Factsheet

Energy Efficiency for Dairy Industry

Sector Highlights

Dairy is an important and growing food industry in Nepal. According to Census of Manufacturing Establishments (2011-12), the number of units manufacturing dairy products is 56. The annual total output value of these units is estimated as NPR 6.428 Billion. The average production of milk and milk products over last three year is estimated at 1.70 million tons (Economic survey, 2014/15).The dairy industry is characterized by multiple product mix, seasonal demand and capacity utilization variations, which impact specific energy consumption.

Conventionally, the Nepalese Dairy Industries are producing standard milk as well as other milk products like yoghurt, ice-cream, cheese and butter. There are three major process steps for milk and milk products, namely chilling of raw milk for intermediate storage, Pasteurization of milk and, finally, cooling for storage and distribution. Dairy industry uses significant amount of electrical and thermal energy for its operations and processes (GIZ/NEEP, 2012).

Energy Use

Main source of electricity is the national grid, whereas diesel generators are used as an alternative source in case of load shedding. Electrical energy is mainly consumed by motors, drives and utilities like compressors (both air and refrigeration), pumps and lighting. The major electricity consuming processes are cold storage, homogenization and chilling. Thermal energy is required for the operation of boilers to generate steam for the pasteurization of milk and other processes. Fuel used for the boiler operations is mainly rice husk/diesel.

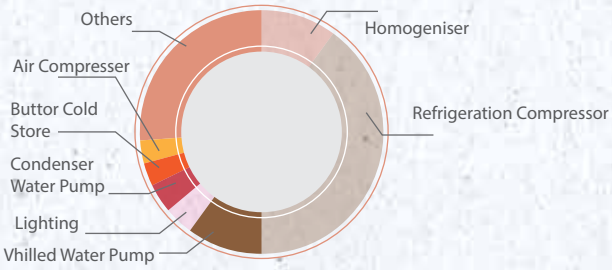


Figure 1: Typical Energy use pattern in Nepalese Dairy Industry (GIZ/NEEP, 2012) [1]

The energy cost on product value in dairy industry is estimated to be around 5%. Energy saving potential for the sector is estimated to be 6% on electrical side and 14% on thermal side.

Nepal Iron and Dairy Industry by numbers

56 manufacturing establishments

1724823 tons production

NPR 6.428 Billion revenue*

2049 person employment*

3-7% energy costs

*Census 2011/12, update not available

Specific Energy Consumption	Baseline 2012[1]	2015 Scenario[2]	Potential Target
Electrical	44-158 kWh/kL	40-128 kWh/kL	33-95 kWh/kL
Thermal(Diesel)	8-77 L/kL	6-68 L/kL	6-55 L/kL

Note: Ranges are high due to capacity variance and product mix of studied industries.

Table 1: Specific energy consumption in Nepalese Dairy sector

Investment Grade Energy Audits conducted in Nepalese Dairy industries till 2015 have identified many energy saving options that are cost effective with payback periods of less than three years.

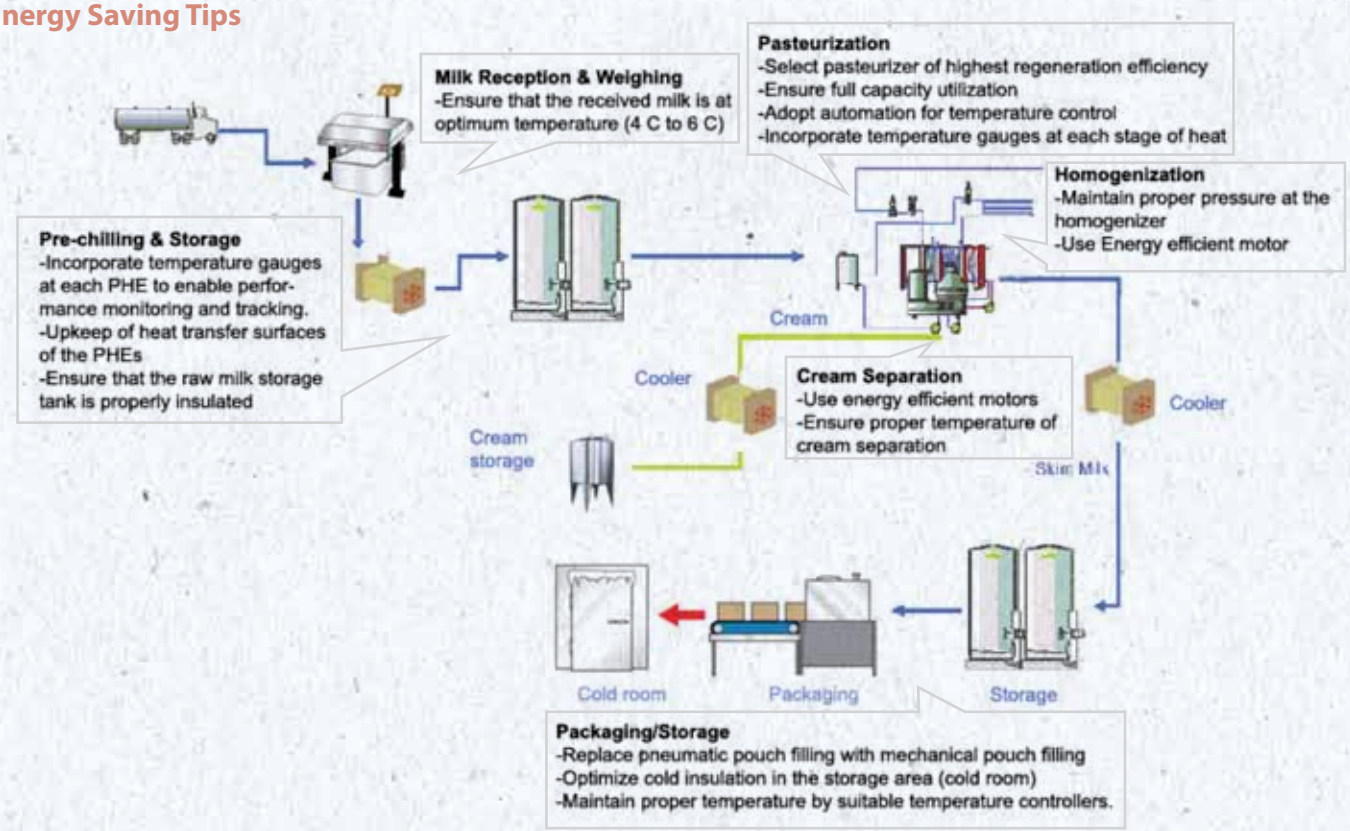
Option	Payback of investment
Power Factor Improvement	Less than 1 year
Revising NEA electrical maximum demand for cost reduction	immediate
Operating non-relevant equipment during low tariff hours	immediate
Installation of VFD for Chilled water pump	Less than 1 year
Installation of solar water heater	Less than 1 year
Replacement of oil fired boiler by rice husk fired boiler	Less than 1 year
Installation of De-super heater in AC Plant	Less than 1 year
Heat recovery from Boilers	Less than 1 year
Insulation of bare pipes and fittings	Less than 1 year
Effective use of Ice Bank System	2 to 3 years

Table 2: Energy saving options and payback period of investment for dairy sector (EEC/NEEP, 2015)

[1] GIZ/NEEP, 2012: Baseline study of selected sector industries

[2] EEC/NEEP, 2015: Pre-market assessment of audited industries

Energy Saving Tips



Case Study

Energy Audit conducted by EEC under NEEP, recorded specific energy consumption (SEC) of 151kWh/kL of electricity and 153kg/kL of rice husk in one of the dairy with a total capacity of 14,060kL/year. The industry was able to reduce its specific energy consumption to 128 and 136 respectively after implementing the recommended energy efficiency measures: investing NPR 1.1 millions, the industry was able to make a saving of NPR worth 6.3 million annually.

Before Energy Audit (SEC):	151 kWh/kL and 153 Kg/kL @ Rice husk
After Implementation (SEC):	128 kWh/kL and 136 Kg/kL
Savings Per kL:	23kWh/kL and 17 kg/kL
Total Production:	14,060 kL/Year
Annual Savings made :	323,380 kWh and 239 T
Monetary Savings made:	Rs. 4,203,940 @ 13/kWh and Rs. 2,151,000 @ 9/ kg.
Total Investment Made:	Rs. 1,120,000

Table 4: A success case from NEEP (EEC/NEEP, 2015)

Contact details

If you are interested to know more about energy efficiency, please, do not hesitate to contact us!

- If you are a business man
get information about energy saving opportunities in your company and get an energy audit done by our professional expert team
- If you are an engineer
explore the articles in our energy efficiency knowledge website and participate in our training programs
- If you are a banker...
participate in our awareness raising seminars and explore the new market of energy efficiency investment.
- If you are an energy auditor...
register in our database of energy efficiency professionals and be listed on our webpage.
- If you are a supplier for energy-efficient technology
register in our online B2B portal and list your products and services.

eec energy efficiency centre

FNCCI

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