

Abu Dhabi City Municipality (ADM)

The Energy Efficiency System in Abu Dhabi City Municipality.



Abu Dhabi City Municipality
Head Quarter

Case Study Snapshot

Industry	Governmental.
Product/Service	Municipal services.
Location	United Arab Emirates - Abu Dhabi City
Energy performance improvement percentage (over the improvement period)	4 % improvement over one year
Total energy cost savings (over the improvement period)	USD 73,578.4
Cost to implement Energy Management System (EnMS)	USD 67,076.1 per one year
Total energy savings (over the improvement period)	911,678 MWh
Total CO₂-e emission reduction (over the improvement period)	301,849.64 Metric Tons

Organization Profile / Business Case

Business Case for Energy Management:

Organization Profile:

The Abu Dhabi City Municipality (ADM) had been established in 1962, under the name "Municipality and Town Planning Department". In 1969, a Royal Decree was issued forming the Municipal Council of Abu Dhabi City, with the aim of offering a complete range of services to residents of Abu Dhabi City. In 2007 a Royal Decree was issued forming the Department of Municipal Affairs which consists of three independent Municipalities which are; Abu Dhabi City Municipality, Ain City Municipality, & Western Region Municipality.

In 2019 a Royal Decree was issued merging Department of Urban Planning & Municipalities with Department of Transport and forming new Department which is called Department of Municipalities & Transport. The Department of Department of Municipalities & Transport includes also the three municipalities; Abu Dhabi City Municipality, Ain City Municipality, Al Dhafra Region Municipality.

ADM scope covers provisional of municipal services, support services, municipal infrastructure & assets, town planning, lands & real estate, strategic planning & projects management services from the head office, five services branched centers, three municipal presence centers. ADM is renovating all aspects of infrastructure, including bridges, sewage networks, and road networks, and transport means which would have the strongest impact in making the City of Abu Dhabi one of the best cities to live in across the globe.

Motivation:

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There are so many drivers which motivated ADM to adopt & implement the Energy Management System (EnMS 50001). Such as Abu Dhabi Emirate Energy Strategy, Abu Dhabi Emirate Energy Conservation Code, Abu Dhabi Emirate Department of Energy Regulations, UAE Energy Strategy & Regulations, Abu Dhabi Emirate Government General Policy Agenda, UAE Strategy for Green Development under slogan of Green Economy for Sustainable Development, 2030 Environmental Vision of Abu Dhabi Emirate Government, Abu Dhabi City Municipality Vision, Environment, Health & Safety (EHS) Management System, UAE Federal Law No. 24 for 1999 regarding Environment Protection & Development, & International Conventions & Protocols related to Environment & Climate Change which UAE subscribed.

Goals:

There are several objectives & goals for implementing the energy management system in ADM such as revolving around achieving ADM business with minimum energy cost, improving its energy performance, saving energy, reducing energy consumption, & minimizing environment impacts & ADM carbon footprint & achieving sustainability, securing energy supply, improving energy usage through energy efficiency & exploring for application of renewable energy. ADM set a goal in 2021 for reduction of its electrical energy consumption (Significant Energy Use; SEU) in its Head Quarter building by 4 %. Indeed, ADM achieved this goal (4 %) in 2021 with its efficient energy management programs. ADM formed & established energy management team with specific roles and responsibilities to supervise, follow and ensure the effective implementation of its energy management programs throughout all ADM business & functions. This team plays crucial role in ADM energy management system and considered as the trigger for the system in ADM. The energy management programs which implemented in ADM are:

- Smart lighting by utilizing of LED lighting in Abu Dhabi City streets & roads (Noor Abu Dhabi Project).
- Solar power generation panels system in ADM main building and SCADA building with 1% production capacity from the total electricity consumption of ADM.
- Replacement of 90 % of the conventional lighting to LED lighting in ADM buildings.
- Refurbishment of the split air conditioning units with the central chilled water air-conditioning.
- Installation of lighting sensors in the toilets and the corridors in ADM buildings.
- Installation of lighting timers for external lighting in ADM buildings.
- Open spaces or workstations offices project in ADM buildings to control the air-conditioning temperature in the rooms.
- Sustainable refurbishment program for the ADM buildings by using.
- Continual awareness program about the energy efficiency management system and its benefits among ADM staff.

Quote from the Organization about its Achievement and Success Through ISO 5000:

“Our vision is integrated, effective, highly efficient & distinguished system that provides safe & healthy environment & achieve sustainable development”. Quoted by Dr. Huda Khalifa Al Salmi, ADM EHS Department Manager & Chairperson of the ADM Energy Management Team.

Business Benefits:

The Abu Dhabi City Municipality achieved various benefits from implementing ISO 50001 EnMS. These benefits can be summarized as; financial benefit in term of the cost savings, reduction on the energy consumption bill of ADM, best utilization of the energy equipment, enhancement of the environmental performance related the implemented EMS in ADM, good reputation for ADM, setting framework for enhancing energy efficiency throughout the supply chain, priorities evaluation & determination for implementing technologies those conserve energy, best practices in energy management & behavior, opportunities for benchmarking with other organizations, & finally transparency & communication with regard to energy resources management. ADM in 2021 achieved saving of energy cost of \$USD 73,578.4 for the 4 % energy consumption reduction in 2021 with the CO₂ emission reduction of 301,849.64 metric ton in 2021. The cost related to implementing the energy management system in ADM is \$USD 67,076.1 per year including the salaries of the staff, cost of the instruments, tools & materials. The staff time engaged in the EnMS implementation is during the ADM normal working hours which is 8 hours per days for 5 days per week.

ADM Experience, Accomplishments, and Business Impacts:

ADM gained robust experience in the implementation of the energy management system this owned since the establishment and development of the energy management system in 2012 until the accreditation of the management system in 2014 by the accreditation third party who continues to do the surveillance & recertification audits ever year and every cycle till today (March 14, 2023). It is worth it to mention that ADM was the first governmental entity to be accredited toward ISO 50001 in the middle east in 2014. The process of the system development & implementation commenced with various and several stages and phases as follow consultation, gap analysis & assessment, establishing & development of the relevant ISO 5001 EnMS documents; policy, procedures, forms, & plans, integration with other implemented Systems (EMS ISO 14001, ISO 45001, & QMS 9001), forming the energy management team which consists from various ADM Departments with specific roles & responsibilities, training & awareness, developing & implementing of EnMS Action plan, conduction of the EnMS internal audit, corrective & improvement action plan for the identified NCRs/observations, assessment external audit, & lastly certification external audit.

The Signification Use of Energy (SUE) in ADM business is the consumption of electricity in HVAC (Heating Ventilation & Air-Conditioning) and precisely in air-conditioning and lighting. Therefore, the impact of ADM business on energy is the consumption of electricity in the offices and administration mandates tasks which entirely done indoor.

Last year 2022 ADM won the Emirates Energy Award- Sliver Category. This is a national energy award organized regularly by the UAE Ministry of Energy. ADM participated in this award by its implemented energy management programs. Also, ADM participated in Sheikh Humaid Bin Rashid (Ruler of Ajman Emirate) Sustainability Award in 2019.

Energy Performance Improvements Achieved:

ADM set a goal in 2021 for reduction of its electrical energy consumption (Significant Energy Use; SEU) in its Head Quarter building by 4 %. Indeed, ADM achieved this goal (4 %) in 2021. The electricity consumption was reduced in year of 2021 to 22,125,858 KWh from 23,037,536 KWh in the year of 2020. This led to a save of 911,678 KWh which represents around 4 % reduction in electricity consumption in 2021. This improvement was achieved through the implementation of the energy programs listed in the above clause (Goals Clause).

Plan

For better understanding of its energy use, ADM follows a phased energy review approach that is conducted on periodic basis. The extent of the assessment depends on the level and quality of the gathered information, Assessment cost, availability of ADM competent resources and expertise. ADM comprehensive or partial energy review is carried out at least once annually where needed or when update of the information. ADM relies in its energy review on one or all of the following; desktop reviews, energy inspections & inspection logs, information obtained from ADM energy O&M contractor, personnel, and O&M logs, & energy surveys.

Preliminary Energy Review:

This type of review can be through desktop analysis of all available & relevant information, & walk through (preliminary audit) by the energy team & ADM subject experts.

Detailed Energy Review:

ADM is undertaking a detailed energy review by ADM Energy Management Team. To ensure maintenance and improvements of ADM energy performance, ADM will undertake such review on periodic basis, preferably once every 3-5 years.

Identification of ADM Energy Sources across Boundaries of ADM; ADM Energy Sources:

ADM energy sources include; electricity, fuels, compressed Natural Gas (CNG), & photovoltaic solar system (PV).

ADM consumes energy in the following areas; meat production, staff transportation, Heating, Ventilation & Air Conditioning (HVAC), refrigeration, water heating for sterilization of meat processing equipment, steam generation,

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combustion for odor control, pumping of water, storm water, & treated sewage, effluent as well as diesel, lifting operations in buildings, warehouses & storage areas, sanitations, bathing, kitchen applications, electricity generation in generators applied temporarily, illuminating of internal & external offices buildings, lighting of streets & public areas, powering of servers, data processors, computers, data storage, data Centers, printers, copy machines & other Offices & kitchens appliances, powering of other miscellaneous loads, parks & landscapes irrigation, pleasure & entertainment activities, decorative & event lighting, & ADM security guards housing.

Commitment of Top Decision Makers in ADM:

ADM has procedure for roles, responsibilities, accountabilities, & resources which describes senior executive’s key responsibilities for leading EnMS. ADM also established high OSH steering committee for overseeing EnMS matters in ADM. Some samples of key responsibilities for the top management or decision makers as follow:

Title	Roles and Responsibility
General Manager	<ul style="list-style-type: none"> • Shall instruct IMS (Integrated Management System) Management Steering Committee Representatives to monitor the effectiveness & communication of ADM IMS, which covers the Energy Management System, Occupational Safety & Health (OSH) Management System, & Environmental Management System at all levels throughout ADM. • Shall provide leadership and set personal examples to promote a climate for the growth of Energy Management System conscious culture. • Responsible for review and approval of the IMS & policy (including EnMS policy). • Approve the IMS resources allocation plan.
Divisions Managers	<ul style="list-style-type: none"> • Effectively support IMS Management Steering Committee Representatives. • Employ or engage persons suitably qualified in management of energy, environment & OSH. • Monitor the OSH of employees, monitor conditions, discharges, emissions, and energy efficiency at any workplace under employer’s management and control.
HSE Manager (Energy Management Team Chairperson)	<ul style="list-style-type: none"> • EHS Department Manager is the appointed Management Representative (MR) for IMS & Energy Management Team Chairperson who shall ensure IMS is implemented and maintained, & the performance reports are presented to top management at least quarterly. • Establishing an IMS & chairing Management Steering Committee in cooperation with Divisions Managers. • Effective implementation of the Procedure of Roles, Responsibilities, Accountabilities, & Resources in ADM-IMS. • Allocate the adequate resources for obtaining the necessary resources for IMS.

Process of Understanding Energy Consumption & Use:

Satisfactory measurement, metering and data capture systems are vital to facilitate energy management efforts and for current and future energy reporting. Developing metering and data analysis systems at ADM is an iterative process.

Understanding energy performance & its effective reporting relies on the availability of good data & sound analysis. This requires availability of an effective energy Metering, Monitoring & Targeting (MM&T) procedure/process/system at ADM to enable the easy production of suitable reports based on reliable information. MM&T is an integral & important part of ADM's EnMS & actions. ADM MM&T may be used to identify opportunities for energy saving through a number of techniques, including; examining energy demand during out-of-hours periods (e.g. overnight and weekends), statistical analysis of data, & implementing automatic exception reporting to flag when energy use falls outside expected norms. Analysis of energy use & consumption is being based on measurement & other data that has been collected and gathered. Monthly, quarterly, & annual consumption and / or generation data information are compared for any increase and or any decrease in consumption trends. Comparisons of consumptions & / or generations are made over a fixed period of time and or the same duration for different years. Evaluation of past & present energy use & consumptions where annual consumption is logged and compared from one year to another to note any increase or decrease in the consumption.

Supporting of EnMS to the strategy and targets in ADM:

Objectives and targets are outputs of the ADM Energy review process. Commitment of ADM top management for setting, monitoring & achieving EnMS objectives & targets are the main contents & pillar of ADM energy strategy & policy. ADM objectives & targets are revolving around achieving ADM business strategy with minimum energy cost, improving its energy performance, saving energy, reducing energy consumption, & minimizing environment impacts & ADM carbon foot print, securing energy supply, improving energy usage through energy efficiency & exploring for application of renewable energy.

EnMS in ADM is implemented for one site not multiple sites.

Quote:

“Granting the ISO 50001 accreditation & retaining it, is the valuing & appreciation of ADM's role & programs in energy management leadership & its implementation of the best international practices in this domain.” by ADM EHS Department Management.

Do, Check, and Act

Implementation Plan/Process:

ADM Energy Management Action plan is established & developed at the minimum along with the following guidelines; shall focus on achieving specific improvement in energy efficiency or on achieving improvements in overall energy management, shall demonstrate for each goal the corresponding energy objectives, & shall determine for each action, the Implementation timeframe, & designate the responsible person or department for implementation with the energy management team. The energy management team is conducting regular quarterly meetings to review & follow-up the EnMS implementation plan progress & achievement. ADM utilized its own financial resources for the establishment, development & implementation of the EnMS ISO 50001:2018. The finance resources obtained from the annual budget which allocated by Abu Dhabi Government through the Department of Finance (DOF). The energy performance indicator is the 4 % reduction of the consumed electricity in KWh significantly used air-conditioning & lighting in ADM in 2021. The high-level equations that were used to estimate energy savings/improvement is *(Total Consumption of Electricity in 2020 in KWh minus the Total Consumption of Electricity in 2021 in KWh then Dividing the Result by the Total Consumption of Electricity in 2020 in KWh and Multiply the Final Result by 100 %)*. Then the saving of the electrical energy in KWh is multiply by the electricity rate or tariff (AED 0.297) of the electricity distribution company (Abu Dhabi Distribution Company, ADDC) to get the final saving in UAE Currency then converted to \$USD (1\$USD = AED 3.68). No normalization methods were in ADM to convert the consumption of electrical energy to other form for instance KWh

consumed per square meter area or per person/employee. The human resources used in this process are the member of ADM energy team in addition to the technical staff (electrical engineers & electricians & mechanics) of ADM operations & maintenance contractor. Tools used are those electric instruments & devices related to electrical energy parameters, temperature, pressure & AC, e.g. Voltmeter, Ammeter, Thermocouples, temperatures switches & gauges, pressure switches & gauges, flow meters & electrical meters (which read KWh).

Motivation & Support of ADM Top Management to EnMS implementation:

ADM HSE Department Manager & energy management team chairperson meets regularly with the Executive Director to review & approve the EnMS, policy, objectives & targets, KPIs, and audit results, ongoing training requirements, and legal requirements. ADM top management demonstrates leadership and accountability to EnMS and provides all the necessary resources for the it as described in the policy. HSE Department Manager is part of the energy management team and she is chairing it and attends its regular meetings to demonstrate leadership and the importance of providing support & presence on the spot. In addition to that, direct inputs are provided form top management during the planned progress energy management meetings, KPI program reviews, and ADM Forums.

ADM launched in March 2023 “Innovation Week” as part of an ongoing effort to promote the innovation, creation, talents, & knowledge with special emphasis on energy management, renewal energy & sustainability. This event includes forum, workshops, exhibition, & networking. During the exhibition of this event there were very ambitious innovative projects & initiatives in the aspect of energy management & sustainability which are currently implemented in Abu Dhabi City, these innovations such as:

- Noor Abu Dhabi Project: Utilizing of LED smart lighting in streets lighting in Abu Dhabi City streets & roads.
- The Use of recycled asphalt aggregates as subbase in road construction works.
- Application of rubber asphalt concrete in Abu Dhabi City roads pavement.
- Using of Virtual Reality (VR) & e-learning (online) in training and education for ADM employees & its interested parties (contractors & consultants) which really impacts & reduces the fuel consumption used in transportation which leads to minimization of the GHG emission and carbon print.

Key Activities List which Identified & Implemented in the Plan that Improved Energy Performance List:

- Smart lighting by utilizing of LED lighting in Abu Dhabi City streets & roads (Noor Abu Dhabi Project).
- Solar power generation panels system in ADM main building and SCADA building with 1% production capacity from the total electricity consumption of ADM.
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emission reduction of 301,849.64 metric ton in 2021. Variables which affecting the energy consumption are the total number of the ADM employees occupying the offices and the ambient temperature specially during the peak summer months.

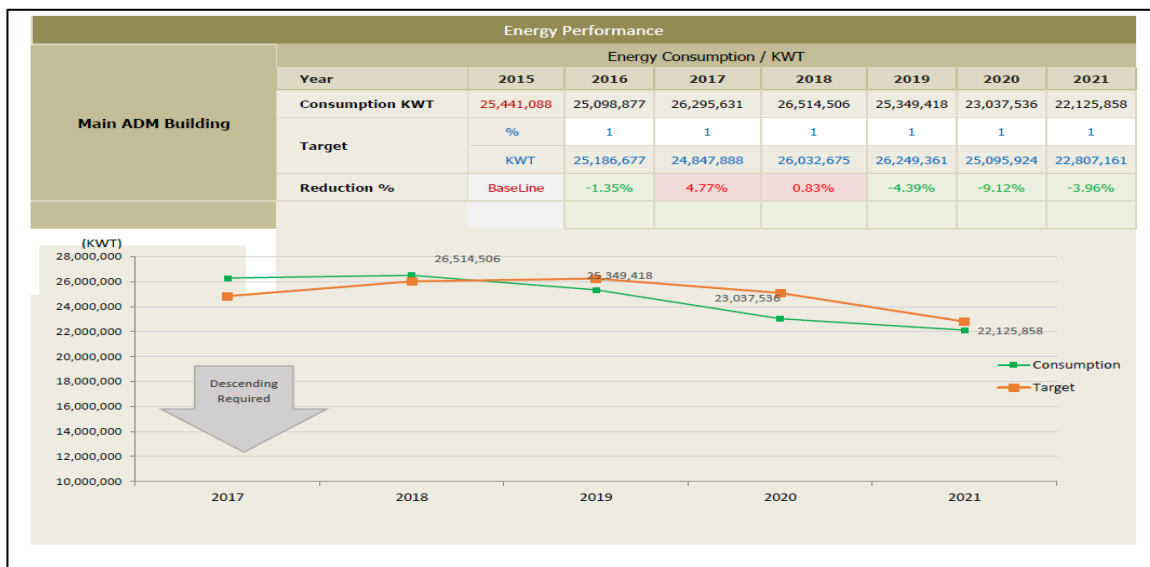
Transparency

The accreditation of ADM EnMS toward 50001:2018 is announced publicly in the social media through ADM official media channels e.g., Instagram, Facebook, & Twitter. Also the Department of Marketing & Corporate Communication in ADM is doing tremendous effort by marketing the EnMS ISO 50001:2018 accreditation through press articles and during relevant events & occasions e.g. Abu Dhabi Sustainability Week, Abu Dhabi Emirate Annual Future Energy Summit & Conference, Abu Dhabi International Petroleum Exhibition & Conference, and joint event with non-governmental organizations e.g. Abu Dhabi Environment Friends Society, Emirates Environment Group & Green Business Network.

What We Can Do Differently

ADM can do it differently by get benefits from the learned lessons through the journey of developing, implementing & accreditation the EnMS. These learned lessons such as; difficulties of coordination with utilities providers' authorities (ADDC & ADNO FOD), weak knowledge & awareness about the EnMS in particularly among contractors & suppliers, ambiguity concerning energy legislation & legal requirements, changes of processes & procedures related to EnMS, & organizational structure changes encountered in ADM. As the nature of business for ADM is mainly services provider rather than products provider, there are difficulties and challenges for conducting the energy reviews and analysis. Decentralization of the services offered by ADM to the community of Abu Dhabi City increases the efforts, resources, works, times for establishing and developing and implementing EnMS.

Our next steps in EnMS ISO 50001 is to maximize the capacity of the energy generated by solar power generation panels system through benchmarking and MoU with Abu Dhabi Future Energy Company (MASDAR). Also, ADM is Intending to go for LEEDS accreditation of Maintenance and Operation for its Head Quarter Building in Abu Dhabi City. In addition, ADM is intending to prepare & development Sustainability Repot according to the GRI Standards which shall contain all its EnMS programs, projects & initiatives.

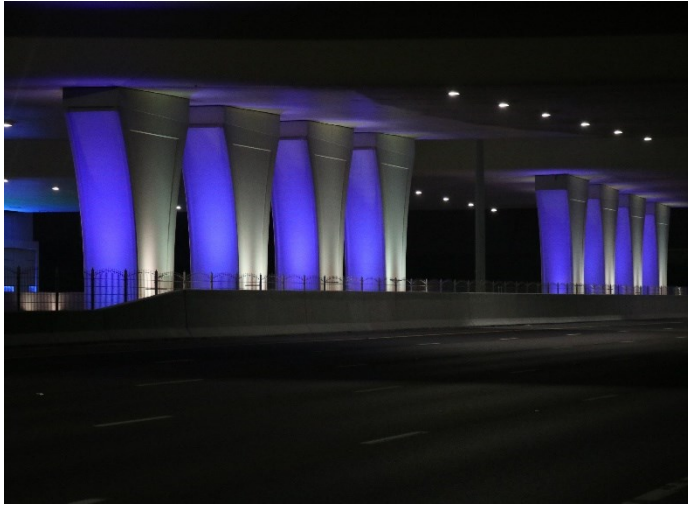


Energy Performance in ADM

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LED Lighting in Abu Dhabi City Streets



LED Lighting in Abu Dhabi City Pedestrians Bridges



LED Lighting in Abu Dhabi City Streets



Conventional Lighting in Abu Dhabi City Streets



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.