ISO 50001 Energy Management System – Case Study

2024 United Arab Emirates (UAE)

ENOC – Corporate Real Estate

Supports business enterprises for its operational purposes and upkeep of facilities. It maintains office building by continuously implementing energy efficiencies projects to reduce the energy requirement.

ENOC Complex

Case Study Snapshot	
Industry	Oil and Gas operating across energy sector value chain
Product/Service	Facility Management
Location	Dubai, United Arab Emirates
Energy performance improvement percentage (over the improvement period)	58.9 % improvement over 5 years
Total energy cost savings (over the improvement period)	USD 376,115.00
Cost to implement Energy Management System (EnMS)	USD 32,500.00
Total energy savings (over the improvement period)	3635.3 MWh
Total CO_2-e emission reduction (over the improvement period)	1479.9 Metric Tons

Organization Profile / Business Case

Emirates National Oil Company Limited (ENOC) L.L.C. is a leading integrated global oil and gas player operating across the energy sector value chain. A wholly owned company of the Government of Dubai, ENOC was initially established in 1993.

Enoc is committed to modelling sustainability across its operations and activities by clearly articulating its purpose through mission and vision statement.

Enoc's vision is "To be an innovative energy partner, delivering sustainable value and industry leading performance" and mission is "To deliver world-class sustainable and integrated energy solutions. We do so by striving for excellence in operations, innovation and happiness for our employees, customers and partners".

Enoc leadership team is completely devoted to conserving resources and improving the bottom line through efficient energy management by awarding/rewarding the departments delivering superior energy performance – Enoc's internal scheme to shift focus from compliance driven to performance driven.

Enoc's Corporate Real Estate Policy further reinforces its commitment to energy efficiency by:

- Ensuring energy performance improvement through the implementation of an effective energy management system (EnMS) covering all aspects related to energy performance and sustainable development.
- Developing and benchmarking relevant energy performance indicators in operations to identify energy and resource performance improvement opportunities.

- Ensuring availability of information and necessary resources to meet our energy efficiency objectives and targets.
- Encouraging economically viable measure to reduce, recover, reuse energy and resources.
- Use energy efficient products and services during design, procurement and maintenance activities based on life cycle cost analysis.
- Regularly review our energy performance by measuring, monitoring, quantifying, and analyzing energy and resource use.
- Complying with the applicable laws and regulations, Energy and resource management manual and other applicable energy related requirements.
- Promoting the adoption of green building practices and the use of renewable energy in existing and new facilities.
- Fostering an energy efficiency culture within the Organization to meet its future aspirations and ambition through awareness campaigns and trainings.

An effective EnMS system plays a crucial role in supporting our corporate goals of sustainability, cost-efficiency, and operational excellence. By continuously monitoring and optimizing our energy usage, we not only reduce our environmental footprint but also achieve significant cost savings, which directly contribute to our financial health and competitive advantage.

Additionally, our commitment to energy efficiency aligns with our Group vision “to be an innovative energy partner, delivering sustainable value, and industry leading performance”.

“At Enoc, Sustainability has always been deeply rooted in our core values, we are leveraging talent and technology with prudence and foresight to co-create a shared future.”
—H.E. Saif Al Falasi, Group CEO

Business Benefits

Since implementing ISO 50001, our business unit has experienced significant advancements in energy performance, resulting in notable accomplishments and positive business impacts.

Adopting ISO 50001 has led to a structured approach to energy efficiency, enabling u to systematically track, analyze, and improve our energy consumption across our operations.

Experience and Accomplishments:

1. Energy Reduction: We have achieved substantial reductions in energy consumption through continuous monitoring and optimization of energy use. This has led to an overall decrease in operational costs.

2. Enhances Operational Efficiency: By integrating energy management into our daily operations, we have streamlined processes, reduced waste, and improved overall productivity.

3. Employee Engagement: ISO 50001 has fostered a culture of energy awareness among employees, leading to more innovative and efficient practices being adopted at all sections of the department.

4. **Environmental impact:** Our commitment to ISO 50001 has significantly reduced our carbon footprint, aligning with our sustainability goals and improving our reputation as an environmentally responsible organization.

Maintaining ISO 50001 certification is crucial for sustaining these benefits and ensuring continuous improvement in our energy management practices. It demonstrates our ongoing commitment to energy efficiency and environmental stewardship, reinforcing our corporate values and strategic goals.

Additionally, it ensures that we remain at the forefront of industry best practices, providing us with the framework to adopts to future energy challenges and opportunities effectively.

Plan

Developing and planning the implementation of our EnMS involved a strategic, multi phased approach to ensure efficiency, sustainability, and alignment with our organizational goals. Here is an overview of key steps we undertook:

Development Phase:

1. Need Assessment:

- Conducted a comprehensive audit of our energy consumption patterns to identify in efficiencies and areas for improvement.
- Engaged stakeholders to understand their energy usage and gather input for the EnMS.

2. Goal Setting:

- Established clear, measurable energy performance improvement targets, aligned with our corporate sustainability and cost saving objectives.
- Set both short-term and long-term goals to ensure continuous improvement in energy management.

3. Research and Benchmarking:

- Researched industry best practices and standards, including ISO 50001, to guide our EnMS development.
- Benchmarked our energy performance against industry peers to identify opportunities for competitive advantage.

Planning Phase:

1. System Design:

- Designed a robust EnMS framework incorporating real-time monitoring, automated control systems, and comprehensive data analytics.
- Ensured the system design could adapt to future technological advancements and organizational changes.

2. Pilot Testing:

- Implemented a pilot project in a specific operational area to test the EnMS functionality and effectiveness.
- Collected data and feedback to refine the system before a full-scale implementation.

3. Resource Allocation:

- Allocated necessary resources, including budget, personnel, and training programs to support EnMS implementation.
- Developed comprehensive training programs to ensure that all relevant personnel could effectively use and manage the system.

4. Implementation Roadmap:

- Created a detailed implementation roadmap, outlining key milestones, timelines, and responsibilities for each phase of the project.
- Established a dedicated project management team to oversee the implementation and ensure adherence to the plan.

5. Stakeholder Engagement:

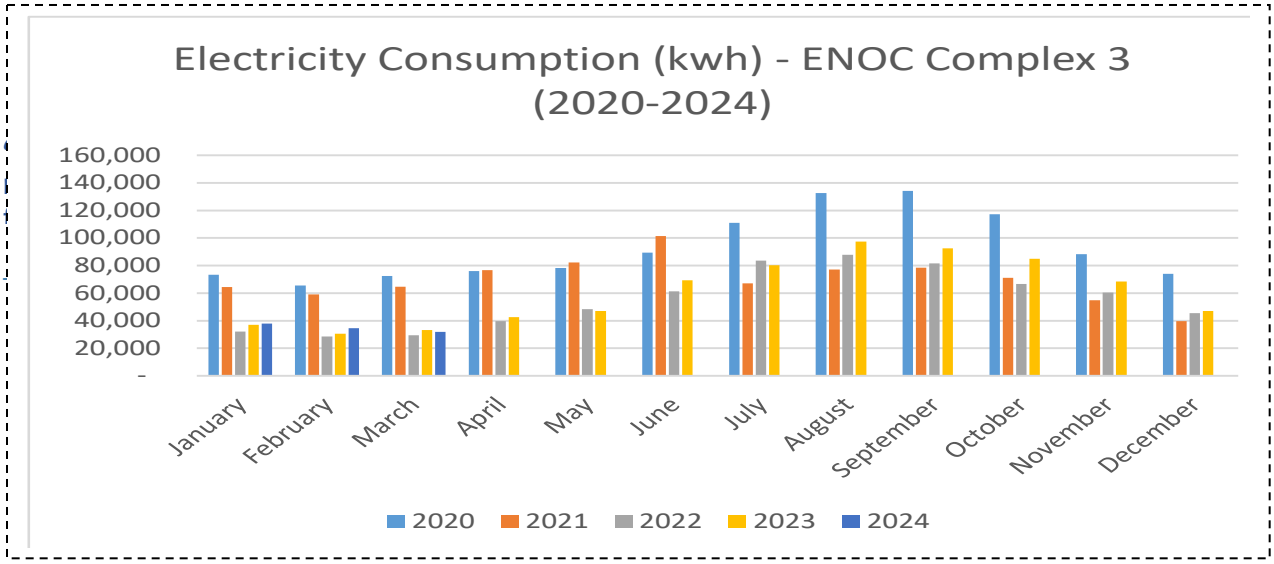
- Communicated the benefits and objectives of the EnMS to all stakeholders to secure their support and involvement.
- Established regular feedback loops to incorporate stakeholder input and address any concerns promptly.

6. Data Integration and Analysis:

- Integrated the EnMS with existing data management systems to ensure seamless data flow and real time energy monitoring.
- Established protocols for data analysis and reporting to track energy performance and identify areas for improvement.

To ensure our EnMS system supported our organizational strategy and targets, we integrated energy management into our corporate strategy with senior management's commitment. We set clear measurable targets aligned with

business objectives and engaged key stakeholders in planning and implementation. Comprehensive training and awareness campaigns educated employees on energy efficiency. A thorough baseline assessment and the integration of advanced technologies provided a real time monitoring and control. Robust performance monitoring, regular management reviews, and a culture of continuous improvement ensure the EnMS effectively supported our sustainability, cost reduction, and operational efficiency goals.



"Adopting Iso 50001 is a commitment to smarter energy use, propelling business toward a greener and a more profitable future."
—Syed Danish, Hard Services Supervisor

Do, Check, and Act

We formed a team with a representative to identify and assess issues, opportunities, and existing process. We held kick-off meeting to discuss the organization's objectives in implementing the EnMS system, the initial step that need to be taken and roles of each team member.

Then we conducted preliminary review of our current compliance and other energy program/system and compare these against the criteria for EnMS. Evaluated our organization's structure, procedures, policies, environmental impact, training program and other factors.

Based on the results of the preliminary review, we prepared a detailed project plan with key actions and budget.

After budget approval, we secured resources and involved other employees for their insights and regularly monitor the progress against the goal and project plan and communicate this progress within the organization including the top management.

Top management constantly motivated us by appreciating our efforts and awarding us with recognition certificates at regular intervals.

Key activities identified and implemented in the plan that improved energy performance were:

- Devising strategy for energy conservation such as integrating efficiency goals into department scorecard, leveraging advanced technologies, and fostering a culture of continuous improvement.

We identified Energy improvement projects through analyzing current energy consumption, identify areas for improvement, evaluating potential projects through below process:

1. Energy audit and Assessments: Conducting energy audits to analyze current energy usage patterns and identify potential areas for improvement.
2. Data Analysis: Analyzing energy consumption data to identify trends, anomalies, and opportunities for optimization.
3. Benchmarking: Comparing energy performance against industry standards and best practices to identify areas of inefficiency.
4. Technology assessment: Evaluating energy efficient technologies and solutions that can reduce energy consumptions.
5. Employee Engagement: Involving employees in identifying energy saving opportunities and encouraging energy efficient behaviors.
6. Financial Analysis: Conducting cost benefit analysis to assess financial feasibility of energy improvement projects.
7. Prioritization: Prioritizing projects based on based on energy saving potential, payback period and impact on Organizational goals.

By following the above process, we systematically identify and executed energy improvement projects listed below:

- Installation and optimization of Building Management system.
- Replacement of inefficient chillers with demand-controlled chillers.
- Replacement of conventional lights with sensor-controlled energy saving LED lights.
- Trainings for the energy team members as well as awareness for all employees
- Installation of VFD's for all motors.
- Installation of Solar PV panels to generate renewable energy.
- Installation of meters to daily monitor the electric consumption.

By implementing above, we not only reached the target but excel it immensely. Technological options, financial, operational, business requirement and pay back analysis were all considered while setting objectives and targets.

Our business unit determined whether performance improved by establishing a robust system of performance monitoring and validation for the EnMS. We started by setting clear, measurable key performance indicator aligned with our energy management goals. These KPIs included metrics such as energy consumption, cost savings and carbon emission reductions.

Performance monitoring:

1. Data Collection: We installed advanced metering and monitoring equipment to collect real-time energy usage data across all operations.
2. Baseline Establishment: A comprehensive baseline assessment was conducted to provide a reference point for measuring improvements.
3. Regular Reporting: We implemented automated reporting system through BMS to regularly analyze and report energy performance against the established KPIs.

Validation and Verification:

1. Internal Audits: Regular internal audits (twice a year) were conducted to review energy data, ensure compliance with EnMS procedures, and identify areas for improvements.
2. External / Third-Party Audits: We engaged certified third-party auditors to validate our energy performance data and verify compliance with ISO 50001 standards.
3. Management Reviews: Senior Management held regular review meetings to evaluate performance reports, previous audit findings, and progress towards targets.
4. Continuous feedback: We established feedback loops for continuous input from all levels of organization, ensuring that any discrepancies or areas needing adjustment were promptly addressed.

This way we validated and verified the results of our EnMS, ensuring accurate assessment of performance improvements and ongoing effectiveness.

Our methodology for determining energy performance improvement was by comparing real time monitoring data against the baseline using advanced analytics such as regression analysis and predictive modelling.

Indicators used to monitor and assess energy performance improvements include energy consumption metrics, energy cost savings, carbon emission reductions, and energy efficiency ratios.

Equations and Explanation to estimate energy savings and energy performance improvements:

1. Energy Savings (KWH) = Baseline Energy Consumption (KWH) – Actual Energy Consumption (KWH)
2. Percentage Energy Savings (%) = {Energy Savings (KWH) / Baseline Energy Consumption (KWH)} *100
3. Energy Performance Indicator (EnPI) = Total Energy Consumption / Floor Area.
4. Energy Intensity = Energy Consumption / Unit Output
5. Cost Savings = Energy Savings * Energy Price

By applying these equations, we quantitatively assess the effectiveness of our energy management initiatives and make informed decisions to drive further improvements.

Relevant Variables that affect energy consumption:

1. Operational Hours: The duration for which equipment/facilities are in use significantly impacts our total energy consumption.
2. Weather Conditions: Temperature, humidity and seasonal changes affect HVAC energy needs.

3. Equipment Efficiency: The energy efficiency of machinery and appliances influences overall consumption. Older/poorly maintained equipment typically uses more energy.
4. Building Occupancy: The Number of people using facility affects lighting, HVAC and equipment usage, thereby influencing energy consumption.
5. Behavioral factors: Habits and practices of employees turning off lights/ AC when not in use, play a significant role.
6. Technological Advancements: Implementing latest energy efficient technologies reduces overall energy consumption.
7. EnMS Practices: Following EnMS practices and its effectiveness in monitoring ad optimizing energy use impacts consumption levels.
8. Maintenance practices: Regular equipment maintenance ensures efficient operation, reducing unnecessary energy consumption.

Understanding and monitoring these variables help us accurately manage and reduce energy consumption.

Methods to ensure normalization:

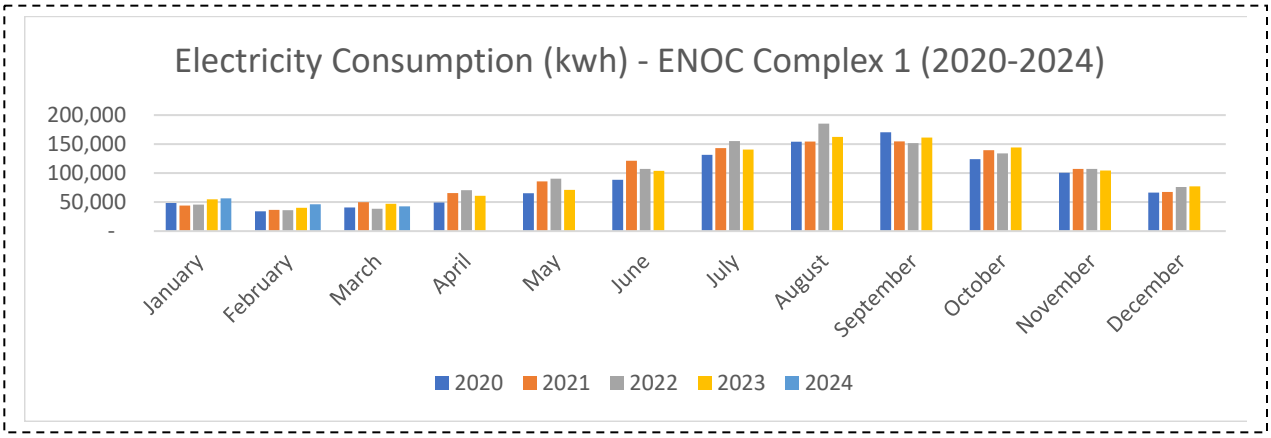
Normalization involves adjusting energy performance data to account for variables that affect energy consumption, allowing for more accurate comparisons and performance assessments.

We applied weather normalization by using cooling degree days calculation to adjust for temperature variations. This helps normalize energy use for cooling relative to average weather conditions.

We also applied regression model to predict expected energy use under normalized weather patterns.

Tools and resources used are given below:

- Resource allocation – Firstly secured resources by justifying the investment and gain the necessary support from the stakeholders. Created a strong Business Case highlighting cost benefit analysis and risk mitigation plan. Engaged senior management, aligned with corporate goals.
- Management representative – serves as a leader/ champion ensuring EnMS is a priority and follows policy and procedures.
- Training, awareness, and motivation – this improved the teams' skills, increased awareness of energy conservation practices and enhanced ability to contribute to energy management goals.
- Clear communications which ensured EnMS goals are understood, embraced, and effectively implemented.
- Scope & boundaries to define the extent of what is included and excluded in the management system. This involves physical boundaries, activities, and energy types such as grid electricity, renewable energy etc.
- Purchase and design energy efficiency for equipment.
- Sub-meters installation to get detailed insights into energy usage, enabling targeted efficiency improvements and cost savings.
- Control devices installation for enhancing operational efficiencies, reducing energy waste and improves overall system performance. Automatic switching off lights and AC in a particular office if it is idle for more than 30 minutes.
- Sizing and numbers of pumps, motors to ensure optimal performance.
- Preventive maintenance to reduce downtime, extends equipment life and improve energy efficiency.



Transparency

Our organization publicly announce the Energy and Efficiency reports through our website by publishing it and by awarding the respective business units during the annual Group Quality award/reward ceremony for certification / re-certification of ISO 50001. This provides clear and accurate information to the stakeholders, demonstrating our commitment to openness accountability. This transparency helps build trust and credibility, showing our dedication to continuous improvement and sustainability.

What We Can Do Differently

We can further enhance the procedures and methods for determining and updating EnPIs and benchmark. It is essential to increase the frequency of internal audits to ensure compliance and identify areas for improvements.

Additionally, we can regularly compare consumption data with industry norms to get valuable insights into our facility's energy efficiency performance and benchmark it.

We can widely publicize the projects already implemented to encourage more awareness and motivate others to initiate such projects in their organization too.

We can map expectation to relevant personnel to streamline efforts and ensure alignment with energy efficiency goals.

We can develop software to digitally record all energy related data to facilitate tracking and analysis, aiding in decision making.

Finally, we can plan for peak load times and implement notification system to manage energy consumption during critical periods.