

# Industrial Energy Efficiency Project

Limketkai Manufacturing Corporation (LMC) produces a variety of products based on oils, fats, and corn, which are distributed under the popular brand of Marca Leon. The company is based in Cagayan de Oro City, which is situated in the province of Misamis Oriental in the northern part of Mindanao Island, Philippines. The LMC factory includes a corn mill plant within its industrial compound. This was the pilot site for making great steps in energy use reduction in food manufacturing processes through EnMS implementation.

## Limketkai Manufacturing Corporation: A continuous improvement Journey

### Overview:

Product: Foodstuff (Corn grits, corn meal)

Address: Lapanan, Cagayan De Oro City 9000 Misamis Oriental, Philippines

Web: <http://www.marcaleon.com/>

### Significant Energy Users in production

This effort began with an onsite energy review, which analyzed all energy users to determine which would be earmarked for reduction in energy usage. This analysis resulted in identification of the top 3 significant energy users to be targeted for reduction. These were the following:

- Pneumatic/ Dust collecting system 39.34%
- Degermination Process 22.13%
- Corn drying system 10.17%

### Energy targets

The overall objective of this effort was a 20 percent reduction in energy consumption in the plant within 3 years of implementing the new Energy Management System.

To make these targets more attainable, the company broke them down into more discrete energy reduction targets, specifically reduction of electric power consumption of each of the top three SEUs by ten percent in 2015.

### Training is key

The expert training provided by UNIDO, which was substantiated through the completion of the energy review pointed out that a significant

portion of energy wastage in the factory is simply due to the lack of understanding among personnel of how systems are designed to operate.

This realization brought the company to a decision to conduct staff training in EnMS implementation in the following areas:

- Energy awareness for managers and supervisors;
- Energy training for energy champions;
- Training the energy team on the structure of the EnMS;
- Training of operators in operational control of the significant energy users and in boiler efficiency.

### Actions speak louder than words

While training is a key element of the management system, the failure to take appropriate action would result in no palpable improvements. Thus, the Limketkai Manufacturing Corporation embraced the energy management system and set about achieving the energy saving objectives with the following opportunities:

- Installing insulation on bare steam lines in the corn mill, repairing or replacing faulty steam traps, thereby reducing thermal energy consumption of 418,000 kWh;
- Repairing leaks in compressed air lines, thereby saving 37,000 kWh of electrical energy

Further opportunities identified were:

- Improving the efficiency of SEU motors;
- Replacing boiler pressure relief valves, yielding an estimated reduction of 3,115,000 kWh of thermal energy consumption;
- Improving the condensate recovery system;
- Re-evaluating usage of compressed air;

- Equipping the steam boiler with an economiser;
- Evaluating all pumps through systems optimisation.

## Barriers and effective solutions in implementing EnMS

Some significant barriers in implementing the EnMS were encountered by staff in the course of implementing the system.

### Barrier 1: Insufficient energy metering

- There were no electrical meters on the identified SEUs in the corn mill plant
- There were no steam meters in the silo dryer and in the conditioner section.

**Solutions:** This barrier was overcome by taking kW readings from each SEU and calculating the percentage electrical consumption of each user from the overall consumption of the entire mill. The energy team addressed the lack of a steam meter by using the steam system optimisation program to assist in its calculations. While the possibility of installing meters was investigated, the cost of doing so was considered too high.

**Barrier 2:** Lack of time given to this effort due to prior commitments and significant work load of the EnMS representative and EnMS assistant.

**Solution:** Adjustments were made in the roles and responsibilities within the organisation to accommodate the operation of the EnMS.

**Barrier 3:** The geographic distance between the office of the expert candidate and the actual plant reduces the frequency of visits.

**Solution:** Increased commitment from senior management through an agreement with the UNIDO trained EnMS expert allowed the frequency of visits to increase to at least once monthly. Weekly interfaces with the energy team through alternative communications platforms such as Skype calls were arranged.

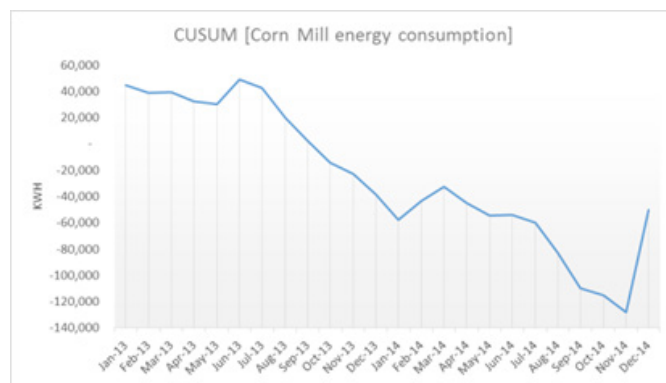
## Measured improvements

Since UNIDO became involved and prompted the implementation of EnMS, the factory has enjoyed a significant and consistent decline in its energy usage. While the training provided to the equipment operators might account for a greater part of the continued reduction in energy consumption enjoyed in 2013 and 2014, it could also be attributed to the improved energy awareness among all the company's personnel.

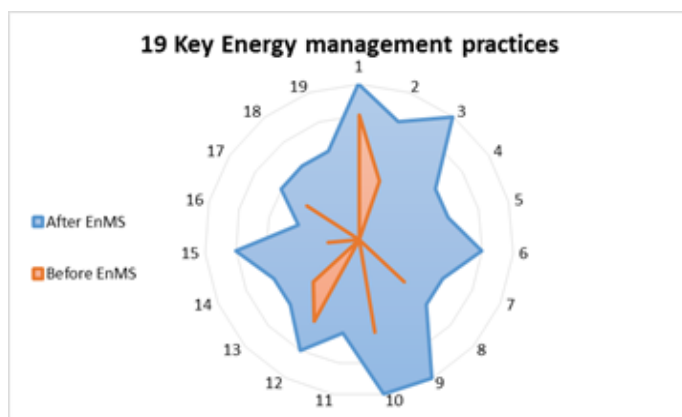
The CUSUM graph below illustrates the reduction in energy consumption in the Corn Mill over this period.

The Energy Team noted that consumption increased temporarily in December 2014 due to the increased demand of fine corn grits, causing an increase in milling time.

## Other improvements



When looking at the entire scope of key energy management practices, the improvements to the plant with the implementation of the EnMS are clear and definitive. The graph below illustrates a representation of the 19 key energy management practices applied in the factory. The success of each practice is scored both before and after the implementation of the EnMS program. The chart shows that after the implementation of EnMS, the plant has improved in all 19 key energy management practices.



### For more information:

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