

Ras Al Khaimah

First government entity certified in the Emirate of Ras Al Khaimah



Ras Al Khaimah Municipality team receiving ISO 50001 certificate

Case Study Snapshot

Industry	Other - Government
Product/Service	Provision of building permits, site inspections, and related government services.
Location	Ras Al Khaimah, United Arab Emirates.
Energy performance improvement percentage (over the improvement period)	14.4% electricity savings at the end of 2 years
Total energy cost savings (over the improvement period)	USD 57,700 (equivalent to AED 211,884 from electricity and water savings over 2 years)
Cost to implement Energy Management System (EnMS)	USD 48,100
Total energy savings (over the improvement period)	4,189 GJ (1,163,748 kWh of electricity over 2 years)
Total CO₂-e emission reduction (over the improvement period)	472 metric tons (from 1,163,748 kWh electricity savings over 2 years)

Organization Profile / Business Case

Ras Al Khaimah is the fourth-largest emirate in the United Arab Emirates, occupying an area of 2,478 km² with a population of about 400,000 residents. The emirate is governed under the leadership and guidance of His Highness Sheikh Saud bin Saqr Al Qasimi, UAE Supreme Council Member and Ruler of Ras Al Khaimah, and His Highness Sheikh Mohammed bin Saud bin Saqr Al Qasimi, Crown Prince of Ras Al Khaimah and Chairman of the Executive Council.

Ras Al Khaimah is undergoing a remarkable transformation and growth in multiple sectors of its economy. Energy and water are central to the policy agenda of the government under Ras Al Khaimah’s Vision 2030 as well as the UAE energy and sustainability strategies and wider vision. In 2018, the Energy Efficiency & Renewables (EE&R) Strategy 2040 was adopted in Ras Al Khaimah to support the competitiveness of its economy through efficient energy use and cost-competitive, available and reliable energy supply. The EE&R Strategy targets 30% energy savings, 20% water savings and 20% contribution from renewables by 2040 from a 2017 baseline. It comprises nine programs, which are briefly described in Figure 1 and more information about it is available on www.reem.rak.ae.

The Energy Management Program of the EE&R Strategy, aims to promote systematic energy management practices such as ISO 50001 across high-energy users, including industries as well as commercial and government entities in Ras Al Khaimah. The EE&R Strategy targets implementing such energy management systems in at least 30 high-energy users by 2040.

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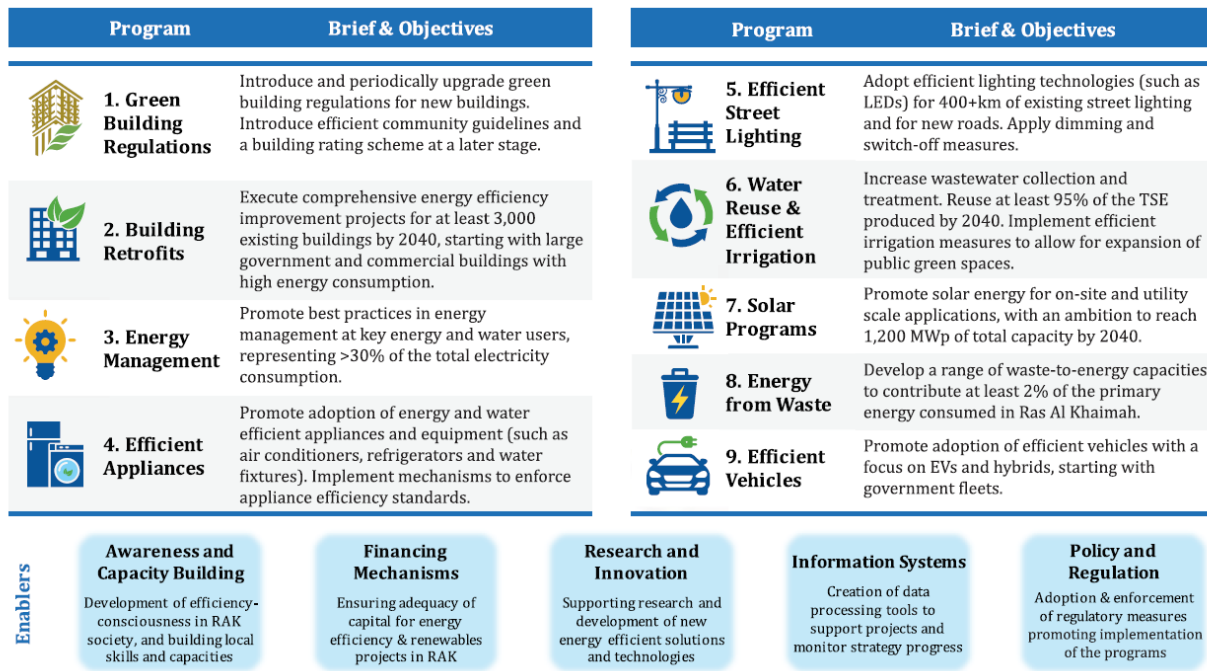


Figure 1 - EE&R Strategy Programs

The EE&R Strategy envisages the government as a leader and champion in adopting energy efficiency solutions and so the government adoption of building retrofits and energy management was mandated through a directive. The Amiri Resolution No.15 of 2018 sets an overall target of 20% energy and water savings by 2022 for the entire Government of Ras Al Khaimah from a 2017 baseline. The Energy Efficiency and Renewables Office (Reem) in Ras Al Khaimah Municipality was tasked to coordinate the EE&R Strategy implementation.

The Government of Ras Al Khaimah consists of 23 entities, covering different local government functions such as the municipality, public infrastructure, environmental protection, customs, museums, economic development, etc.

In particular, Ras Al Khaimah Municipality activities focus on the provision of building permits, site inspections and related government services. The Municipality operates 10 buildings comprising the main office (HQ) to which a Customer Happiness Centre was added in 2020, the Public Health Department offices and labs, 2 abattoirs as well as the common areas of 6 markets and 1 set of co-located retail stalls.

“The ISO 50001 certificate awarded to the Municipality is the first step in achieving the certification for the broader Government of Ras Al Khaimah and we look forward to supporting other entities in achieving this kind of recognition”

H.E. Munther Mohammed bin Shekar Alzaabi, Director General of Ras Al Khaimah Municipality

Business Benefits

Ras Al Khaimah Municipality was selected as a test-bed for the Building Retrofits and Energy Management programs of the EE&R Strategy because it hosts Reem, which is the center of energy efficiency expertise in the government.

As a leading entity for these programs, the Municipality assessed the feasibility of retrofitting some of its buildings and signed its first Energy Performance Contract (EPC) with an Energy Services Company (ESCO) in 2018. The EPC guarantees 29.3% electricity and 46.0% water savings in the overall utility bill of the Municipality HQ, without the yet-to-be-built Customer Happiness Centre, the Al Flaya abattoir and the lab buildings of the Public Health Department

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from a 2017 baseline. The main energy conservation measures (ECM) in the EPC address Heating Ventilation and Air Conditioning (HVAC) demand reduction and optimization, light replacement and water reduction.

With the initial steps done on the Building Retrofits program, the Municipality focused on the Energy Management System (EnMS) and started the EnMS planning activities in 2019. Monthly working sessions were scheduled and attended by the energy principals and teams of all other government entities who had been nominated to coordinate the EnMS implementation across the government.

In April 2020, and under a wide energy management initiative covering all 23 government entities, some quick wins were sought in the early stages of the EnMS implementation. The quick-wins initiative was launched because energy management was perceived by the government leadership as a tool to fight the economic difficulties caused by the COVID-19 pandemic. Hence, quick-wins in energy equipment, monitoring, and consumption behavior were prioritized for immediate deployment, with implementation of the full EnMS postponed for a later stage as shown in Figure 2.

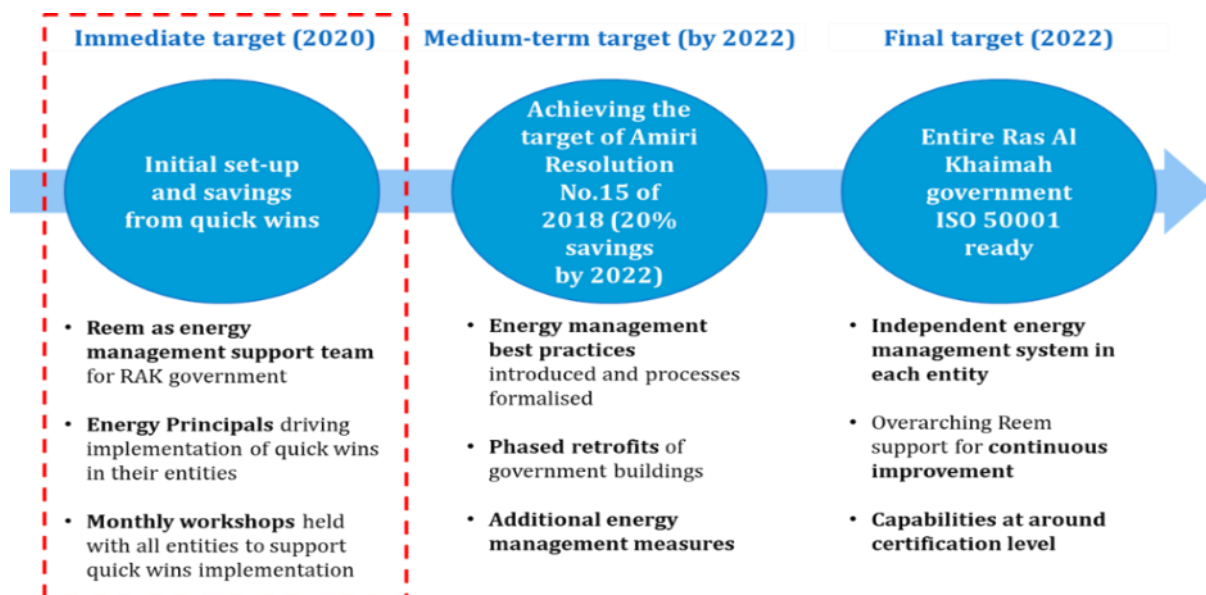


Figure 2 – ISO 50001 implementation and task timeline

The implementation of these quick wins achieved 8% energy savings when comparing the summer of 2020 vs. 2019, but, equally important, helped to establish a culture of energy management across the Municipality and the government.

Table 1 below presents the total unadjusted electricity and water consumption and costs across all Municipality buildings during 2019, the baseline year, 2020 and 2021. The total adjusted bill of both utilities went up, because of:

- The increase of electricity consumption in the markets due to the installation of additional HVAC equipment to ensure the comfort of public in 2019 and 2020.
- Additional consumption in the Public Health Department buildings due to their use for accommodation since the COVID lockdowns.

Table 1 also presents the adjusted consumption data. The adjustments included non-routine, such as the consideration of the additional HVAC loads for the markets using back-casting since the equipment has been operational for more than 12 months and some additional loads in the Al Flaya slaughterhouse which were established in the EPC measurement and verification (M&V) plan, as well as routine adjustments due to weather using liner regression of electricity and cooling degree days (CDDs). Non-routine adjustments were not made for the health center accommodation since a clear correlation between occupancy and consumption could not be established due to lack of data.

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Once the adjustments were made, Table 1 shows a reduction in electricity of 14.3%, although still a rise in water of 29.3% due to increased usage in the markets and the abattoirs as well as some monthly spikes in the HQ. Nonetheless, over the last 2 years, the Municipality has achieved an overall cost reduction of 4.4%.

Year	Parameter	Electricity (kWh/year)	Water (IG/year)	Cost (AED/year)
2019	Unadjusted baseline consumption	3,502,312	9,524,236	1,637,556
	Non-routine adjusted baseline	4,327,868	9,524,236	1,877,209
2020	Unadjusted consumption	3,756,953	10,355,886	1,740,532
	Routine plus non-routine adjusted baseline	4,299,961	9,524,236	1,869,342
	Savings (-)	-543,008	831,650	-128,810
	% savings (-)	-12.5%	8.7%	-6.9%
2021	Unadjusted consumption	3,865,564	12,318,180	1,873,531
	Routine plus non-routine adjusted baseline	4,486,304	9,524,236	1,956,604
	Savings (-)	-620,740	2,793,944	-83,073
	% savings (-)	-14.3%	29.3%	-4.4%
2020+2021	Cumulative savings (-)	-1,163,748	3,625,594	-211,884

Table 1 – EnMS performance summary

The majority of the savings are achieved because of the EPC. Nonetheless, the EnMS will bring significant additional business benefits to the Municipality because it provides a wider framework for energy savings in space, i.e. it covers more buildings than the EPC, and for a longer timeframe, i.e. it will continue after the EPC finishes (5 years).

As a result of the electricity savings in the past 2 years, around 472 tons of CO_{2eq} have not been emitted into the atmosphere. The grid emission factor used (0.406 kgCO_{2eq}/kWh) is the same as the last EE&R Strategy Annual Report.

To achieve the certification and prepare for the external audit, the energy principal and the team dedicated the equivalent to 0.3 full time employees (FTEs) of their time in the last year. They were supported by the Reem team with two junior resources, with a combined dedication of 0.5 FTEs, and some more senior resources with a dedication of around 0.1 FTEs. This resulted in approximate costs of AED 160,000. No extra monitoring equipment was required. In addition, the external auditor certification costs were circa AED 15,000.



Figure 3 – Energy Day participants

Most of these costs will be leveraged for future certifications since the lessons learnt with the EPC and the certification process in the Municipality are being transferred to the energy principals of other government entities during monthly meetings and even an annual “Energy Day” as shown in Figure 3. This knowledge has already been put into action with the signature of a government-wide EPC for retrofitting 46 buildings in 2019 that, although the

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last construction phase is still ongoing, has already started yielding savings to the government entities where the ECMs were implemented early in the project. Moreover, following the Municipality ISO 50001 certification path, there are a total of 10 government entities that are undergoing the EnMS certification process in 2022 with the remaining scheduled for 2023.

In addition to the implementation of ISO 50001 certification in the government entities, the performance of energy consuming equipment is also being carefully considered in the emirate due to the recently launched Green Public Procurement initiative. This has sparked an interest from manufacturers of renewable energy and energy efficient products and solutions to establish themselves, either inland or offshore, in the emirate. This is further supported by incentives such as waivers in annual business licenses fees leading to a blooming company ecosystem, which also includes energy auditors and ESCOs.

Plan

Following completion of the first Municipality buildings retrofit project in 2019, the implementation of an ISO 50001:2018 compliant energy management system (EnMS) was launched. After the short period where the focus was on achieving quick energy wins, the impetus was regained in early 2020. This was part of the Municipality's commitment to lead by example with regards to the EE&R Strategy implementation as requested by the leadership.

The Director General of the Municipality approved a newly created energy policy and appointed an energy principal with a team to lead all energy management activities supported by Reem. It was scheduled that all team members will meet monthly under the Director General's supervision.

The energy principal and team dedication was part time, whilst additional resources from Reem were devoted to the EnMS implementation albeit with the wider aim to support other government entities in the future. With regards to economic resources, a dedicated budget was allocated for the external auditor certification costs as well as for energy efficiency activities related to the EnMS implementation. The approval for investments in relation to the EnMS have always been sought through a strong business case. This was the case of the EPCs with the ESCOs as well as with the installation of a solar PV system in the Customer Happiness Centre carpark. In both cases, only a strong return of investment justified the disbursing of public funds.

As part of the planning process, a gap analysis was performed to compare the existing process with the ISO 50001:2018 requirements. Walkthrough energy audits of all Municipality buildings were conducted. Also, processes for consumption reporting, monitoring and review were put in place, including development of a bespoke energy model for the Municipality buildings.

In order to identify the Significant Energy Uses (SEUs) in the Municipality, the baseline consumption as well as the operation of the different buildings and activities of the Municipality were thoroughly analyzed. Based on the team's experience and the data analysis results, it was established that electricity was a SEU, driven by HVAC that represents between 60% and 70% of the total electricity consumption. Other SEUs were water consumption and fuel consumption. The latter was added during the last 2021 management review.

The initial targets of the Municipality EnMS were aligned with the Amiri Decree targets with an intermediate target of 10% reduction of electricity and water costs in 2021 from a 2019 baseline.

At this stage, it was also agreed that the Municipality's ISO 50001 certification had to cover all buildings operated by the Municipality as well as site inspections done by its employees. Despite the multiple building locations and activities, e.g. customer services, licensing, inspections, animal slaughtering, etc., they are all under the management of the Municipality's Director General so it was decided to develop a uniform EnMS for the Municipality as a whole.

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Do, Check, and Act

Once the plan for achieving ISO 50001 certification was launched, the energy principal and the team, with the support of Reem, got into action with monthly meetings held under the Director General’s guidance and encouragement. For each site, the monitoring and activities were coordinated by the energy principal with the team members and technical staff when necessary.

Whilst the majority of the savings were coming from the EPC, additional energy saving opportunities were constantly sought on HVAC and lighting on the demand side. These extra savings would come through small improvements, e.g. improved controls, lighting sensors, etc., but mostly through internal communication campaigns to minimize the use of energy focusing on air conditioning set points which were deemed to be the simplest and most efficient way to save energy. Since these energy saving tips were also useful for other government organizations, businesses and residents of the emirate, they were also shared through social media. Figure 4 illustrates one of these messages as well as the impact they had increasing, and then maintaining, the level of electricity savings.

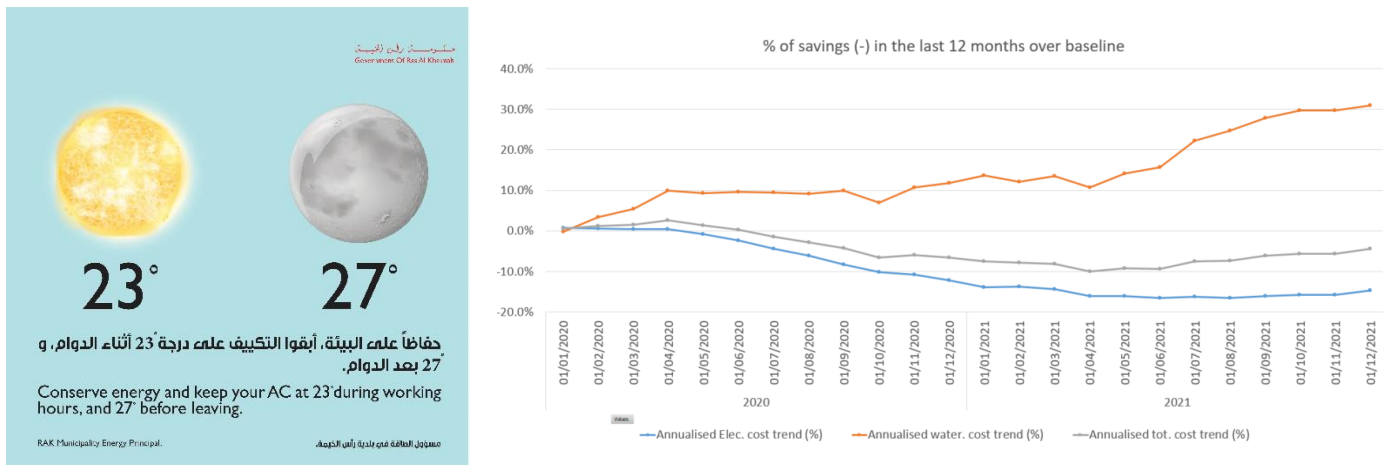


Figure 4 – Internal communication example and impact

With regard to the utility data, Reem created an Excel-based utility tracker to input the utility info, e.g. kWh, imperial gallons and AED per month and account. The tracker allows to do routine adjustments with CDDs since the weather was identified as the most significant driver behind the Municipality’s energy consumption. The Excel file also allows for non-routine adjustments and even forecast future performance by including the impact of retrofits, etc. Together with the info on the tracker, any other major changes were also documented by the team, e.g. changes in operation hours during lockdown, or set points as well as installation of new equipment.

Using the tracker, monthly data consumption for 2019 was gathered as the baseline. From January 2020 until December 2021, i.e. the reporting period, utility bills were collected for each utility account and every month, new bills were added manually by the team.

The tracker facilitates the overall analysis of the energy performance of the Municipality with their automated numerical and graphical output. The Municipality’s energy performance is calculated using the last 12 months rolling savings, i.e. adjusted baseline minus actual consumption, over the adjusted baseline of 2019 for electricity. No adjustments are performed on water consumption, so it is a pure bill to bill comparison. Cost savings are calculated multiplying the electricity and water savings at their respective monthly rates. The evolution of the water and cost performance is calculated using the same formula as for the energy performance.

The internal audit carried out late in 2021, identified minor non-compliances that were quickly fixed by the team. In the executive review meeting, in December 2021, the top management was informed that the total RAK Municipality electricity and water consumption cost had not met the 10% reduction target set for 2021. This was mostly due to an increase in water consumption that was not compensated by the above target electricity reduction. In addition, the

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new equipment in the markets, increased services and changes in operation had made very difficult to adjust the savings. Following recommendations from the energy team and approval from the top management, from 2022 onwards, 2019 data will be considered as baseline for the Municipality HQ and Al Flaya abattoir and 2021 will be the as baseline for the other buildings. These baseline changes have not been included in this submission figures, which has only included improved back-casting models for baseline adjustments in the markets and the Al Flaya abattoir.

After the internal audit and the management review, the team had a preliminary check with the external auditor, TÜV Rheinland, to ensure that all the documentation and resources were available for the certification. Once this was confirmed, the team underwent stage 1 and stage 2 audits in January and February 2022 which resulted in zero non-conformities and led to the award of the certification in March this year.

In order to further support the remaining government entities with their certification, the Municipality organized a training with TÜV Rheinland for internal auditors. Thirteen representatives of different government entities attended the training and were awarded their internal auditor training completion certificates.

The felicitation received by the team after achieving the certification motivates them to keep working on the continuous improvement required by the EnMS certification as well as the Amiri Resolution targets.

Transparency

Once the Municipality achieved the ISO 50001 certification, there was an awarding ceremony where the top management of TÜV Rheinland handed over the certificate to the Director General of the Municipality. This was communicated to all the Municipality employees in an internal email.

Regarding external communications, a press release in English and Arabic was prepared and circulated to local and national generalist media as well as specialized technical publications with the support of Ras Al Khaimah Government Media Office. The external outreach was further amplified by the publication of the certification news and pictures through the Municipality's social media channels, e.g. LinkedIn, Instagram, and Facebook.

What We Can Do Differently

In hindsight, some steps and activities that could have been improved are:

- Smarter utility data input. The utility trackers are subject to manual input errors and are somehow tedious to use. A smarter method of utility bill input with error checking would have been useful.
- Easier consumption analysis. The utility trackers were designed mostly for routine weather adjustments. When non-routine adjustments were needed to be made to account for changes in static factors, e.g. operational hours, increased cooling capacity, etc. The adjustments had to be custom made and were difficult to trace and audit for errors.

Apart from these which are currently being implemented, the next steps include continuation with the established plan whereby the Municipality energy principal and the team will collect utility bills and analyze them. The team will continue to identify key interventions to reduce utility consumption requesting the required budget based on solid business cases. These may be installing light motion sensors and building management systems (BMS) in the markets. Furthermore, the Municipality will continue to seek for opportunities of installing renewable energy in its premises.

Finally, the experience acquired by the team during the implementation will be shared with the remaining government entities to facilitate their own certifications and therefore achieve the wider goals of the EE&R Strategy.



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.