

ISO 50001 Energy Management System Case Study

2020

Ukraine

NOVOORZHYTSKYI SUGAR PLANT LLC –

Agro-industrial holding Astarta-Kyiv

The first sugar plant in Ukraine introduces an energy management system (EnMS) and certified in accordance with the requirements of the international standard ISO 50001. EnMS has helped to save more than \$ 250,000 over 4 years.



The history of the enterprise dates back over 40 years

Organization Profile & Business Case

"Novoorzhytskyi Sugar Plant" LLC became a part of the Agro-industrial holding "Astarta-Kyiv" in 2013, becoming the eighth sugar factory of the company. The plant was built in 1978.

The plant has undergone significant upgrades over the last 6 years. At present, it is a modern enterprise for sugar beet processing and production of finished products – white crystalline sugar, molasses and dried granulated beet pulp. In 2019, among the sugar producers in Ukraine, the plant ranked second in beet processing capacity - more than 8200 tonnes of beets/day, with a design capacity of plant is 6000 tonnes

of beets/day. The Novoorzhytskyi Sugar Plant produces 95.1% of the first category sugar. During the production period, the company employs more than 450 people.

Case Study Snapshot

Industry	Sugar production
Product/Service	Sugar
Location	37714 Str. Central, 2, smt. Novoorzhitske, Orzhitsky district, Poltava region. Ukraine
EnMS	ISO 50001
Energy performance improvement period, in years	4
Energy Performance Improvement (%) over improvement period	27 %
Total energy cost savings over improvement period	258 000 (\$USD)
Cost to implement EnMS	196 000 (\$USD)
Total Energy Savings over improvement period	28 600 (GJ)
Total CO ₂ -e emission reduction over improvement period	1,700 (t)

The daily activities of the personnel of the Enterprise are based on the following principles:

- ❖ Gas and electricity savings - everyone's personal contribution to the development of the Enterprise.
- ❖ Care for nature and environmental is a concern for the future of our children.

Since 2008, "Astarta-Kyiv" is a member of the Global Compact Network in Ukraine, an official representative

of the UN Global Compact, a global initiative that brings together the United Nations and companies around the world and annually reports on its progress in fulfilling the principles of the treaty, as well as has been publishing sustainable development reports for several years now.

In 2016 the Program for Ensuring Energy Efficiency Improvement at the "Astart -Kyiv" was approved. The main purpose of the program was to provide energy efficiency improvements to enterprises and reduce resource consumption.

The program envisaged the introduction of EnMSs, which complemented the already existing corporate integrated management system that met the requirements of ISO 9001, ISO 14001, OHSAS 18001 and ISO/FSSC 22000.

First, the program was aimed at improving the skills of specialists of all levels in the issues of resource efficiency, saving non-renewable energy sources.

Secondly, to implement the Pilot Project on the application of energy management tools at the "Astarta-Kyiv" and the implementation of the management system in accordance with the international standard ISO 50001. The "Novoorzhytskyi Sugar Plant" LLC was selected as a pilot enterprise.

The implementation of energy management not only strengthened position in fulfilling the tasks of the plant but also makes possible for the enterprise to be one of the leading enterprises of the "Astarta-Kyiv" and sugar industry Ukraine.

"Novoorzhytskyi Sugar Plant" LLC took an active part in the UNIDO-GEF project "Introduction of EnMS standard in Ukrainian industry", the enterprise received theoretical and practical knowledge about the peculiarities of the functioning of the EnMS. As part of the training to improve the skills of the employees of the enterprise have listened to the information, which consisted of 4 modules that fully covered the requirements of the international standard ISO 50001.

During the training, practical experience in conducting internal audits of the EnMS was gained. A tool developed

by UNIDO to facilitate the management of the EnMS using regression analysis to normalize baseline consumption, namely the use of regression analysis, has been taken.



"Take care of the environment and save energy the way you like your own business and how you care for your children"

— Pavlo Perkhailo, Director of Novoorzhytskyi Sugar Plant

This UNIDO's EnM Tool is used as an alternative to SEC when calculating the achieved energy efficiency.

So, from 2016, natural gas consumption for sugar production has been reduced by 27%.

Over the 4 years of the EnMS's operation together with the installation of the energy metering system, a savings of 258,600 USD was achieved at a cost of 196 100 USD.

Business Benefits

Since 2008, in cooperation with the European Bank for Reconstruction and Development, the implementation of the Best Available Technique Program (BAT) has been launched, which upgrades enterprise equipment to modern standards in the sugar industry. Due to the implementation of BAT in the direction of resource efficiency at the "Astarta-Kyiv" in the years 2012-2016, the total resource-saving was achieved: gas - 16%, electricity - 6.7%, water - 16%. At present, the BAT Program 2016-2020 is in operation, which has already

allowed achieving natural gas savings in 2016 - 2019: **gas - 10%, electricity - 12%, water - 26%.**

One of the components of this program was the implementation of the EnMS. Which helped to more transparently see achievements and comprehensively analyze energy-saving projects, set and achieve ambitious goals. In addition, electronic tools have been introduced to monitor technological indicators of the Sugar information system (SIS), web navigation and electronic log of technological indicators and weighted averages.



“Technology discipline is the key to safety, quality, and energy efficiency”

— Yuriy Andreiev, technical director

During the ENMS implementation, the corporate standard “Energy planning” was developed. The main purpose of which, was to comply with the requirements of ISO 50001 and to establish a planning and analysis of those activities that may affect the level of energy efficiency achieved.

Since the introduction of EnMS, **19.1% of natural gas and 43.2% of electricity have been saved** at the Novoorzhytskyi Sugar Plant.

Certification by international standards has led to an increase in the company's image. "Novoorzhytskyi Sugar Plant" LLC became the first ISO 50001 certified sugar mill in Ukraine.

The culture of production and consumption of resources by the personnel of the enterprise has improved.

Workers began to be more economical about water and electricity costs.

At the end of 2015, a team was formed to design and plan the implementation of the EnMS.

National experts-consultants and all engineering and technical personnel of the plant and specialists of the Astarta-Kyiv central office were involved in implementing the requirements of the standard. It helped to create the first energy management group in the plant. The main aim of this group was the implementation of the ENMS system at the plant, group operated in a weekly meeting mode. The implementation lasted from May to September 2016. Sugar production takes place in the autumn from September to December. In this period the energy manager works every day and group operated in an everyday meeting mode.

During the repair period from January to September, the main production is stopped. The equipment is in preparation for the season.

During this period, the main tasks of the energy manager and group are to control the processes of purchasing the necessary spare parts and equipment and checking the quality of repairs. In this period group operated in a month meeting mode.

Plan

For the implementation of the Energy Efficiency Program in 2016, Novoorzhytskyi Sugar Plant was selected, where the equipment was actively modernized. This program was attended by plant technical managers and central office specialists. The UNIDO project trained more than 20 Astarta's professionals who became drivers of the "Astarta-Kyiv" energy efficiency movement and received certificates from energy management experts.

This training facilitated the use of regression analysis to normalize consumption. This is the basis of the methodology for determining energy efficiency at the enterprise. UNIDO's energy management tool was used as the base, which applied regression analysis to the

normalization of energy resources consumption in the actual operating conditions of the enterprise.

With the completion of UNIDO training courses, the requirements of ISO 50001 have become clearer in enterprise to managers. This was the driving forcing to conduct the internal training of plant specialists and staff on the need to save resources, adhere to the appropriate modes of operation of the equipment to achieve the energy efficiency targets.



“Our success depends on our knowledge”

— Mariia Voloskovets, chief specialist of the central office

The EnMS has become an integral part of the Corporate Integrated Management System, which has been implemented at "Astarta-Kyiv" enterprises since 2011. At present, the corporate integrated enterprise management system includes the areas of quality management (ISO 9001), food management (FSSC 22000) and feed safety (ISO 22000), occupational health and safety management (ISO 45001), environmental management (ISO 14001) and energy management (ISO 50001).

Entire enterprises reflect the goals and policies of "Astarta - Kyiv", which maintains a caring attitude towards the environment and resource efficiency. The process of reviewing and analyzing energy use, deciding ways and directions of resource use, and prioritizing actions, involves a thorough analysis of external and internal factors of influence and stakeholder interests.

Do, Check, Act

The key to success in achieving these goals is well-adapted, documented information that describes all the necessary processes and actions related to the EnMS.

That is why it was decided to harmonize and adapt the EnMS with the Corporate Integrated Management System that existed at the level of "Astarta-Kyiv". In addition, more than 20 documented procedures and reporting forms were developed that regulates the activity of the EnMS at the enterprise level.

Periodic analysis of EnMS performance is implemented in the form of daily meetings and discussions with plant employees to achieve key performance indicators and assess their environmental impact.



“Energy management is a teamwork that needs continuous interaction”

— Yurii Andreiev, technical director

The sugar industry of Ukraine is characterized by the seasonality of energy consumption "Production period" and the "Repair period". Consumption during the repair period is very small, not more than 5% of consumption in the Production period. Therefore, the baseline was built on the data of the enterprise during the Production period on the basis of daily data from September to December, during which period the company operates 24/7.

An important factor in supporting the EnMS is the on-going training of employees in accordance with the annual training schedules, as well as the exchange of experience with other enterprises. Specialists from the company and central office periodically visit exhibitions, seminars, and conferences to get acquainted with the best practices, features of the legislation, improve their professional level and strengthen the necessary competencies. An important role in enhancing the learning process and understanding its effectiveness was the involvement of employees in the UNIDO Project.



"We are constantly increasing our competencies to be competitive and efficient"

– Mariia Voloskovets, chief specialist of the head office

An updated equation was obtained in the transition to the requirements of the updated ISO 50001:2018 as a result of regression analysis based on the 2018 production period data:

$$Y=1305+2\cdot(X1)+1625\cdot(X2)+472\cdot(X3)-127\cdot(X4)+35\cdot(X5)+0.8\cdot(X6)+1071\cdot(X7)$$

1305 – baseload (daily)

(X1) "Beet recycled"

(X2) "Sugar content"

(X3) "CP syrup with vacuum clerking apparatus"

(X4) "Vacuum water flow rate for filters"

(X5) "Molasses"

(X6) "Generated electricity"

(X7) "HDD"

To define more precisely the parameters that influence the consumption of energy resources, in 2019 the implementation of the system of accounting of the use of energy resources for the production process, namely:

- ❖ Total gas consumption and by individual consumers (boilers).
- ❖ The number of steam produced by each boiler and total.
- ❖ Steam flow to the turbo-generator, through the reduction and cooling (ROW) and to the granulation compartment.

This made it possible to analyze the efficiency of steam boilers, to visualize the balance of produced and consumed steam and to respond in time to deviations from the regulatory parameters.

Each year the enterprise sets targets and objectives and develops a program to achieve the targets, which is implemented in accordance with requirements of ISO 50001.

In 2016 was implemented:

Vacuum Appliance Replacement.

Reconstruction of the pulp drying unit.

Replacement of a beet pump.

In 2017:

Replacing Centrifuges.

Replacement of crystallizer mixers.

In 2018:

Installation of frequency converters on motors.

Lighting upgrade.

In 2019:

Thermal insulation of pipelines.

Installation of frequency converters on motors.

Optimization of a compressed air system.

The implementation of these measures has led to a 27% reduction in energy consumption for sugar production. In January - February every year the EnMS is evaluated and a plan for further improvement of the system and its indicators is developed.

Transparency

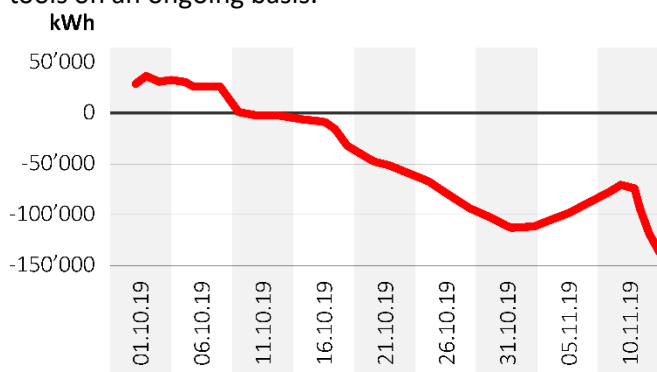
To ensure transparency of the enterprise, procedures for action plans with external stakeholders are developed and maintained. "Astarta-Kyiv" announced that it has passed the certification of ISO 50001 Novoorzhytskyi Sugar Plant on the company's website and in the corporate magazine "Visnyk Astarta". This information was also included in the annual GRI reporting.

Lessons Learned

The main lessons learned during the implementation of EnMS were:

- ❖ The need to change the thinking of management and employees of the company;
- ❖ Passing quality training;
- ❖ The importance of using advanced methods for determining energy efficiency;
- ❖ Availability of appropriate accounting system.

As a result of the knowledge gained about defining the baseline of consumption, the continued use of UNIDO tools on an ongoing basis.



“CUSUM electricity consumption using the UNIDO instrument”

In 2019, the company successfully passed the recertification audit of the EnMS in accordance with the requirements of ISO 50001, by the certification body DQS GmbH.



“The result always justifies the time spent on its implementation if the team works together”

— Pavlo Perkhailo, Director Novoorzhytskyi Sugar Plant

The management of the enterprise reaffirmed its commitment to corporate policy requirements and its focus on saving energy and reducing environmental impact.

The staff of the company has shown a conscious attitude not only to their own activities but also to the requirements of the modern world and the society in which we all live.

The results obtained during the successful implementation of EnMS at the Novoorzhytskyi Sugar Plant were passed on to other industrial enterprises of the “Astarta-Kyiv”, four of which are already 4 certified according to ISO 50001.

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit www.cleanenergyministerial.org/energymanagement.