

Global Energy Management System Implementation: Case Study

Philippines

Maynilad Water Services, Inc.

Established and implemented an Energy Management System leading to energy conservation while still meeting demand of expanding customer base.

Business Case for Energy Management

Company Profile/Business Case

With its vision of becoming the leading water solutions in the Philippines with a strong presence across Asia, Maynilad has been improving in its operations as part of its commitment in the Quality, Environment, Energy, Safety and Health (QESH) Policy. Its QESH Policy reflects the commitment of the company especially its top management on quality of operation, environmental protection, energy efficiency and personnel safety and health.



Maynilad Head Office in Metro Manila, Philippines

As part of its commitment on energy efficiency, Maynilad started with the establishment of its energy management system (EnMS) based on ISO 50001:2011 to serve as a framework for a more structured monitoring of its energy utilization performance. Prior to this, energy reduction formed only part of the

environmental aspect of Maynilad's Integrated Management System (IMS) with each facility targeting a specific number in terms of electricity consumption.

With the launch of the Energy Management System (EnMS) on June 5, 2015, Maynilad was able to focus its energy reduction efforts on facilities which had the greatest contribution to the overall energy consumption of the company. Each facility was evaluated to identify the different significant energy using equipment being used and target those to come up with opportunities for improvement. The benefits realized translated more than just reduction in energy consumption but also reduction in operational expenses.

“We continue to optimize our resources so we can sustain operations while keeping power consumption to a minimum,”

—Ramoncito S. Fernandez, Maynilad President & CEO

This EnMS has also enabled Maynilad to contribute in the Philippine government's initiative to improve energy utilization of all users through its National Energy Efficiency and Conservation Program. The government's Department of Energy has recognized the efforts of the company as reflected by the Outstanding Award received by two (2) Maynilad facilities (La Mesa Treatment Plant 2 and PAGCOR Pump Station) in the Don Emilio Abello Energy Efficiency Awards. This is national event is among the initiatives by the government for commending industries for its energy saving best practices.

Business Benefits Achieved

After the implementation of the Energy Management System (EnMS), the company was able to realize reduction in energy consumption of 1.99%, equivalent to 2,915,785.73 kWh, over one (1) year and seven (7) months.

The reduction has led to the company saving almost \$USD 430,685 from payment of purchased electricity. This, while also reducing the impact to the environment by reducing the CO₂ emissions by 1,636.02 tons CO₂e and spending only \$USD 33,970.96 (equivalent to 1 month payback period).

EnMS Development and Implementation

Organizational

The company, specifically its Top Management Team, has recognized the need to include energy efficiency in its operation as part of the company’s Triple Bottom Line: Planet, People and Profit. With this, the company’s Quality, Environment, Safety and Health (QESH) Policy was updated to include Maynilad’s commitment to energy efficiency and thus resulted to the Quality, Environment, Energy, Safety and Health (QESH) Policy (**Figure 1**).

As indicated in the appointment letter of the EnMS Core Team, there are roles assigned to each group to ensure the energy management system is maintained. **Figure 2** reflects the organization chart for the EnMS Core Team while **Table 1** shows the responsibility for the EnMS-specific roles.

Case Study Snapshot

Industry	Utility
Product/Service	Water and Wastewater
Location	Philippines (Metro Manila)
Energy Management System	ISO 50001:2011
Energy Performance Improvement Period	June 2015-December 2016 (1 yr and 7 mos.)
Energy Performance Improvement (%) over improvement period	1.99%
Total energy cost savings over improvement period	\$USD 430,685
Cost to implement EnMS	\$USD 33,970.96
Payback period on EnMS implementation (years)	0.079 years (1 month)
Total Energy Savings over improvement period	10,496 GJ
Total CO₂-e emission reduction over improvement period	1,636.02 tons CO ₂ e

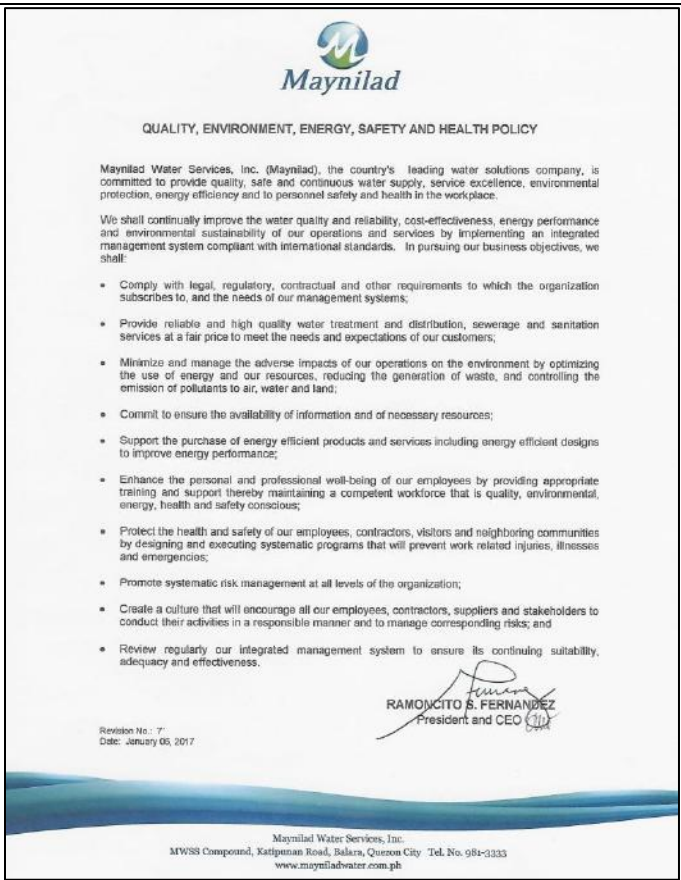


Figure 1. Maynilad QESH Policy

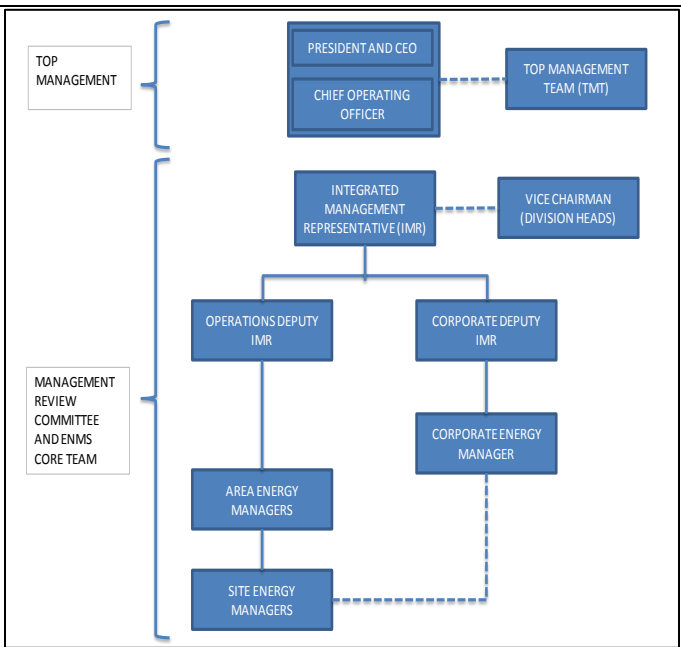


Figure 2. Maynilad EnMS Core Team

Table 1. Roles and Responsibilities of EnMS Core Team

KEY POSITION	RESPONSIBILITIES AND AUTHORITIES
CORPORATE ENERGY MANAGER	<p>Mainly responsible in:</p> <ul style="list-style-type: none"> • Providing guidance and technical advice to the Corporate Deputy IMR; • Providing assistance in drafting an energy management policy, energy review and the action plan; • Assisting in the promotion of the energy management initiatives particularly the energy saving opportunities; • Facilitating the conduct of energy audit, as may be required; and • Providing general support to the Corporate Deputy IMR.
AREA ENERGY MANAGER	<p>Mainly responsible in:</p> <ul style="list-style-type: none"> • Ensuring that EnMS requirements are effectively cascaded to their respective areas; • Providing support to the Corporate Energy Manager and Corporate Deputy IMR in the conduct of energy planning process and energy audits; • Ensuring that best practices in energy efficiency are identified and considered for inclusion in the Opportunities List of EnMS Tool; and • Ensuring the full compliance of sites to applicable energy laws.
SITE ENERGY MANAGER	<p>Mainly responsible in:</p> <ul style="list-style-type: none"> • Facilitating compliance of business unit to applicable energy laws and keeping of records of such; • Ensuring energy performance measures of their respective business unit are established, implemented and maintained; • Managing the implementation of relevant management system policies, objectives & targets,

KEY POSITION	RESPONSIBILITIES AND AUTHORITIES
	<p>plans & programs, procedures, work instructions and guidelines;</p> <ul style="list-style-type: none"> • Ensuring the effective implementation and maintenance of the EnMS tool; and • Initiating, identifying and recording any problem in the business unit relating to the management system policies, objectives & targets, plans & programs, procedures, work instructions and guidelines, and ensuring timely and adequate actions to management system nonconformities.

Energy review and planning

In the initial stage of establishing its Energy Management System (EnMS), the company tapped the services of an external consultant, Accelence Consultancy Inc. whose lead consultant is among the first batch of UNIDO-trained EnMS experts in the Philippines, which provide the Maynilad employees knowledge on the EnMS (based on ISO 50001-2011) and how it will be implemented for the facilities. Aside from attending trainings on EnMS, the Core Team was tasked to identify all the energy using equipment in the site to identify which among them has significant energy consumption.

From there, the team was able to determine energy saving opportunities which will be used to establish its target energy reduction. In addition, the company appointed energy managers per site who will ensure the implementation of EnMS. The appointment letter for the EnMS Core Team was signed by the company President and CEO during the start of implementation of the EnMS on June 5, 2015.

Aside from the assigned energy managers for each site, the core team also included different departments which act as support for the energy managers and these include the Automation and Instrumentation Dept.,

Logistics-Administration Dept. and Corporate QESH Division where the Corporate Energy Manager is assigned.

“It was not easy to reduce power consumption given our massive expansion and service improvement projects. But we still identified points for improvement, and managed to pass the strict certification audit.”

—Ramoncito S. Fernandez, Maynilad President & CEO

Cost-benefit analysis

In the initial implementation of the EnMS, Maynilad has come up with opportunities for improvement with minimal cost. **Table 2** shows the breakdown of expenses by the company in the first 1 year and 7 months:

Table 2. Breakdown of costs for EnMS implementation

Cost Item	Implementation Cost (\$USD)
Internal Staff time to develop and implement the EnMS (400 man-days)	8,333.33
Internal staff time to prepare for external audit (200 man-days)	4,166.67
Additional monitoring and metering equipment installed to meet EnMS requirements	625.00
Third party audit costs (for year 1 and 2 only)	5,546.88
Technical assistance (e.g. hired consultants to assist with EnMS implementation)	15,299.08
Other (e.g. internal communications)	-
TOTAL EXPENSES	33,970.96

Approach used to determine whether energy performance improved

Considering that consumption of energy is dependent on production volume of its facilities, Maynilad used the volume of water delivered/treated or wastewater treated of the concerned facility (in terms of million liters, ML). In addition, since the company uses fuel as

additional source for power, Maynilad has decided to adopt the measure being used by the government's Department of Energy, which is in terms of Liters of Oil Equivalent (LOE). The ratio of power consumption per volume processed (LOE/ML) is then used as the metric in measuring improvement in energy performance. The target LOE/ML and previous year's LOE/ML (**Table 3**) serve as basis in determining if a facility was able to realize energy savings for a given period.

Table 3. Energy performance by facility (2014-2016)

Facility Name	Energy Intensity (in LOE/ML)		
	2014	2015	2016
La Mesa Pump Station	38.82	40.03	38.17
La Mesa Treatment Plant 1	1.05	1.10	1.24
La Mesa Treatment Plant 2	1.38	1.13	1.07
PAGCOR Pump Station	45.93	44.17	42.30
Pasay Pump Station	30.39	31.49	32.31
Tondo Sewage Pumping Plant	12.98	14.48	13.93
Villamor Pump Station	53.02	50.93	50.07
TOTAL	15.20	14.73	14.44

Approach used to validate results

Since electricity readings are read from the sub-meter within the facilities, the billings issued by the electricity distributor are being used as basis to verify the consistency of the monthly readings. In addition, the sub-meters are subjected to periodic calibration/verification consistent with our system procedure on control of monitoring and measuring equipment.

Steps taken to maintain operational control and sustain energy performance improvement

Each site energy manager is tasked to monitor the daily energy performance of their facility and reporting the results on a monthly basis to the management. This is part of our procedure on monitoring and measuring of Quality, Environment, Energy, Safety and Health (QESH) Performance. In addition, the opportunities for improvement established by each site energy managers

are measured to specifically quantify the impact of each activity.

Development and use of professional expertise, training, and communications

As part of the establishment of its EnMS, the core team members underwent several trainings to be better equipped. Among the trainings provided are the following: User Training on EnMS (ISO 50001:2011 Appreciation Course), Internal Audit Training and EnMS Documentation. The consultant also served as the auditors on the energy audit of the seven (7) facilities to identify additional opportunities for energy savings.

During the same period, existing procedures from the company's integrated management system (IMS) based on ISO 9001, ISO 14001 and BS OHSAS 18001 were reviewed and revised to take into account the requirements of the ISO 50001:2011 standard. The revision covered system procedures on control of documents and records, internal and external communication, participation and consultation, non-conformity, corrective and preventive action, internal IMS audit and management review.

Tools and resources

In order to help the team get more familiar with the implementation of the EnMS, the consultants introduced the tool prepared by the United Nations Industrial Development Organization (UNIDO), which was an excel-based tool reflecting the different data needed. The Area and Site Energy Managers used the said tool to establish the energy baseline of each facility before determining the opportunities for improvement based on the significant energy uses (SEUs) (**Figures 4 & 5**).

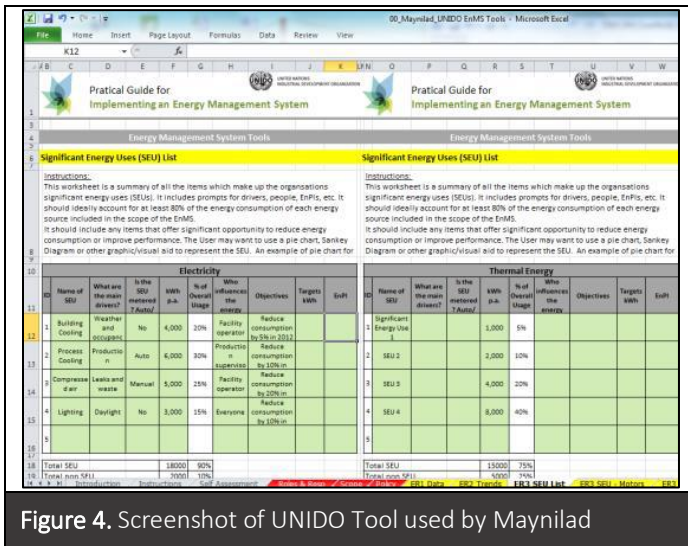


Figure 4. Screenshot of UNIDO Tool used by Maynilad

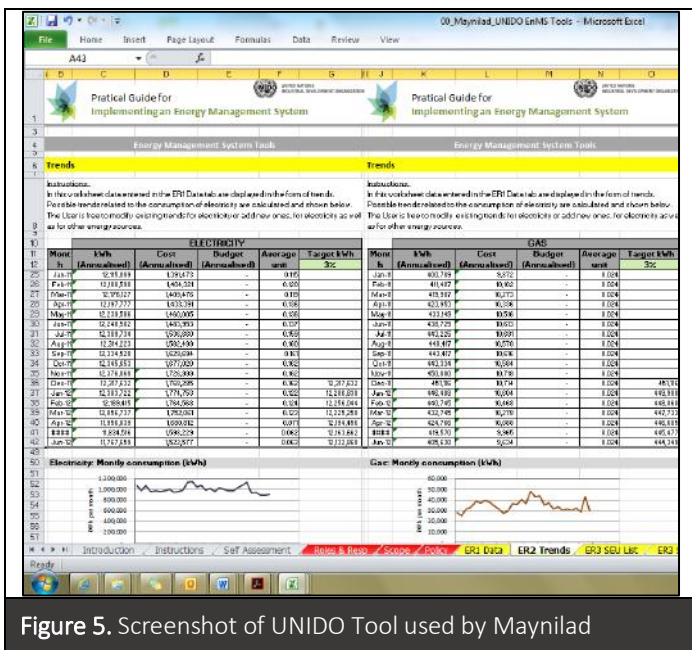


Figure 5. Screenshot of UNIDO Tool used by Maynilad

Lessons Learned

Keys to Success

- Commitment and support from Top Management
- Involvement of every group/division
- Consistency leads to sustained improvement
- Savings can come from simple changes

The implementation of EnMS in the company was rolled-out as an improvement project that complement the company's Greenhouse Gases (GHG) Inventory initiative, which has been verified based on ISO 14064:2006 (the first company to do so in the Philippines). Based on the inventory, more than 80% of the company's GHG emissions came from purchased electricity used to power its facilities. In order to properly focus its energy conservation efforts, Maynilad used the Pareto Analysis to identify the top facilities consuming most of its purchased electricity.

During the documentation stage of the EnMS, the core team was able to review and rationalize existing procedures in the facilities. Evaluation of existing procedures has led to the team realizing there are still plenty of opportunities for energy savings simply by optimization of equipment operation.

A more specific example of this learning is the reduction in operating hours of rapid mixers during low turbidity of raw water input in the La Mesa Treatment Plant 1 and the reduced scour air operation in the La Mesa Treatment Plant 2. The reduction in operating hours ensured that energy consumption is reduced during normal conditions without affecting the quality of the product water.

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.

