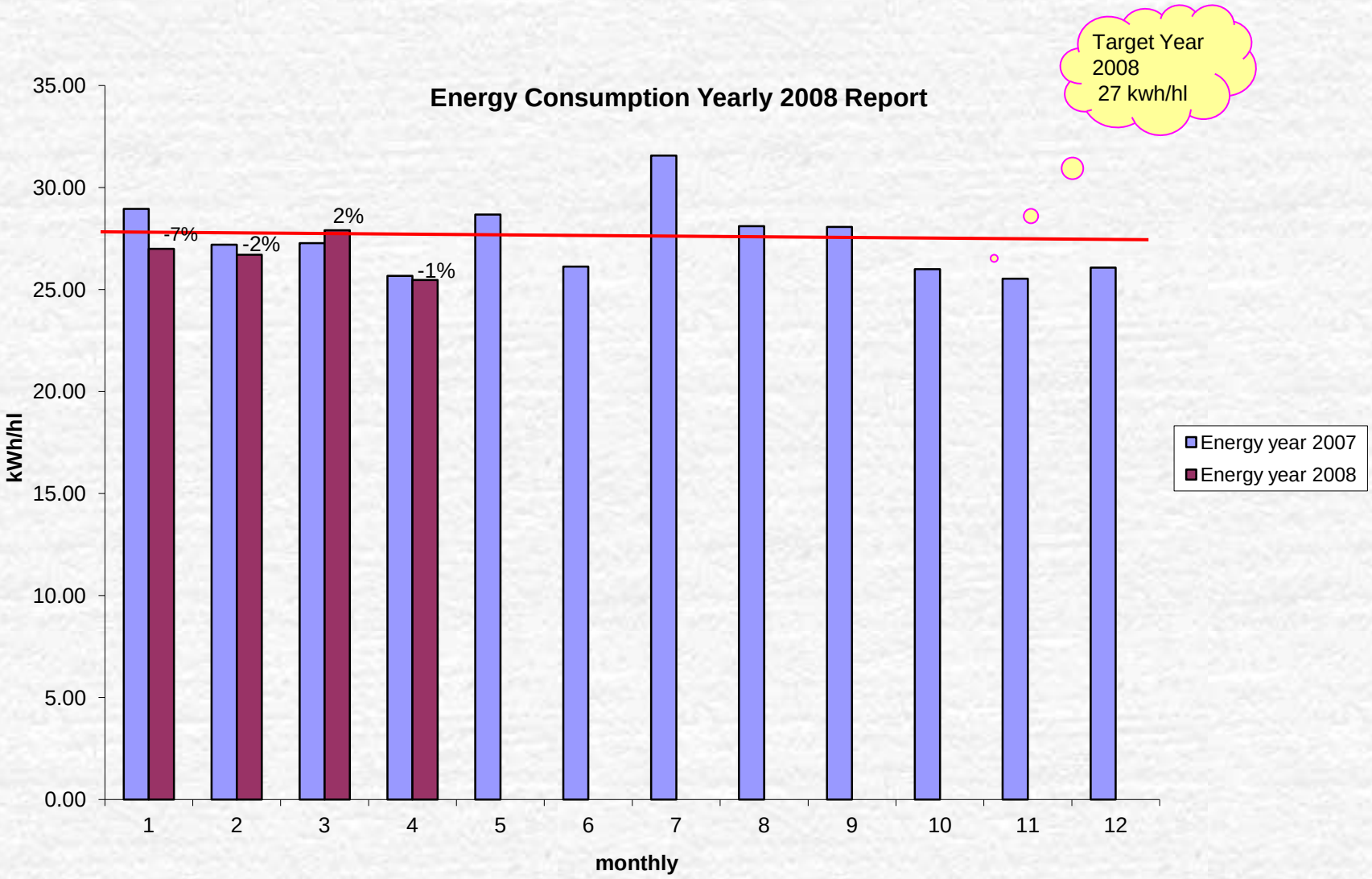
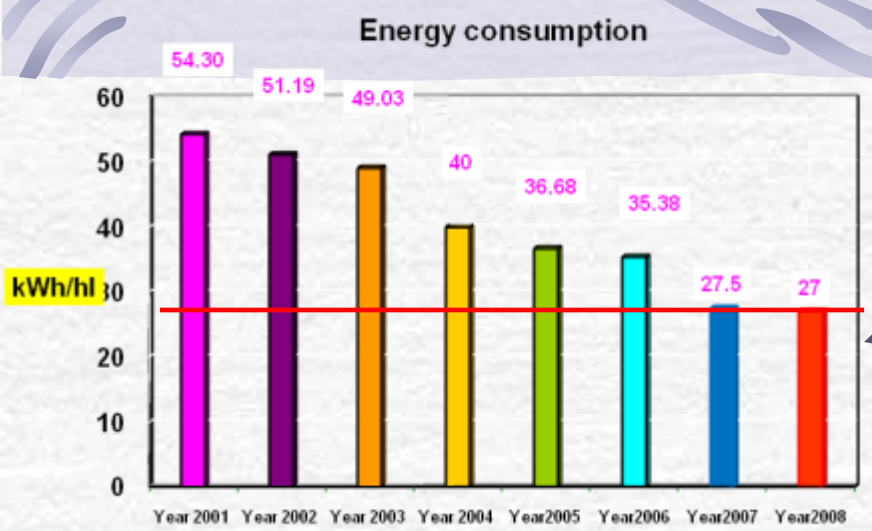




Monthly energy consumption before and after installation energy saving facilities





Target
Year 2007
27 kWh/hl