



January 2020

ISO 50001 Energy Management System

Case Study

Areej Vegetable Oils & Derivatives S.A.O.C (AVOD)

***AVOD** is the first organization in Oman to implement an ISO 50001 energy management system (EnMS)*

“

Through ISO 50001 implementation, we are able to maintain our competitiveness in the market and deliver to our customers the most cost-effective and high-quality products.

”

— Eng. Salem Al Bortmany, CEO

Areej Vegetable Oils & Derivatives S.A.O.C

First organization in Oman to implement an ISO 50001 energy management system (EnMS)



Figure 1: Areej Vegetable Oils and Derivatives production line

Areej is a leading fast-moving consumers goods (FMCG) company in Oman, founded in 1980. The company manufactures a wide range of products including cooking oils, vegetable ghee, margarine, specialty fats, butter, mayonnaise, salad dressings and ketchup. Areej products serve the local market as well as over 30 countries around the world. Partners include many of the major brands to fulfill their production requirements in the region such as: Unilever, Emborg, Heinz, Hellmann’s, Knorr. Plant capacity is 240,000 tons of oil per year and employee count is 750 employees.

“ISO 50001 is a tool that helped us to better understand our consumption trends and systematically control it.”

—Eng. Imam Ergawi, Energy Manager

Case Study Snapshot	
Industry	Food Processing
Product/Service	Processing, manufacturing and warehousing of cooking oils, vegetable ghee, butter, margarine, specialty fats, blended butter, mayonnaise, ketchup, and salad dressing.
Location	Rusayl, Muscat, Oman
Energy Management System	ISO 50001
Energy performance improvement period	1 Year (Jan 2018 - Dec 2018)
Energy Performance Improvement (%) over improvement period	Electricity: 11% Natural Gas: 23%
Total energy cost savings over improvement period	USD \$779,000
Cost to implement EnMS	USD \$138,520
Total Energy Savings over improvement period	43,763 GJ
Total CO2-e emission reduction over improvement period	11,382 metric tons CO2-e

ISO 50001 Motivation

In January 2017, the Omani government introduced a Cost Reflective Tariff (CRT) for all large electricity consumers with greater than 150 MWhr of electricity consumption per year. For many years previously, Oman electricity tariffs were flat and very low. The CRT tariffs introduced a time-of-use tariff scheme to Oman with high electricity rates in peak times during the summer months, which resulted in a large 62 % increase in Areej's 2017 electricity bill compared to 2016 (while maintaining a consistent production output). This was the key motivation for Areej to take the initiative to bring operational expenses back under control, while reducing the facility's GHG footprint (in line with the direction of the Omani government and the global sustainable development goals).

After some research, ISO 50001 was found to be the global best practice for energy management and energy cost reductions of industrial organizations. improve performance through continuous education and cultural changes. Since the ISO 50001 approach focuses on staff behavior and operational controls to drive energy performance improvements, it was found to be in line with management's high-level business strategy of empowering its staff to improve performance through continuous education and cultural changes.

Areej launched its EnMS program in September 2017, working with an external consultant to provide coaching, mentoring, and training throughout the one-year EnMS implementation timeline (see Figure 2).

The Areej EnMS concentrates on practical measures to improve energy performance, with a focus on operational controls, staff behavior, and the minimization of unnecessary documentation.

Areej also installed more energy meters and upgraded equipment for improved energy efficiency by installing energy efficient motors, variable frequency drives (VFDs), pumps, and insulation. Implementing the guidelines of the standard played a crucial role in bringing energy expenditures back under control and helped in achieving corporate energy and financial targets for the year. It also enabled the company to maintain competitiveness in the market by bringing down production costs.



Figure 2: ISO 50001 Implementation Timeline

Business Benefits

With the focus to reduce energy expenditures and CO₂ emissions, Areej implemented an ISO 50001 EnMS as a part of an overall medium-term change management strategy aimed at achieving the highest level of efficiency and resource utilization.

Being the first company in Oman to adopt an ISO 50001 EnMS and one of the few in the region, the ISO 50001 EnMS helped the company meet its goal of mitigating the impact of the CRT completely in 2 years, while reducing GHG emissions.

Prior to implementing our EnMS, Areej was very immature in energy management, due to the very low electricity and natural gas prices in Oman prior to the introduction of the CRT. Since the implementation start in September 2017, Areej has demonstrated outstanding savings with simple daily measures, accomplished through a tailored EnMS that empowers its staff with training and provides them the platform and the tools to take ownership of their operations. This is the beauty of ISO 50001 compared to other investment intensive initiatives such as retrofitting and renewable energy.

The achieved benefits include the following energy and non-energy benefits:

- Impressive savings in both electricity and natural gas by 11% and 23% respectively in 2018, for a combined energy savings of 43,763 GJ for the same period. Approximately 74% of these savings come directly from operational savings alone.
- Water savings of 15% or 26,487 m³ in 2018 (while not an energy source, water management was also included in the EnMS).
- Utilities cost reduced by 22%.
- Reduced CO₂ emissions by 18%.
- An 18% improvement in the conversion factor for raw material to finished goods.
- Monitoring energy consumption on a daily basis helps in better understanding of energy users allowing us to challenge the operating parameters while strengthening the operational controls.
- Improved energy monitoring by installing smart energy meters and gas flow meters in the most critical areas.

- Increasing the awareness level among the workforce enables them to take more control towards achieving the energy efficiency targets. Areej staff contributed 100 improvement opportunities in 2018 alone.

EnMS Costs

Implementation of the EnMS is estimated to have cost \$138,520—including internal staff time spent to develop and implement the EnMS. This cost estimate takes into consideration the following elements:

- Internal staff time to develop, implement and maintain the EnMS. Internal staff included 1 energy manager and a variety of supporting cross-functional staff, with total staff time estimated to be 3.7 FTE over the 1-year implementation period (3.7 person-years).
- Third-party certification audit
- External technical assistance (consultants)
- Communications and internal printing such as printed posters, banners, etc.

Implementation Highlights

The culture of continuous improvement requires frequent human driven changes to energy consuming systems and practices. This necessitates a high-level commitment and continuous support from the top management to adopt and support the initiative. As such, EnMS implementation started with Areej operations staff first developing the project charter and business case, which was presented to top management along with energy cost trends. Once it became clear of the specific potential benefits that could result from low-cost savings measures, leadership increased their support and provided full resources to support ISO 50001 adoption.

Areej then conducted a simple energy audit to better understand its energy consumption patterns. An energy balance was also developed to better identify significant energy uses (SEUs), which was the basis for identifying energy saving opportunities.

Energy saving targets were then determined and a cross-functional energy team was established. These targets were re-evaluated every quarter by the energy team and the top management based on our achievements and revised if needed. These meetings were key to ensure continuous support and leadership towards achieving the set targets.

A Roles and Responsibilities matrix was developed for all the major stake holders throughout the implementation stages. This was very important to essentially build the culture that energy management should be seen as an integral part of the daily routine for everyone across the company, and not just the responsibility of the energy team or a single department.

Historical energy data was used to develop the baseline for electricity, natural gas, and water. Data collection and record keeping was improved to facilitate the process of energy data collection, feeding into dynamic regression models developed specifically to analyze and monitor the facility's energy performance. Energy data was normalized to take into account all relevant variables including production shifts and mix, oil processing and refining quantities, bottle and cans making, and weather (HDD/CDD) to give an accurate picture of the energy.

Using this Model, energy savings were determined by comparing modeled 2018 energy consumption to the 2017 baseline period, representing the consumption in each energy source under its present condition. This method enabled Areej to closely monitor and understand performance trends on a daily basis and gave us the ability to quickly react in case a deviation was detected in a focused manner. The graph shown in Figure (3) below shows normalized energy performance improvement.

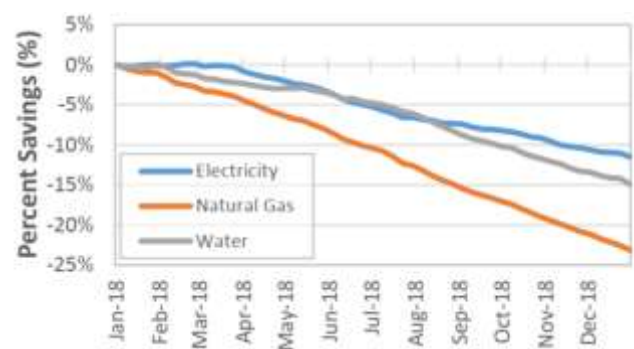


Figure 3: Normalized energy performance improvement for electricity, natural gas, and water in 2018 based on weekly data points that take into account factors including production and weather

The key EnMS tool used to collect and evaluate identified saving opportunities by Areej staff is a live energy savings opportunities (ESO) spreadsheet that serves as the centralized location to detail all plant energy savings opportunities and action plans.

Each ESO idea is studied by the energy team based on the savings/cost ratio and agreed upon ideas are assigned to individuals responsible for implementation and verification of the savings. Following implementation, the savings from each idea was validated/verified using an appropriate method (e.g., measurements, calculations, etc.), with methodology described in the ESO spreadsheet. This approach promotes a more systematic approach to energy management and ensures continuous employee engagement.

This case study is an adapted and shortened version of a more detailed publicly available case study available for download from the Clean Energy Ministerial (CEM) website:

<https://www.cleanenergyministerial.org/publications-clean-energy-ministerial/areej-vegetable-oil-and-derivatives-global-energy-management>. The Clean Energy Ministerial (CEM) is a global forum where major economies and forward leaning countries work together to share best practices and promote policies and programs that encourage and facilitate the transition to a global clean energy economy. Areej's CEM case study was a winner of a 2018 CEM Award of Excellence in Energy Management. The CEM awards programme highlights the clear energy, environmental, and business benefits achieved by the diverse types of organizations that invest in energy efficiency.

Clean Energy Business Council MENA

Masdar City
Abu Dhabi, UAE
info@cleanenergybusinesscouncil.com
www.cebcmena.com/

