

Abu Dhabi Distribution Company

ISO50001: delivering results in house and helping to build a successful efficiency programme amongst key customers.



Figure 1: ADDC's HQ in Abu Dhabi

Case Study Snapshot	
Industry	Utility Sector
Product/Service	Electricity and Water Distribution
Location	Emirate of Abu Dhabi, United Arab Emirates
Energy performance improvement percentage (over the improvement period)	Absolute cumulative reduction up to 2023 vs 2015 baseline of: 16.8% overall, made up of 18.7% for buildings electricity and 21% for vehicle fuel. 11.7% reduction in losses from replaced transformers from 2019-2023 vs 2018 baseline. The 2.8% savings for ADDC industrial customer energy in 2022 vs 2021 baseline are not included.
Total energy cost savings (over the improvement period)	USD 8,008,974 for ADDC consumption reduction, USD 3,106,076 for industrial customer consumption reduction.
Cost to implement Energy Management System (EnMS)	USD 180,058
Total energy savings (over the improvement period)	128,108 MWh ADDC savings, 39,858 MWh savings amongst industrial customers assisted.
Total CO ₂ -e emission reduction (over the improvement period)	31,724 metric tonnes Scopes 1 & 2, plus 64,474 Scope 3 (amongst cable suppliers), and 10,602 tonnes Scope 4 (amongst ADDC's industrial customers who were assisted with EnMS).

Organization Profile / Business Case

Abu Dhabi Distribution Company (ADDC) is responsible for the distribution and sale of electricity and water in the city of Abu Dhabi, its surrounding areas and the Al Dhafra region. It is a subsidiary of Abu Dhabi National Energy Company (TAQA) and within the license set by the Department of Energy (DoE), working side by side with other companies in the group to operate the water and electricity supply chain in Abu Dhabi.

ADDC's vision is "To be a leading digital utility that delivers reliable and sustainable value to customers through empowering our people", and we have two overarching corporate goals for improving sustainability:

- To deliver operational excellence through world class, safe, resilient and environmentally sustainable operations.
- To deliver customer delight with smart and sustainable services, empowering customers to sustainably rationalize consumption.

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Our goals align with those of our parent company, TAQA Group, to safeguard resources, deliver demand side management, be efficient in energy and natural resources, have sustainable supply chains and responsible procurement. Our target to achieve a 25% per capita cut in buildings and vehicle energy by 2023 is aligned with TAQA's goal to reduce Scopes 1 and 2 CO₂ by 25% by 2030.

The strategic drive towards energy efficiency began in 2013/14, when our regulator put an incentive on us to develop a Demand Side Management (DSM) Strategy to rationalize consumption amongst our customers. Our strategy was delivered in 2015, and our Executive Team was motivated to request that our Health, Safety and Environment (HSE) to develop our own energy management system (EnMS) in 2016. The success of this initial work led our HSE Team to develop a business case for accreditation to ISO50001 based on the potential for significantly larger savings and benefits. The CEO and Main Board embraced this proposal and ordered that the EnMS should be embedded in our corporate strategy, based on its ability to break down internal barriers and to engage with staff and customers.

The measurement and management of greenhouse gases (GHGs) and other sustainability impacts is an integral part of the EnMS, and we use it as our framework for assessing and managing the technical aspects of sustainability initiatives. Because the EnMS system covers all our sites and operations and the Energy Management System Committee (EnMS Committee) is cross-functional, it has helped us to break down internal silos and support other initiatives such as service improvement, digitalization and procurement. We motivate our staff by embedding energy and carbon goals into role descriptions and KPIs, with bonuses of up to 8.5% of salary for those who deliver well. Our "Fekrah" staff suggestions scheme also rewards and recognizes ideas for energy and GHG improvement that are implemented.

Our regulatory framework provides us with a direct incentive to help our customers to cut their energy use, and we realized early on that our insights into ISO50001 implementation could assist our industrial customers. International case studies show that suitable assistance can help industries to easily reduce energy and carbon by at least 10 - 15%. We collaborated with the Abu Dhabi Department of Economic Development (DED) in mandating the adoption of EnMS in return for being awarded an energy discount in the DED's industrial Energy Tariff Incentive Program (ETIP). ADDC then provided industries with ISO50001-based EnMS training workshops and detailed systems templates, helping them build business cases for improving efficiency and to compete in new export markets for green products.

“Achieving and maintaining our ISO 50001 accreditation and integrating it with our customer outreach not only embodies our commitment to energy efficiency, but is also the cornerstone of our alignment with the UAE's 2050 Net Zero Strategy. Our journey to meeting this international standard has helped us to meet our parent company's goals and highlights our dedication to excellence on a global scale.”

—AbdulAziz Al Shamsi, Executive Customer Services Director, Abu Dhabi Distribution Company.

Business Benefits

ADDC's experience of implementing ISO50001 is that the EnMS necessitates working across multiple sites and functions, bringing together staff with different skills, breaking down internal barriers and promoting holistic thinking. It supports business efficiency programs of all types, and engages us with customers and stakeholders, including our regulator. It has engaged staff with our corporate goals, helping our people to see that ADDC is serious about change of all types and has built support for all our initiatives. Staff now provide many energy and sustainability ideas into our "Fekrah" suggestions scheme, where they can win bonuses for successful implementation.

Our EnMS assesses opportunities across all operations and activities. The tools and systems needed for an ISO50001 EnMS have made it the best framework to measure, analyze, manage and reduce of all categories of GHGs as it efficiently identifies and targets significant areas of resource consumption. We have extended it to deal with direct emissions from equipment and indirect emissions in our supply chain. The ISO50001 protocols, combined with the

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breadth of knowledge of our EnMS Committee has proven useful for technically assessing other sustainability and supply chain initiatives. Our improved capabilities for GHG measurement and accounting has enabled us to better work with our supply chain to bring us cleaner, more efficient solutions, such as high efficiency transformers, green transformer cooling fluids, SF₆ – free switchgear and copper-free cables.

As our EnMS accurately measures the benefits delivered, the business case for recertification is always very strong, based on maintaining the momentum of savings, delivering future reductions, and protecting our reputation. The business case is continually strengthening based on our growing track record of benefits already delivered. We are also starting to quantify non-energy benefits, including staff time savings and control of environmental and reputational risk, driving for even deeper changes.

Going beyond ADDC's boundaries, our experience with the ISO50001 system was vital in helping us to develop our innovative ISO50001 industrial training initiative, delivering not only regulatory compliance but also a leading example of international best practice in EnMS promotion and uptake. We required Abu Dhabi manufacturers to adopt ISO50001 compliant EnMS' in return for energy subsidies, and have supported them with tools, training workshops and ISO50001 systems templates, balancing the requirements of the subsidy against the capacity of new adopters to build new EnMS'. Our 60 largest factories now have EnMS aligned with ISO50001, and key outcomes include:

- Increasing the percentage of sites with energy managers from 24% to 100%.
- Increasing the percentage of sites with an energy survey from 39% to 100%.
- Increasing the number of sites certified to ISO50001 from zero in 2019 to 6 in 2023.
- Factories saved 2.8% of their electricity in 2022, worth \$3,106,000, and reducing CO₂ by 10,602T.

Benefits in energy, GHG, financial and qualitative terms are summarized in Table 1. We have not quantified staff time savings, as we usually deliver more service with the same resource. However our improved logistics and electronic meeting initiatives definitely save staff time, and our systems and EnPIs are being adapted accordingly.

Table 1: Business Benefits Delivered by our ISO50001 EnMS System.

Initiative	Energy savings	GHG savings	Cost savings	Other benefits
Buildings energy savings	28,419,135 kWh	8,380TCO ₂ Scope 2	\$1,524,774	Improved staff comfort, credentials.
Fleet fuel savings	63,482,335 kWh	15,209TCO ₂ Scope 1	\$4,511,086	Improved staff driving skills.
Low loss transformers	36,207,000 kWh	8,135 TCO ₂ Scope 2	\$1,973,115	Reduced network losses and good publicity for innovation.
Aluminium cabling	None.	64,474 TCO ₂ Scope 3	\$401,683,787	Improved safety during installation.
SF ₆ -free switchgear	In progress	In progress Scope 1	In progress	Lower maintenance costs and good publicity for innovation.
Green oils in transformers	In progress	In progress	In progress	Reduced environmental spillage impacts.
Industrial customer EnMS training	39,857,689 kWh customer energy	10,602TCO ₂ Scope 4	\$3,106,000	Improved customer relations and insight into demand.

“ADDc’s ISO 50001 initiative for our industrial customers and experience of EnMS has helped us to better understand our customer’s needs and to train them to improve their energy efficiency.”

—Dr. Mohamed Al Hosani, DSM Department Manager

Plan

ADDC's strategic EnMS planning approach was developed in 2015/2016 based on an appreciation of the financial and carbon value at stake. It was natural for us to plan our initial EnMS guided by the ISO50001 standard process, as it offered a clear framework for organizing our thinking, activities and documentation. We initially established our organizational context and policy options and considered the risks and opportunities amongst legislation, stakeholders, our infrastructure and operations, and our existing strategic corporate drivers. This was combined with development of boundaries and scope, which informed the development of our draft energy policy. Our initial findings, scope, overview of energy use, significant energy uses and estimates of savings based on international case studies was discussed with our Executive Team as a high level business proposition. Based on this, the Executive Team gave firm allocation of resources for setting up the EnMS and their direct support during the formal energy review and in establishing the EnMS governance structure. The Head of Safety, Health and Environment (HSE) was appointed as Energy Manager ("EM"), reporting directly into them. The Executive Team subsequently reviewed and accepted the detailed findings from the planning process, including stakeholder needs and expectations (based on interviews), legislation (with an update of the ADDC Legislative Register) and likely legislative developments, the internal and external strategic landscape, the proposed baseline, significant energy uses, detailed objectives, the performance gap analysis, EnPIs and targets, policy and proposed improvement plans. Improvement plans were then prioritized based on simple payback, implementation risk and capital availability. They were then submitted for Executive Team approval and built into the ADDC resourcing plan and budget for 2016. The initial working EnMS was built by the EM and EnMS team, while the EnMS Committee was established later to bring together all ADDC functions, operations and buildings for coordinating action and to consider more complex energy and GHG measures, such as the design of future buildings and revised supply chain procurement policies.

The good results from 2016 provided firm data for the business case for ISO50001 certification, based on projections of viable savings. The Executive Team accepted this in 2017, and instructed that the goals, EnPIs and EnPI values should also be formally incorporated into the ADDC corporate strategy, and it is now incorporated into our latest 2026 strategy. This, combined with our Executive's ongoing commitment, ensures that energy management is integrated into ADDC's business processes, helping to prioritize energy efficiency initiatives. The Executive Team continues to support our plan by ongoing allocation of resources and openly endorsing the EnMS and policy in meetings and events at all levels of the organization.

We are now seeing the longer term value of our integrated strategic planning approach using the ISO50001 framework, for example identifying that the UAE's rapid grid decarbonization combined with fleet electrification can deliver deep GHG savings, or the beneficial impacts that we can deliver in the operations of our customers and supply chain.

Each year the EnMS Team carries out an ideation process to develop new ideas for energy and GHG savings, gathering ideas from employee suggestions, web research and observations of operations. Viable initiatives are gathered into the EnMS planning cycle and developed into outline business cases by the EnMS Team, working with relevant members of the EnMS Committee to ensure that they are fit for purpose. The surviving business cases are prioritized based on payback, GHG impact, risk and demand for resources, and are submitted to the full EnMS Committee for vetting and approval. The final prioritized projects are then submitted to the Executive Team, and if formally approved are then built into the Annual EnMS Plan. Initiatives in the Annual Plan then enter the ADDC Planning Process for assignment of human and financial resources, and detailed execution planning in our AMPLIFY project management system.

The Annual EnMS Plan also addresses changes identified from our annually updated risks and opportunities study, annual internal audits, surveillance audits, our annual review of EnMS target delivery and initiative progress. It is our core plan for driving continuous improvement.

Our planning process also allows for ad hoc opportunities that arise outside of the formal planning cycle, with a system to modify the Annual Plan to reflect these. We gather new ideas continually, and some are suitable for immediate implementation, rather than putting them off until later. Many such opportunities come from employee participation

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in our employee suggestion scheme, “Fekrah”, which provides rewards for suggested initiatives that are implemented. Any new ideas on energy and GHGs are fed into the EnMS Committee for consideration and prioritization.

Our corporate training plans include energy and greenhouse gas awareness, providing compulsory or voluntary training as appropriate, and have proven effective in stimulating staff interest in our EnMS and efficiency suggestions scheme.

Figure 2: Absolute kWh Savings in Vehicle Fuel and Buildings from 2015 Baseline

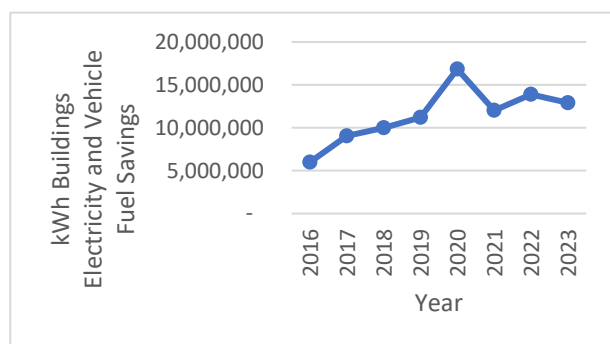
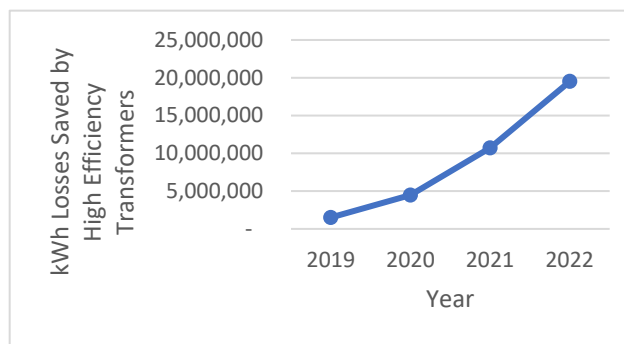


Figure 3: Absolute kWh Savings from High Efficiency Transformers against Original Equipment Baseline



While our engagement with customers to improve their efficiency also started in 2015 as part of our regulatory obligations, it was in 2019 that we started collaborating with the Abu Dhabi Department of Economic Development (DED) and planned to use their Industrial Energy Tariff Incentive Program (ETIP) to promote energy efficiency. We built a requirement for industries to have an EnMS in order to receive the subsidy. From the start we identified that imposing large EnMS burdens from the start would be likely to cause push back, and planned to prevent this by combining progressively tightening EnMS standards with assistance to reduce the demand on resources. Our ISO50001 experience enabled us to plan that progression, matching it to industry capacity. We developed a five year plan that moved from very basic systems in year 1 to ISO50001 aligned systems in year 5, while providing ever-more sophisticated systems templates and over 300 training workshops. This has greatly accelerated adoption of industrial EnMS in Abu Dhabi, building capacity to build stronger business cases and justify deeper investment.

“The structured approach of an ISO 50001 EnMS has really helped us to organize our improvement programme and take our sustainability journey to the next level.”

—Mohamed Abdel Maguid, HSE Department Manager

Do, Check, and Act

The EnMS was implemented by the EnMS Team, led by the EM, who also leads the EnMS Committee. The EM reports to the Executive Team on energy and GHGs, and on the use of internal and external resources provided by them.

Approved initiatives from the planning process are contained in the EnMS Annual Plan approved by the Executive Team, addressing ongoing and planned initiatives, and improvements suggested from the previous year’s EnMS review. The plan contains a summary table of all initiatives and improvement activities in a trackable format and is the high level reference against which operational progress is measured. Initiatives are owned by the relevant managers in ADDC’s operations, who have developed their execution plans for them in collaboration with the EnMS Team. Work and progress is controlled and monitored within ADDC’s AMPLIFY project management system, with the EnMS Team and Committee overseeing progress.

As well as through oversight of the implementation of specific initiatives, operational control is exercised by the EM and EnMS Team monitoring energy consumption and GHG emissions, and inspecting and surveying buildings, systems

and operations. They use a simple gap analysis and summary to report overall operational effectiveness to the EnMS Committee for discussion and development of site and operational level corrective action plans. The arising high level reports are provided to the Executive Team every month.

The EnMS Committee meets quarterly in person to review consumption and progress against the annual plan, based on the monthly reports, and develops the detailed materials that the EM will present in person to the quarterly Executive Team EnMS update. The EM will use this Executive Team update to gain direct support as required to ensure that momentum is maintained and necessary corrections are prioritized. Coordination between different corporate functions and sites involved in more complex project is ensured through the representative membership of the EnMS committee and the fact that action plans are owned down to the site and operational unit level. For example, the committee members from Shared Services manage ADDC's buildings and coordinate and spread knowledge and best practice across our estate. This multisite coordination is vital in spreading best practice quickly and developing common solutions for removing obstacles to progress. The EnMS Committee also plays a strong role (assisted by its Media and PR Department members) in communicating to staff and customers on energy and GHG issues, through mediums including bulletins, virtual training by DSM specialists, labeling campaigns such as for eliminating plastic bottles, Ramadan campaigns for customers, new employee orientation, and our corporate newsletter

All EnMS elements and outcomes are validated and verified by annual first party internal audits, which the EnMS Team prepares for via a review of the EnMS system and corrective action follow-ups. Internal audits are verified through surveillance audits by our ISO50001 assessor, and results are reported directly to our Executive Team.

Motivation is maintained by the fact that the Executive Team has built EnMS targets into our 2026 Corporate Strategy goals which cascades down to Departments and staff KPIs. Outcomes from the HR performance management system are then tied to staff bonuses, providing strong links and incentives to deliver our EnMS goals and targets.

ADDC has a formal staff training strategy and plan, into which the EnMS training plan feeds. This now reflects new systems and efficient methods of work, such as building management systems, software for reducing travel, and new Standard Operating Procedures for aluminium cables and low loss transformers. The impact of training is monitored through staff feedback, operational KPIs, HSE statistics and direct feedback from managers and operatives.

Sustainability training is delivered by our own experts and has increased staff interest in our programme of change, covering EnMS, efficient buildings, vehicle efficiency and the hydrogen economy etc. Staff engagement with this training and subject matter is measured through satisfaction surveys, and monitoring shows that nearly 12% of suggestions into our "Fekrah" innovation scheme are now for energy and sustainability improvements.

Our ongoing consumption is monitored and analyzed based on the protocols that follow below.

- Our baseline period is 1st January 2015 to 31st December 2015, the first year prior to commencement of our EnMS and savings activities. Due to our 24 hour activities, ADDC has a large consumption base load for both electricity and vehicle fuel, which is taken into account in our normalization and EnMS planning and modelling. Buildings energy is influenced by weather, BMS settings, building quality and occupancy. Vehicle fuel use is influenced by fleet efficiency, network length, logistics planning and provision for effective electronic meetings.

Buildings energy savings are estimated through the following high level equations/processes:

- Building metering data obtained from ADDC's Customer Care and Billing System ("CC&B") and assigned to buildings. Figures are linearly corrected for meter read date vs. calendar date.

$$\text{Total Building Electricity in Month} = \sum_{\text{Day}=1}^{\text{Day}=28,29,30 \text{ or } 31} (\text{kWh Meter1} + \text{kWh Meter 2} \dots \text{kWh Meter N})$$

- kWh are linearly regressed against degree days during the 2015 baseline subsequent annual consumption is corrected against a cooling base of 10°C.
- Savings in each year computed by subtraction of corrected consumption from baseline consumption.

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- Per capita kWh consumption calculated by dividing corrected consumption by headcount numbers supplied on request by Human Capital Directorate.
- Annual Scope 2 CO₂ emissions and savings are calculated from respective annual energy and delivered CO₂/kWh figure from EWEC, adjusted for distribution losses taken from ADDC's regulatory submissions.

Vehicle fuel energy savings are estimated through the following high level equations:

- ADNOC fuel station transaction data obtained from our Maximo financial data tracking system.
- Litres purchased data assigned to calendar months and year.
- Savings each year calculated by subtraction of annual consumption from baseline figure.
- Vehicle kWh consumption computed by combination of litre consumption with kWh/litre conversion factor supplied by UK Department of Energy and Climate Change conversion factors and DUKES database.
- Per capita vehicle kWh consumption and savings are calculated by dividing corrected kWh fuel consumption by headcount numbers supplied on request by Human Capital Directorate.
- Vehicle CO₂ emissions calculated by combining litres consumed with CO₂/litre conversion factors from UK Department of Energy and Climate Change conversion factors and the DUKES database.

Greenhouse gas reductions are measured based on international best practice and the previous experience of the EnMS Team members. The GHG constants and calculation protocols are taken from reputable sources including the United Nations, World Resources Institute, National Governments, and industrial representation bodies.

We carry out reviews to ensure the continued effectiveness of our EnPIs. An example of this is that vehicle fuel savings have levelled off in recent years as our network length has expended faster than our headcount. The vehicle fuel target will now be revised to include suitable normalization for network length, rendering it more reflective of operations.

Table 4: Buildings Electricity and Vehicle Fuel Targets and Outcomes

Category	Target per capita	2015 baseline	2023 Per Capita Actual	2023 Absolute Actual
Buildings Electricity	25% cut by 2023	7,686kWh/capita	35% cut, 4,997kWh/capita	28%
Vehicle Fuels	25% cut by 2023	15,297kWh/capita	27%, 11,127kWh/capita	20%

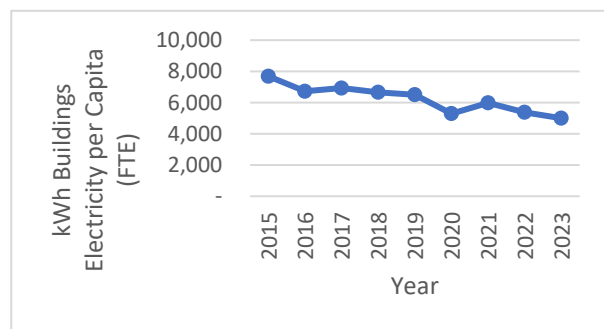


Figure 4: Per Capita Buildings Electricity kWh

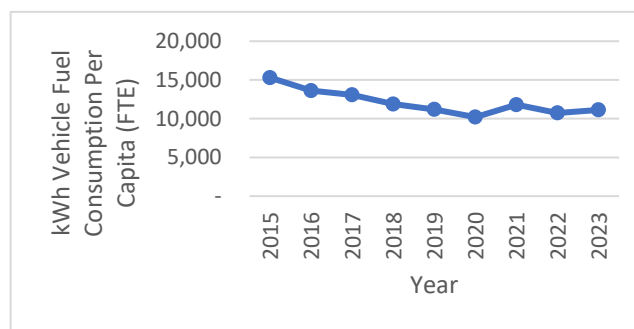


Figure 5: Per Capita Vehicle Fuel kWh

Our improvement of network transformer efficiency was not originally built into EnMS targets, but this is being included as we revise our targets to improve their applicability as mentioned above.

A key area for change has been our procurement system, due to the large influence on both our own energy consumption and GHG emissions, and those of our suppliers. Changes to supplier specifications have been driven by EnMS members from procurement and approved by the Tender Committee. This has included specifying low loss

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distribution network transformers, specifying aluminium distribution cables, reducing costs and delivering Scope 3 supply chain GHG savings, and the first Middle East Region specification and trial for SF₆-free switchgear.

For our industrial EnMS acceleration program, annual formal checks of documentary evidence against written criteria ensure that industrial sites conform with EnMS requirements as a condition of them receiving their incentive tariffs. The criteria and the format of the checks ensure that the sites would be in a good place to achieve ISO50001 accreditation for their EnMS. Sites report savings from existing measures and their plans for the next year. This is combined with their throughput and energy consumption records, allowing us to assess and cross check their continual improvement, as in table 3. We also monitor satisfaction scores from our industrial workshops to ensure quality, and gather requests to inform the ongoing design of our training programmes.

Table 3: Electricity Savings on Industrial Sites Assisted by ADDC.

Category	Planned Savings for 2022 as Stated by Sites	Delivered Savings in 2022 as per Abu Dhabi EM & V Protocol	Additional Savings Planned for 2023 as Stated by Sites
kWh savings	34,681,092	39,857,689	63,764,189
Power cost savings	\$2.7M	\$3.1M	\$5.0M
Tonnes CO ₂ savings	9,218	10,594	12,147

Transparency

Our EnMS is publicized on our website (<https://www.addc.ae/en-US/distribution/Pages/Safety-Policy-and-certifications.aspx>). We also publicize the benefits of ISO50001 via our training workshops and our extensive series of training slideshows, available online on: [Home – Business ETIP: Energy Tariff Incentive Programme \(addc.ae\)](#).

We also publish our EnMS results consolidated within the TAQA Group Annual Sustainability Report.

Industrial consumption savings are calculated in compliance with the Abu Dhabi Evaluation, Monitoring and Verification Protocol, assessed by an independent accredited third party evaluator, then reported to our regulator.

What We Can Do Differently

Based on experience, in hindsight we would have done things differently and improved our approach as follows:

1. Incorporate more staff with dedicated energy skills into our EnMS team and EnMS Committee.
2. Give more regular updates to ADDC staff on our EnMS, improving their engagement.
3. Deploy more information on our website and social media to publicize our achievements.
4. Have a more compact EnMS Committee and ensure regular attendance more rigorously.
5. Develop a counterfactual energy savings reporting tool to present business benefits to senior management.
6. Develop audit tools to assist our industrial partners to check and improve their energy management systems.
7. Revise procurement terms in one go to more quickly force suppliers to build efficiency into our purchases.
8. Build in reductions in Scope 3 GHGs at our suppliers and Scope 4 GHGs at customers whom we advise.

We are now working to incorporate all eight of these improvements into our EnMS and associated systems.



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.