

ENERGY METRICS AND PERFORMANCE INDICATORS

CASE STUDY



INDUSTRIAL
ENERGY
ACCELERATOR



S.A JLC

Chisinau, Republic of Moldova

Sector

Dairy processing

Intervention

Advanced energy analytics and automated energy performance monitoring and reporting system

EnMS and cooling system optimization period

2016-2017

Project Investment	US \$15,550
Annual energy savings ¹	47,558 kWh
Annual financial savings ²	US \$4,984
Total payback time	3.1 years

1 Estimated value of incremental energy savings achieved by JLC as a result of the automated energy performance monitoring and reporting system implementation

2 Financial savings for the incremental energy savings achieved as a result of the automated energy performance monitoring and reporting system implementation

Company profile

JLC is the largest dairy processing plant in the Republic of Moldova, and a leading producer of dairy products in the region. The company's manufacturing departments include: whole milk, sour milk, cottage cheese and curd products, water and soft drinks.

Being a dairy product producer, energy is among JLC's biggest costs of doing business. JLC facilities require various amounts of energy for a number of processes including milk chilling (refrigeration), widespread use of electric machinery (pumps, stirrers, plant compressors and various servomechanisms) milk processing (milk packaging, production of cheese, yogurt, etc.), storage and space cooling as well as the use of steam boilers for homogenization and pasteurization of milk and cheeses.

Energy consumption in the dairy industry

Milk typically has a short shelf life. However long life products such as milk powders and the development of cold chain and industrial refrigeration technology has enabled globalisation in the industry. Dairy processing requires relatively intensive amounts of energy use, which is why energy management in dairy facilities has increasingly come to the fore. As plant managers grapple with rising competition and fluctuating milk prices, energy management is being seen as an opportunity to reduce costs while maintaining product quality. In recent years, as internet-based technologies and digital automation has



progressed, opportunities have emerged in the dairy industry, among others, to enhance data acquisition and value addition of advanced analytics for energy monitoring, reporting and decision-making.

The energy optimization solution and UNIDO's role

In 2017 JLC partnered with UNIDO to improve its energy performance monitoring and reporting capabilities as an integral part of its ISO 50001 energy management system (EnMS) continual improvement. After three years of energy management system implementation work JLC identified insufficient secondary metering and limited energy data management capacities as key barriers to furthering its energy performance. Therefore the company decided to embark on a project to address these specific gaps. The project involved:

Phase 1

Development of a measurement plan

JLC's existing energy meters did not cover the plant's main significant energy uses and data collection was fragmented and conducted manually. This made it near impossible to establish reliable energy performance baselines and targets to effectively guide energy management decisions and actions. Through a detailed review of JLC plant's energy flows, energy consumption drivers and significant energy uses, UNIDO experts and the JLC energy management team identified the need for additional meters to complement existing ones in order to improve energy performance monitoring and reporting. A total of 10 electricity meters and one new water meter were procured to feed data into JLC's monitoring and reporting system.

Phase 2

Installation of meters and auxiliary ICT system

UNIDO managed the international sourcing of meters, auxiliary communication devices and installation services required to set up the automated data collection and processing system. From there detailed analysis of JLC's energy consumption and performance could begin.

Phase 3

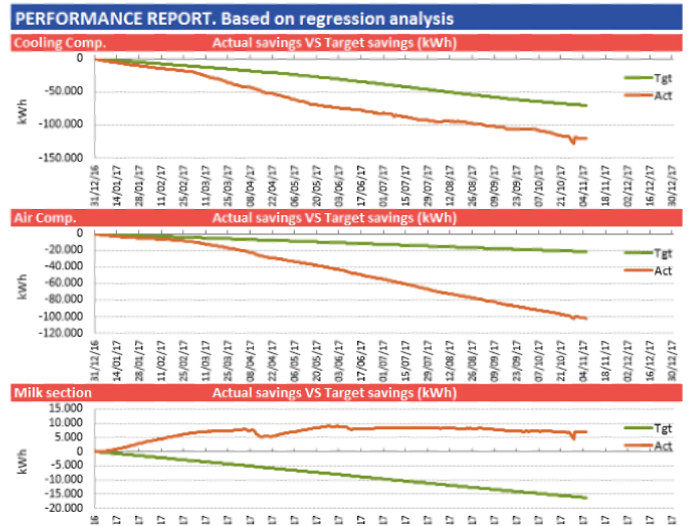
Development of energy performance indicators (EnPIs)

Energy performance indicators were developed for JLC plant's total consumption of electricity and natural gas respectively, and for each significant energy use. All indicators were developed using regression analysis. In the dairy industry, as in many other sectors, baseload energy consumption is large and weather tends to be a significant energy consumption driver. Multivariate regression analysis was used to account for baseload, relevant energy consumption drivers and variables to enable normalization of analysis.

Phase 4

Monitoring and reporting tool

An EnPI Excel tool was developed to help improve monitoring and reporting results of energy management and performance improvement activities through different functions. Key features included automated data collection and processing. Excel macros helped to automatically compile the daily information sent by the data loggers. Colour coded displays of deviations enabled much faster reactions to higher than expected energy consumption patterns.



Figures 1: JLC energy performance dashboard.

Outcomes

The energy performance monitoring and reporting system implemented with UNIDO's support enabled JLC to:

- Automatically develop energy performance models, baselines and indicators for each significant energy use taking into account the impact of the baseload and all relevant variables. This reduced JLC staff time spent on data collection and management. JLC could focus on taking actions.
- Compare actual and expected energy consumption in real time, calculate and show energy performance improvements, and compare EnPIs against target values.
- Verify energy savings based on best international practices and protocols.
- Detect deviations through the use of appropriate EnPIs.
- Enable faster and more effective reactions to excessive consumption, thereby avoiding energy waste at no additional cost.
- Identify additional energy saving opportunities and areas for improvement through better modelling achieved through regression analysis.

JLC's automated EnPI system, combined with energy management system (EnMS) implementation, enabled electricity savings of 5.5% (98.6 MWh) within the first six months. This electricity saving was equivalent to 179, 542 MDL (US \$10,833, Aug-2018).

About the energy efficiency solutions series

The Accelerator is drawing on its collective wealth of experience and expertise to produce a series of knowledge kits on industrial energy efficiency. These cover five key energy efficiency solutions: Energy Management System; efficiency solutions for Motor-driven Systems; for Industrial Heat; for Industrial Cooling; as well as Energy Metrics and Performance Indicators. Find out more: www.industrialenergyaccelerator.org/efficiency-solutions/

Conclusions & lessons learned

The implementation of a robust and technologically advanced energy performance monitoring and reporting system at JLC enabled greater precision and frequency of energy performance assessments as well as faster and better decision-making. The ultimate result was a more effective energy management system and greater performance improvement.

The fact that JLC already had an EnMS in place at the time of project implementation helped to increase the cost-effectiveness of the project. It helped to avoid the purchase of unnecessary metering and other devices. It's important for companies to strengthen their secondary metering and ICT infrastructure for automated energy performance monitoring only after having achieved a strong understanding of their significant energy uses and associated relevant variables.



Automating the process of collecting and analysing data within a SME provides more time and information to identify energy-saving opportunities and the enhancement of best practices."

Sergiu Codreanu, National EnMS-EnPI Expert

Ready to take the next step in your energy performance measurement and monitoring journey?

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For more information about UNIDO's EnMPI and industrial energy efficiency benchmarking training programmes contact Marco Matteini: M.MATTEINI@unido.org.

For more information about UNIDO's Industrial Energy Accelerator visit: www.industrialenergyaccelerator.org or contact R.GHONEIM@unido.org.



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