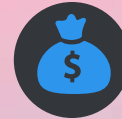




# Energy Efficiency Enhancement

Providing Energy Management Tools, Services and Increasing Efficiency at a Powder Milk Factory



## OVERVIEW

SB Electronics Engineering and Control (Pvt.) Ltd. (SBEEC) is an Energy Services Company (ESCO) Providing a broad range of Energy Solutions including design and implementation of Energy Savings Projects, Energy Conservation, Energy Infrastructure Outsourcing, Energy Supply and Risk Management for ICT, Commercial and Industrial Customers. Owing to increasing Energy Costs Industrial consumers require following solutions;

1. Improvement of Energy Consumption through Energy Monitoring Tools
2. Energy Audits of their Significant Energy Users (SEU)
3. Decreasing Overall Cost of Energy from Significant Energy Use Sources
4. Develop PUEs (Power Usage Efficiency) and EPIs (Energy Performance Indicators)

To achieve the above objectives an Energy Efficiency Enhancement (e3) program was introduced by SBEEC for accurate monitoring of the Factory. Aim of this project is to improve Energy OPEX at the Factory.



# ENERGY MONITORING

To identify the Significant Energy Users, Smart meters were installed on all Loads of the Factory including Grid Supply and Generators. Total of Twenty-One Meters were installed which had the following break up:

1. Grid Supply – 1 Nos.
2. Generators – 3 Nos.
3. Factory Departments & SEUs – 17 Nos.

After installations, Energy and Production analysis were conducted to determine SEUs, Energy Efficiency as well as Cost of Production.

## ANALYSIS OF ENERGY CONSUMPTION

Table 1 depicts the Energy Profile of the factory in a pie chart to determine which areas of the Factory use the most energy. Using this table a list of SEUs was compiled and identified for Energy Audits

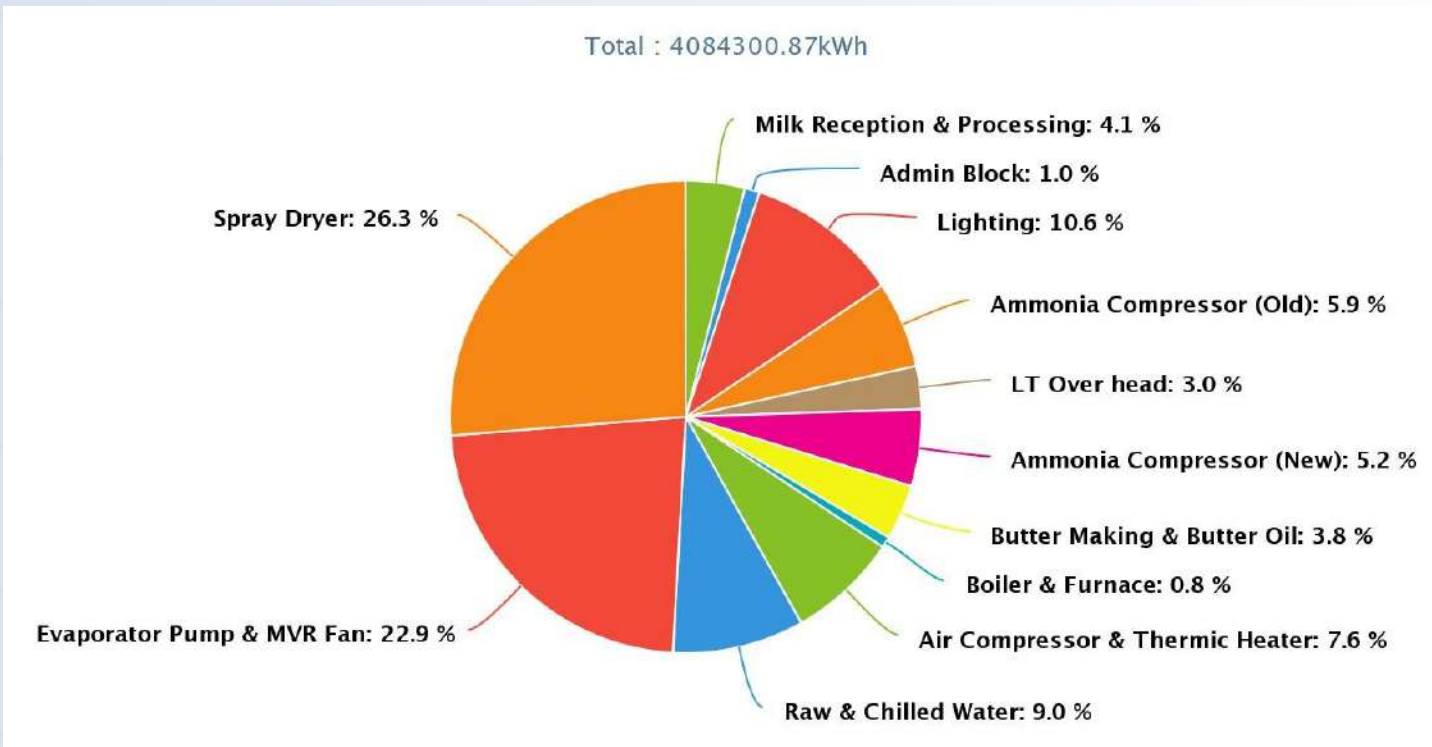
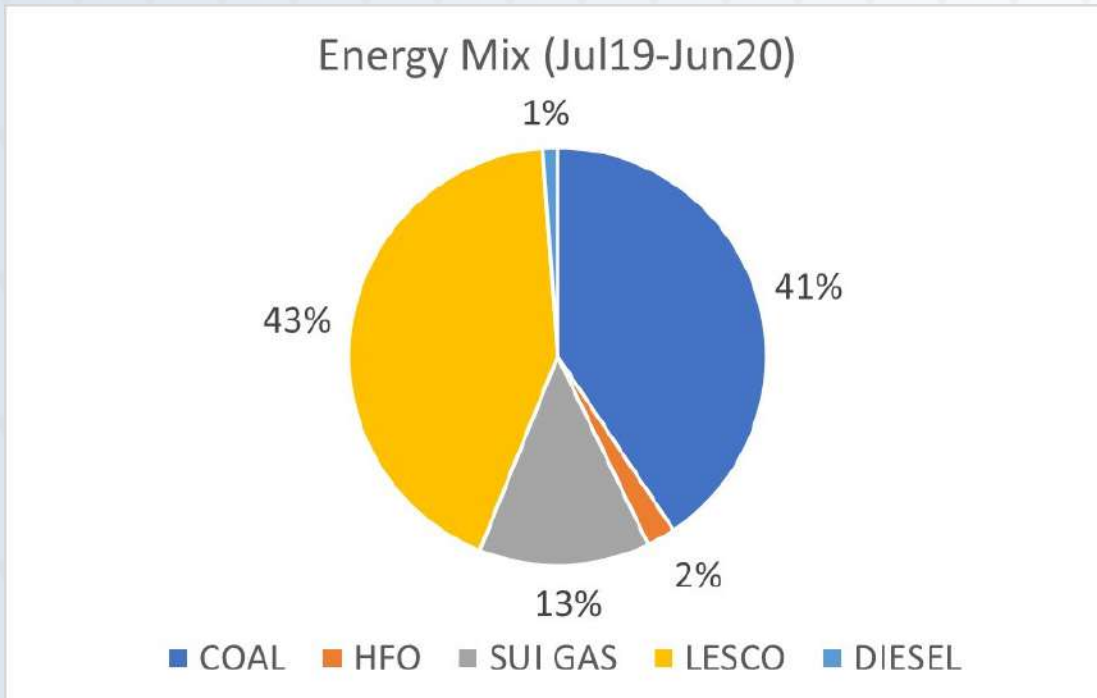


Table 1. Factory Consumption Areas (Jul19-Jun20)

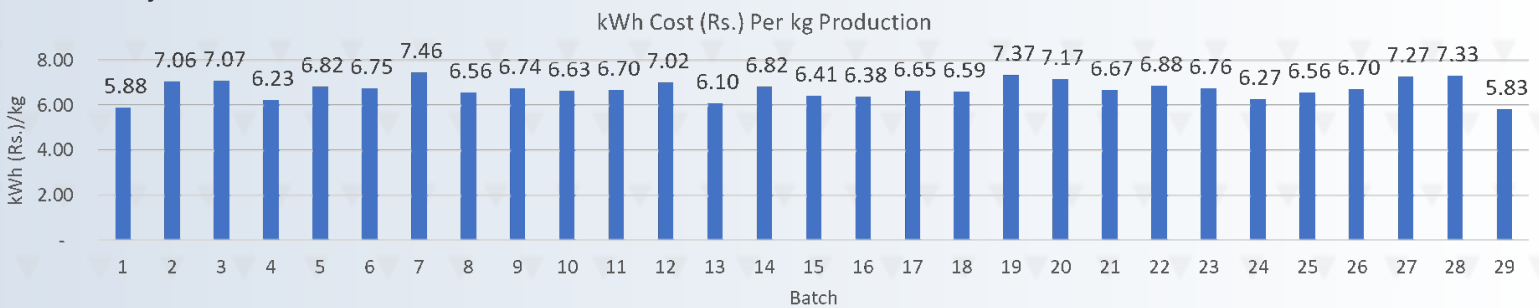


Table 2 below depicts the Energy Mix Costs of the Factory a pie chart. This was used to determine what are the Major Energy input costs to the factory and how Energy OPEX can be reduced.



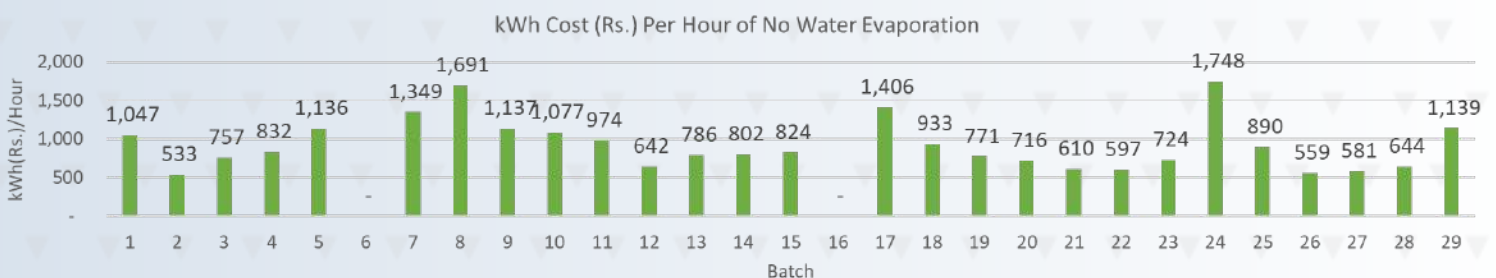
**Table 2. Energy Mix (Jul19-Jun20)**

Table 3 below shows the Energy Cost Per kg of Production being incurred by the factory. These analyses are used to determine their production efficiency and it can be clearly seen that there is significant variance in energy usage from batch to batch which can be improved to achieve the objective.



**Table 3. Production Cost Analysis**

Table 4 below depicts the Cost of Energy for Time period where No Production has taken place. This analysis presents us with a picture of Energy that is not being used for Production and hence can be easily controlled & monitored.



**Table 4. Energy Cost Per Hour (Period of No Water Evaporation/Production)**



Table 5 below depicts the SEUs that have been identified from their respective Energy Meters. For these SEUs an Energy Audit is being conducted to determine their Efficiency

S#	Motor Name	Capacity (kW)
1	High Pressure Pump or Homo	45
2	Atomizer Motor	30
3	Blower of Air intake system	19
4	Forced Draft Fan for Spray Drying Unit (Hot air)	37
5	Forced Draft Fan for Static Fluidizer Bed	15
6	Exhaust Fan (M-4)	75
7	CIP Pump for Dryer	22
8	CIP Return Pump of Dryer (65-PXX)	15
9	MVR Fan	200
10	Tube Well (Turbine # 01)	37
11	Tube Well (Turbine # 02)	19
12	Raw Water Pump For SCM	22
13	Blower Of Ammonia Condenser # 02	15
14	Air Compressor # 01	86
15	Air Compressor # 02	45
16	Air Compressor # 03	55
17	Main Motor	132
18	Coal Fire Boiler	
19	Gas Fire Boiler	
20	Thermic Oil Exchanger	

**Table 5. Significant Energy Users**





# ACTIONS



An Energy Committee (e3c) was formed by the Factory which is constantly monitoring the SEUs highlighted above and they have taken the following actions which is expected to realize a reduction of Costs by 10%-20%:

1. Conduct an Ashrae Level II energy Audit for the SEUs at the factory
2. Set Targets for Production Costs and No Production Energy Cost (idle time) to ensure there is no wastage
3. To Reduce the Input energy costs, Data loggers are being installed on Boilers for Coal and Steam
4. Dependence on Grid supply is being supplemented with Solar Energy to reduce the Unit Cost of Electricity from the Grid in PPA mode in three instalments of 30kW, 500 kW and 500 kW
5. Based on the Report of Energy Audit, Energy Efficiency improvement shall be conducted of the SEUs

Table 6 below depicts the Target set by the Committee for Cost of Production. The lowest Cost has been set as the Target as due to inherent processes. The minimum that has been achieved on a batch of production has been analyzed as the most efficient and can not be reduced further. Reaching this target will reduce Energy Cost by almost 10%-20%

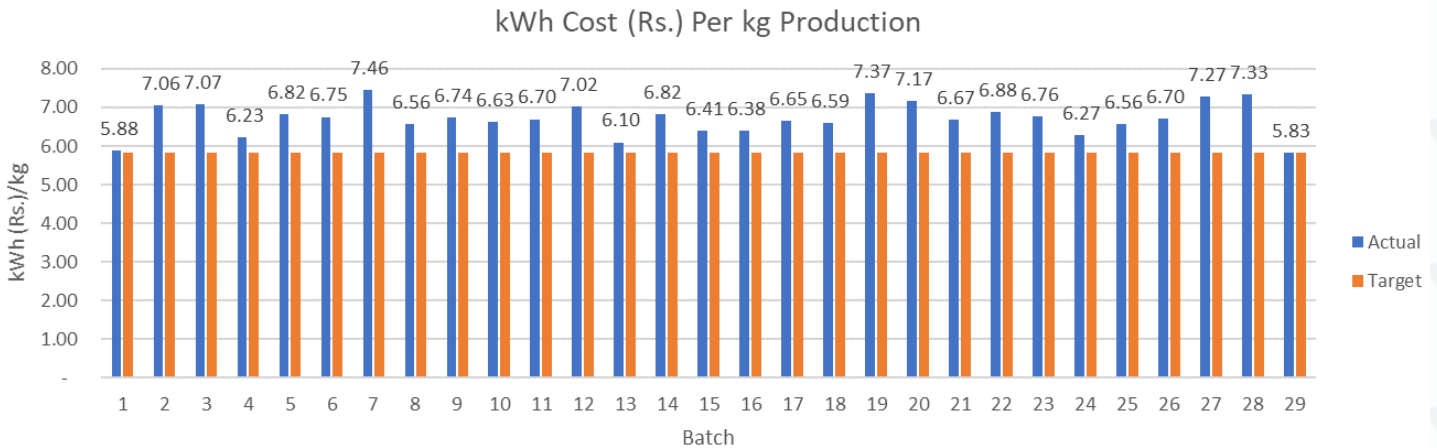


Table 6. Actual Vs Target, Cost of Production

Table 7 below depicts the target set by the Committee for the Cost of No Production periods. The lowest cost has been set as the Target due to inherent processes. The minimum that has been achieved has been analyzed as the most efficient. Reaching this target will reduce Energy Costs by almost 25%-30%

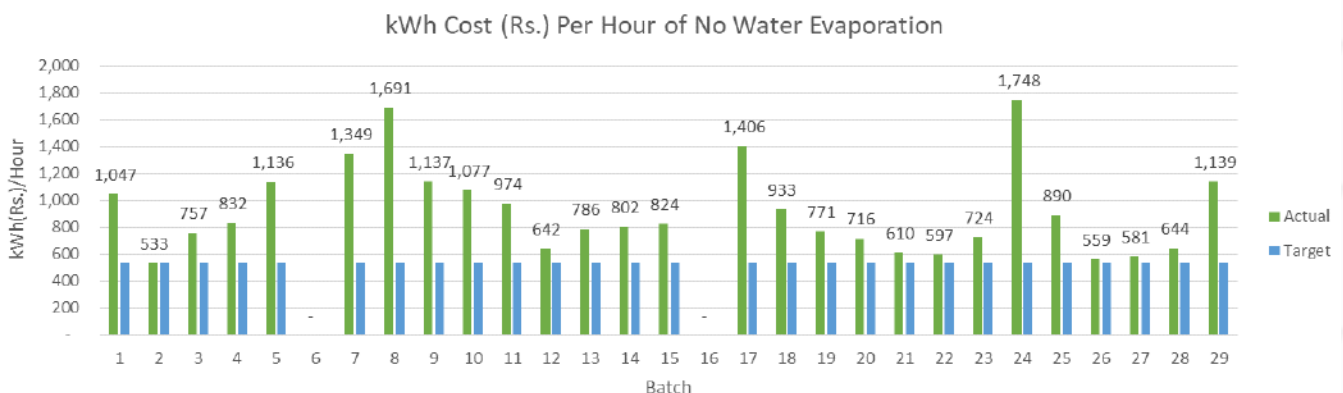
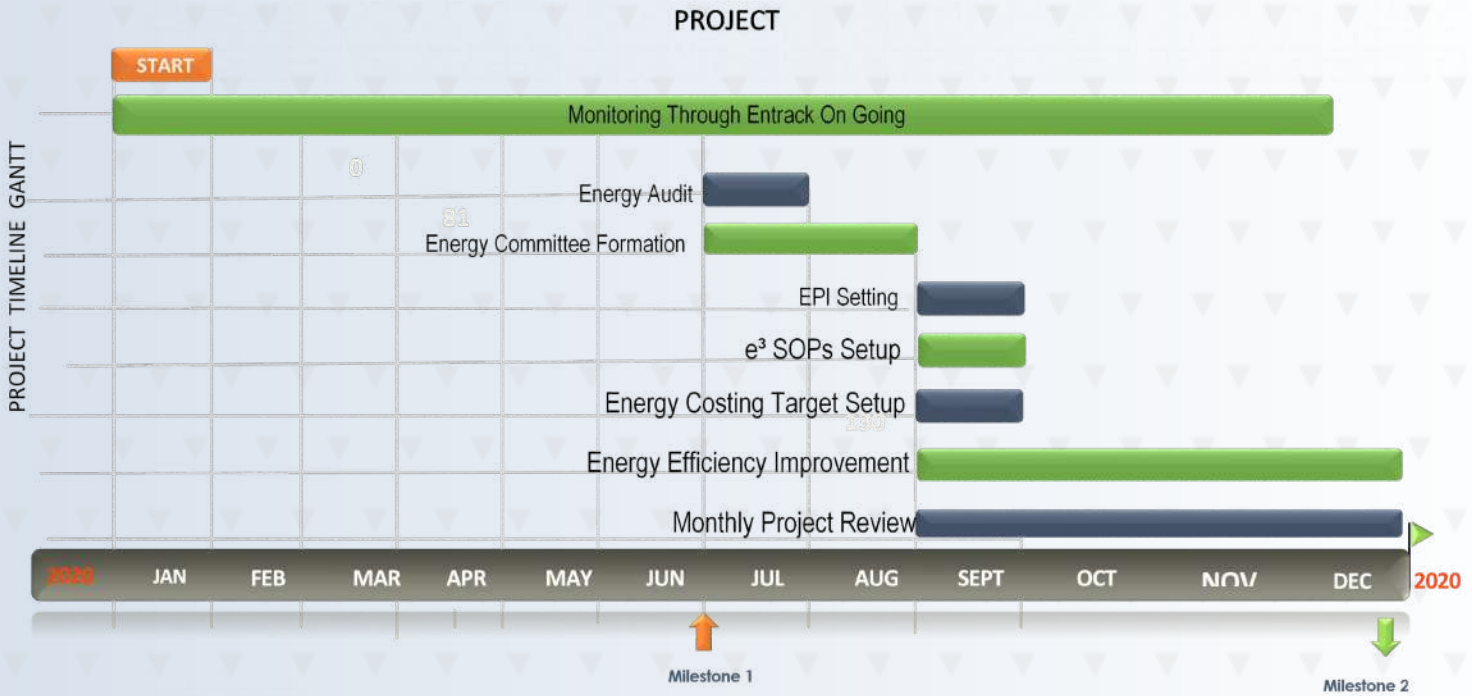


Table 7. Actual Vs. Target, No Production Cost



# TIMELINE OF PROJECT



## Return on Investment (ROI) & Savings

Based on report above, expected Cost reduction of 20% is expected at the Factory. Services cost of SBEEC is based on Savings Sharing model where SBEEC will get 33.33% share of the savings in the first year and the rest belongs to the Factory. Based on the savings share of Factory, the ROI of the project is depicted below in Table 8.

S#	Item	UoM	Cost (Rs.)
1	Investment in Energy Efficiency and Monitoring Equipment	One Time	3,440,000
2	Total Energy Cost	Monthly	19,151,934
3	Expected Savings (20%)	Monthly	3,830,387
4	SBEEC Share of Savings (33.33%)	Monthly	1,276,668
5	Factory Share of Savings (66.67%)	Monthly	2,553,719
6	ROI	Month	1.35

Table 8. ROI

As can be seen from table above with 20% reduction in costs will lead to ROI of less than Two Months which translates to Rs. 30,644,628 yearly savings to the factory in the first year and in subsequent years savings of Rs. 45,964,644 will be achieved by the Factory

what gets measured, gets managed.