

ISO 50001 Energy Management System Case Study

2021

Philippines

Maynilad Water Services, Inc.

Implementation of Energy Management System with expansion of scope from 7 to 10 facilities leading to energy conservation while still meeting demand of expanding customer base and service coverage area.



Maynilad Head Office in Metro Manila, Philippines

Organization Profile & Business Case

Maynilad Water Services, Inc. (Maynilad) is the Philippines' largest private water concessionaire in terms of customer base, with the most number of ISO certifications across its sites and facilities. It provides services for 17 cities and municipalities that comprise the West Zone of the Metropolitan Manila area. It is an agent and contractor of the Metropolitan Waterworks and Sewerage System (MWSS).

As a private company providing public service through the management of water and wastewater services, sustainability is critically important for the company. By integrating sustainability practices into our business

Case Study Snapshot	
Industry	Utility
Product/Service	Water and Wastewater
Location	Philippines (Metro Manila)
Energy management system	ISO 50001:2018
Energy performance improvement period, in years	4 years (2017 – 2020) Base year 2016
Energy Performance Improvement (%) over improvement period	3.51% (for sites #1-7) 2.61% (site#8) 3.97% (site#10)
Total energy cost savings over improvement period	1,236,088 \$ USD
Cost to implement EnMS	135,000 \$USD
Total Energy Savings over improvement period	38,878 (GJ)
Total CO ₂ -e emission reduction over improvement period	7,460 (Metric tons)

Note: calculations provided separately on the Entry form.

operations, we mitigate the current challenges of climate change, rapid population growth, poverty, and the ongoing pandemic which remains at the forefront of hurdles we need to overcome.

To do this, Maynilad Water Services Inc. (Maynilad) remains dedicated to its mission and vision, of providing safe and affordable water solutions for its customers. We practice environmental management to reduce our carbon footprint and adhere to mandated regulations. Through advancements in technology and collaborating

with partners, we seek to develop optimal water and wastewater solutions to the attainment of the United Nations Sustainable Development Goals (SDGs). Maynilad focuses on Goal 6: Clean Water and Sanitation, with the objectives of ensuring availability and sustainable management of water and sanitation for all.

Energy Management plays a significant role in the company’s business strategies which is anchored on the three pillars, Operational Efficiency, Organizational Capability and Business Growth. As part of Maynilad’s commitment on energy efficiency, it implements and maintains its energy management system (EnMS) based on ISO 50001:2018 to serve as a framework for a more structured monitoring of its energy utilization and performance.

Maynilad focuses its energy efficiency and conservation efforts on the top facilities with significant energy usage. These facilities were evaluated to determine the most energy intensive equipment being used and check if it operates at an optimal level and come up with opportunities for improvement. The benefits realized translated to reduction in energy consumption and 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

Business Benefits

The implementation of the Energy Management System (EnMS), enabled the company to achieve an average annual reduction in energy intensity of 3.51% against 2016 base year for a 4-year (2017 – 2020) improvement period for the first 7 EnMS facilities that were certified in 2016.

In 2018, the company added one more facility in the scope of EnMS Certification and it achieved an average annual savings of 2.61% in energy intensity from 2019-2020.

In 2020, the company expanded again the scope of EnMS certification and added 2 new facility with significant energy usage. These sites are currently on the baselining period, but Site #10 already achieve 3.97% improvement in energy intensity in 2020 against 2019 base year.

Overall, Maynilad was able to save 38,878 GJ of energy for a 4-year energy performance period aggregated for the 10 facilities. This is equivalent to 10,526,724 KWH savings in energy consumption over a period of 4 years.

The reduction has led to the company saving \$USD 1,236,088 from payment of purchased electricity. This, while also reducing the impact to the environment by reducing the CO2 emissions by 7,460 metric tons CO2e and spending only \$USD 135,000 for the implementation of EnMS. (equivalent to 0.1092 years payback period).

Through the implementation of EnMS, Maynilad was able to contribute in Philippine National Energy Efficiency and Conservation Program. The Department of Energy recognized and awarded Maynilad with two (2) Outstanding Award for (La Mesa Treatment Plants 1 and 2), one (1) Special Award for (La Mesa Pump Station) and one (1) Citation award for (Tondo Sewage Pumping Plant) in 35th Don Emilio Abello Energy Efficiency Awards on December 2017 in Pasay City.



The ASEAN Centre for Energy recognized Maynilad’s energy efficiency and conservation practices after it conferred an ASEAN Energy Award to its La Mesa Treatment Plant 2. Receiving the award are Maynilad officials led by chief operating officer Randolph Estrellado (left) and water supply operations head Ronaldo Padua (2nd from left).

Furthermore, Maynilad’s La Mesa Treatment Plant 2 was declared winner under the “ASEAN Best Practices Competition for Energy Management in Buildings and Industries (Small and Medium Industry Category)”. Maynilad is one of only five Philippine companies to be recognized in the ASEAN Energy Awards on September 2017, which honored 86 companies and individuals from Malaysia, Indonesia, Thailand, Singapore and Philippines.

Plan

Energy Planning and Review

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) 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.

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 & Instrumentation Dept., Supply Chain Management, Integrated Asset Management Division and Quality, Sustainability & Resiliency Division, and where the Corporate Energy Manager is assigned.

The Top Management role is also vital in providing strategic direct and drives the company down the line to push forward to be more efficient and meet the goal of energy management, energy efficiency and conservation with adhering to the company’s mission and vision and contributing to sustainability where possible.

“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



Figure 1. Maynilad Quality, Environment, Energy, Safety and Health Policy

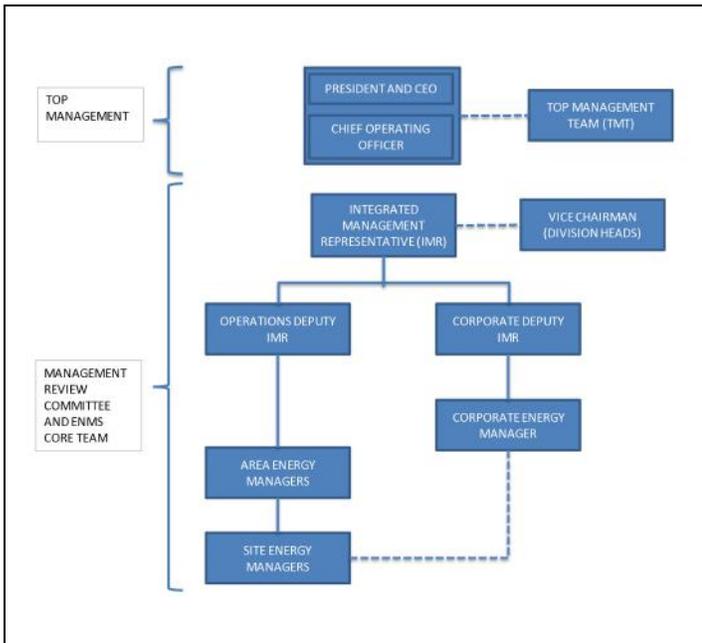


Figure 2. Maynilad Energy Management Core Team

KEY POSITION	RESPONSIBILITIES AND AUTHORITIES
SITE ENERGY MANAGER	<ul style="list-style-type: none"> Facilitating compliance to applicable energy laws Ensuring energy performance measures are implemented and maintained; Managing the implementation of relevant management system policies, objectives & targets, plans & programs, procedures identifying problem relating EnMS, ensuring timely actions to management system nonconformities.

Table 1. Roles and Responsibilities of EnMS Core Team

KEY POSITION	RESPONSIBILITIES AND AUTHORITIES
CORPORATE ENERGY MANAGER	<ul style="list-style-type: none"> Provides guidance and technical advice to management Provides assistance in drafting an energy management policy, energy review and the action plan; Assisting in the promotion of the energy management initiatives and energy saving opportunities; Facilitating the conduct of energy audit, as may be required;
AREA ENERGY MANAGER	<ul style="list-style-type: none"> Ensuring that EnMS requirements are effectively cascaded to their respective areas; Providing support in the conduct of energy planning process and energy audits; Ensuring that best practices in energy efficiency are identified in the Opportunities List Ensuring the full compliance of sites to applicable energy laws.

Cost-benefit analysis

In the implementation of the EnMS, Maynilad lead to opportunities for improvement with minimal cost. Table 2 shows the breakdown of expenses by the company for implementation of Energy Management System over a 4-year period from 2017 – 2020.

Table 2. Breakdown of costs for EnMS implementation

Cost Item	Implementation Cost (\$USD)
Internal Staff time to develop and implement the EnMS (2,000 man-days)	43,000
Internal staff time to prepare for external audit (800 man-days)	16,000
Additional monitoring and metering equipment installed to meet EnMS requirements	47,000
Third party audit costs (for 4 years)	8,000
Technical assistance (e.g. hired consultants to assist with EnMS implementation)	15,000
Other (e.g. internal communications)	6,000
TOTAL EXPENSES	135,000

Note: calculations provided separately on the Entry form.

Do, Check, Act

Do, **Baseline Approach was used to determine energy performance improvement for a 4-year period**

We used the Baseline approach where-in we measured energy performance improvement for a period of 4 years (2017-2020) against the baseline year 2016 performance. Considering that consumption of energy is dependent on production volume of its facilities, Maynilad used the volume of water delivered and/or treated wastewater of the concerned facility (in terms of million liters, ML). The energy intensity is measured using the ratio of power consumption per unit of volume processed in (KWH/ML).

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 reports the results monthly to the management. This is part of our procedure on monitoring and measurement of Quality, Environment, Energy, Safety and Health (QESH) Performance. In addition, we also created online Dashboard through Microsoft Share point Portal for centralized energy reporting.

Training and Development 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 50001:2018 Appreciation Course), Internal Audit Training and EnMS Documentation. Internal Audits were also conducted annual for the (10) 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 ISO 45001 were reviewed and revised to consider the requirements of the ISO 50001:2018 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

To help the team to be 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 set targets and monitor energy performance and determine opportunities for improvement based on the significant energy uses (SEUs) (Figures 4).

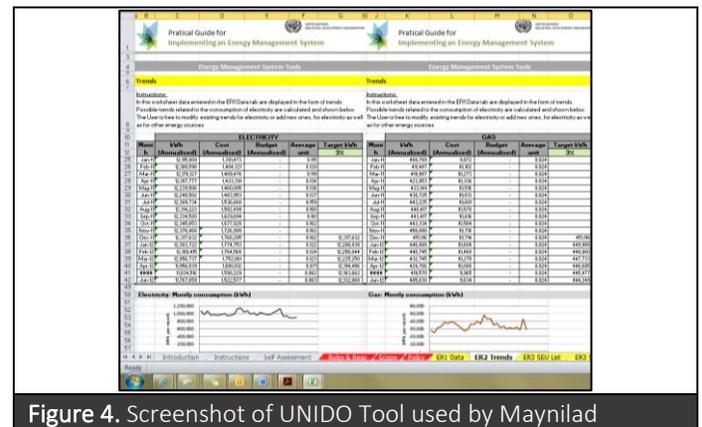


Figure 4. Screenshot of UNIDO Tool used by Maynilad

Check, **Ensure Proper Monitoring and Measure Performance through Internal Audit and Management Reviews**

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. Internal audit and at least 2 management reviews per year are being done to check and measure performance of set targets and to ensure suitability and adequacy of the Energy Management System.

Table 3. Energy performance by facility (2016-2020)

Site # 1 to 7	Energy Intensity (in KWH/ML)				
	2016	2017	2018	2019	2020
La Mesa PS	4.73	4.51	4.39	4.39	4.13
La Mesa TP-1	4.03	3.67	3.77	5.06	3.82
La Mesa TP-2	145	141	139	140	140
Villamor PS	192	201	209	211	214
PAGCOR PPS	161	157	141	137	143
Pasay PS	124	106	124	122	123
Tondo SPP	53	54	47	46	45
Aggregate Intensity	55.0	52.5	53.5	53.3	52.9
Improvement against 2016	Base year	4.47%	2.66%	3.10%	3.82%
4-year Average Improvement		3.51%			

Note: detailed computation provided separately

Energy Intensity (in KWH/ML)			
Site # 8	2018	2019	2020
Head Office	124	129	113
Improvement against 2018	Base Yr.	-3.65%	8.89%
2-year Ave. Improvement	2.62%		

Note: New Facility added in the EnMS Scope in 2018

Energy Intensity (in KWH/ML)		
Site # 9	2019	2020
Putatan TP - 1	320.61	323.99
Loss against 2019	Base Year	-1.05%

Note: New Facility added in the EnMS Scope in 2020

Energy Intensity (in KWH/ML)		
Site # 10	2019	2020
Putatan TP - 2	384.69	369.43
Improvement against 2019	Base Year	3.97%

Note: New Facility added in the EnMS Scope in 2020

Act,

To further improve the implementation of EnMS:

- Invested in the rehabilitation of its 2 major water treatment plants i.e. La Mesa Treatment Plants 1 & 2, which includes upgrade of equipment & installation of 2 solar energy (1MW each).
- Established Integrated Asset Management earlier to help in asset health care and performance. Project STREAM or the Computerized Maintenance Management System (CMMS) started in 2019 and completed in March 2021.
- Invest in industrial automation and instrumentation and a centralized energy monitoring software. A Central Control Monitoring (CCM) System was established in 2018.

Transparency

Maynilad publicly announced its ISO 50001 certification through official press releases, in newspapers, company newsletters and corporate website. We also disclose this information in our annual and sustainability reports. Disclosures for CDP, SASB and other ESG reporting are made through the parent company Metro Pacific Investments Corporation.

What We Would Have Done Differently

- Maynilad could have invested in tools needed for monitoring and measurement of equipment performance in the earlier stages instead of EnMS.
- Look for more renewable energy opportunities like our biosolids for methane gas

Keys to Success

- Top Management Buy-in and support
- Involvement of every group/division
- Consistency leads to sustained improvement
- Savings can come from simple changes
- Regular Energy Performance Reporting
- Integrate Sustainability in business strategies

The Energy Management Leadership Awards is an international competition that recognizes leading organizations for sharing high-quality, replicable descriptions of their ISO 50001 implementation and certification experiences. The Clean Energy Ministerial (CEM) began offering these Awards in 2016. For more information, please visit www.cleanenergyministerial.org/EMAwards.

