

GREEN BUILDINGS:

Best Practice Case Studies in Retrofitting



ABOUT DUBAI CHAMBER OF COMMERCE AND INDUSTRY

Dubai Chamber of Commerce and Industry is a private non-profit organisation whose mission is to represent, support and protect the interests of the business community in Dubai, by creating a favorable business environment, supporting the development of business, and by promoting Dubai as an international business hub.

ABOUT THE CENTRE FOR RESPONSIBLE BUSINESS

Founded in 2004, the Dubai Chamber's Centre for Responsible Business (CRB) plays a leading role in promoting CSR and guiding organizations to adopt sustainable and responsible business practices. The CRB provides businesses with platforms, knowledge and tools to help them embed CSR and sustainability into their business practices. Currently, CRB engages the business community through a range of programs. They include:

- Dubai Chamber CSR Labels
- Engage Dubai
- Dubai Chamber Sustainability Network
- Dubai Chamber Business Mentoring and Support

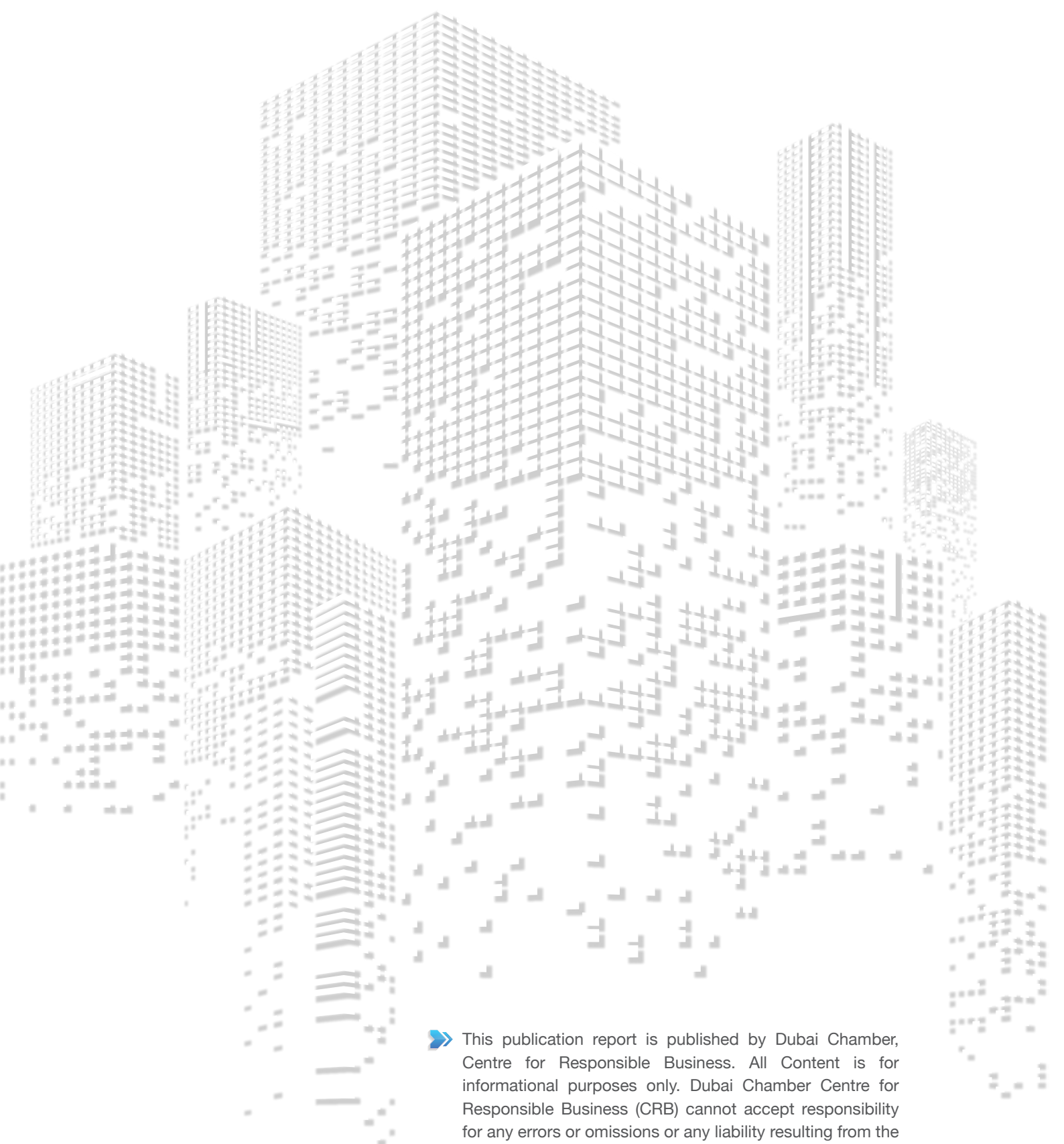
CRB Mission

CRB assists members of the Dubai Chamber and the rest of the business community in adopting responsible business practices that enhance their performance and competitive advantage through

- Promoting CSR, sustainability and good governance at all levels of the Dubai business community by imparting knowledge on these practices and creating tools and guides
- Providing direct advice and feedback by evaluating companies' CSR performance
- Encouraging companies to integrate CSR, sustainability and good governance into their management, operations and processes at every level
- Measuring and documenting responsible business practices in Dubai and the UAE

CRB's objectives are:

- Help the Dubai business community embed CSR and sustainability practices in their operations
- Engage the Dubai business community in assuming greater responsibility for the emirate's social and environmental needs
- Promote Dubai as a regional and international business hub by offering its business partners an environment of transparency, strong governance, and rule of law



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Summary and Key Takeaways

In line with the Dubai Clean Energy Strategy 2050, the Dubai business community aims to head towards green buildings that reduce energy consumption, depend on renewable energy sources, and utilize sustainable building materials while ensuring the wellbeing of building occupants. This publication presents some of the best practices from five Dubai-based organizations. The case studies highlight the need for relying on sustainable building materials and improving indoor air quality for occupants. In addition, the case studies present successful innovative methods implemented while retrofitting buildings to improve different areas of waste management, sustainable landscaping and farming, HVAC systems, the buildings' general BMS, and green buildings' certifications.

➤ **A number of takeaways can be learned from the five case studies. These include:**

- Sustainable building materials are not only environmentally friendly but can also provide financial benefit to companies
- Building materials that are sustainable can be used without the need for major investments
- Indoor air quality is a very important element of green buildings as it impacts the health, comfort and wellbeing of occupants
- Constant monitoring of indoor air quality through, for instance the BMS, is required to track possible changes and determine potential sources of indoor air pollutants

Sustainability Partnership of Enova and Majid Al Futtaiim Shopping Malls

Enova was originally founded in 2002 as an in-house sustainability partner for Majid Al Futtaiim's facilities portfolio and has since widely supported with sustainability measures across the entire portfolio. Regionally, Majid Al Futtaiim has proven themselves as a **sustainability pioneer**, which was reinforced with the launch of the Net Positive Roadmap in early 2017.

➤ Phase 1 of the Sustainability Partnership - Energy Performance Contract (EPC)

At the start of 2019, Enova and Majid Al Futtaiim Shopping Malls partnered on a new program, an Energy Performance Contract (EPC) across the shopping malls portfolio in the UAE. This new project started out with a set of non-CAPEX-related Energy Conservation Measures (ECMs) focused on live monitoring and optimized operational interventions. The connection to Enova's in-house monitoring platform Hubgrade enabled live monitoring of energy and water data as well as space temperatures. Facilitated by Hubgrade monitoring and analysis, the onsite maintenance team are equipped with field devices that enable the prioritizing of work orders efficiently and rectifying irregularities in the energy consumption quickly.

This first phase of the EPC resulted in total energy savings of 28.3 GWh (to put it into context, 1 GWh alone can power **110 million LED lamps**) and approximately 150,000 m³ in water savings (equivalent to 60 olympic swimming pools). The below figure 1 demonstrates the monthly electricity and water savings as well as the generated savings.

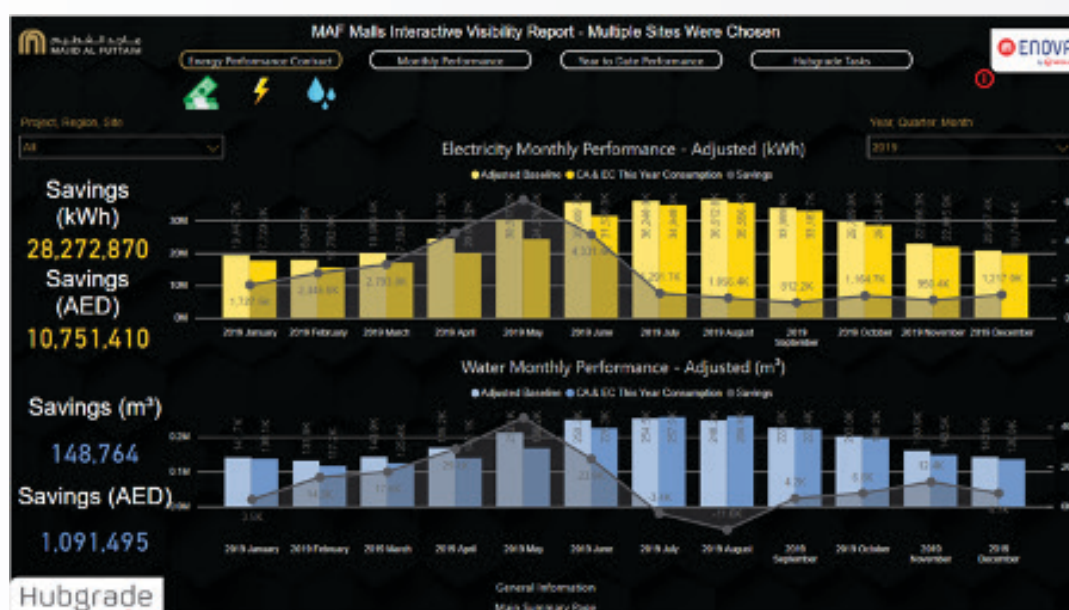


Figure 1 : Monthly Electricity and Water Savings of Majid Al Futtaiim Shopping Malls EPC in 2019

In 2020, the second part of the program unfolded with the partial re-investment of previously generated savings to allow the implementation of CAPEX-intensive Energy Conservation Measures:

» Water savings

- Installation of waterless urinals (Mall of the Emirates, City Centre Deira, City Centre Shindagha)
- Recovery of condensate water from the Air Handling Units (City Centre Fujairah)
- Installation of a modern on-site Sewage Treatment Plant and a Reverse Osmosis Plant (City Centre Fujairah)

» Energy savings

- Replacement of conventional lighting systems by more energy efficient LEDs (City Centre Deira, City Centre Me'aisem)
- Replacement of existing split unit ACs with more efficient inverter split ACs (City Centre Mirdif)
- Installation of a modern on-site Sewage Treatment Plant and a Reverse Osmosis Plant (City Centre Fujairah)

The below figure 2 shows the report of electricity and water savings in 2020.

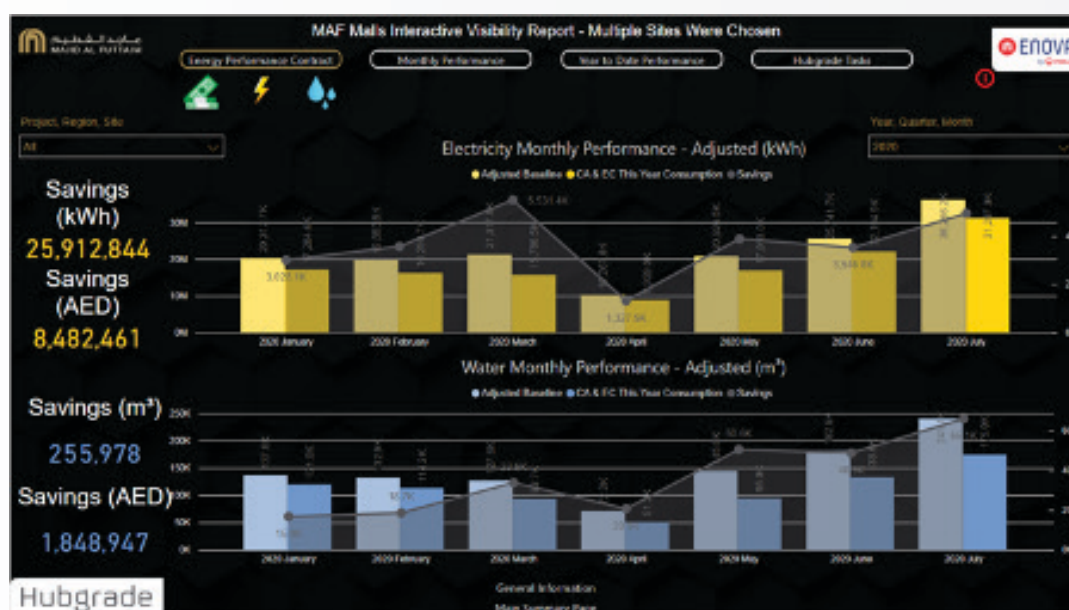


Figure 2: Monthly Electricity and Water Performance of Majid Al Futtaim Shopping Malls EPC in 2020

► Phase 2 of the Sustainability Partnership – Indoor Environmental Quality (IEQ)

Not only did the 2020 phase focus on the modernization of assets for long-term savings, optimizing building occupant and visitor comfort also moved into the limelight in this customer-centric sustainability approach.

The Majid Al Futtaim shopping mall portfolio was already equipped with the **Enova by Veolia smartphone app**, that has allowed clients 24-hour access to real-time data on Energy & Facilities Management services since 2017.

Catering to a newly defined need and target of optimized IEQ, the app's capabilities were extended to cover real-time IEQ data, as shown below in figure 3. Rolled out in March 2020 in a collaboration with Majid Al Futtaim Shopping Malls, this application now also includes a live view of indoor temperature and indoor air quality in an effort to optimize the end-user comfort and well-being through enhanced IEQ. The app enables the user to monitor temperature, humidity and CO2 levels of a site and to quickly and efficiently respond to any variations of these parameters to ensure the comfort of the building occupants. The app's thresholds follow green building regulations and specifications which are based on ASHRAE Standards and comply with WELL & LEED guidelines in terms of hygrometric conditions and indoor air quality indicators. The app is used on a daily basis by the Enova Operations team to ensure an optimized indoor environmental quality is maintained for all building occupants and visitors.



Figure 3: Enova by Veolia Smartphone App with Real-time IEQ Data

Daikin's Office Retrofit: Pushing Forward the Drive for Sustainability

► Background

Daikin Industries is a global leader in developing and manufacturing advanced, high-quality air conditioning, heating, ventilation, air-conditioning, and refrigeration products (HVAC-R) providing solutions for residential, commercial, and industrial applications.

Founded in Japan in 1924, the company strives to combine expertise and experience to create new innovative technologies by anticipating the future requirements of customers and society. Daikin has evolved over nine decades to employ 80,000 people with 100 production bases and presence in 150 countries worldwide.

Daikin's commitment to the local market has been the main driver in the move to a new office inside the Jebel Ali Free Zone to consolidate its manufacturing, sales and training facilities, and become its headquarters in the Middle East and Africa region.

Daikin's building needed a complete retrofit to meet its sustainability standards and to include its renowned air conditioning technologies around the world for its high-energy efficiency and low environmental impact.

Daikin moved to its new headquarters in July 2019. Daikin's HQ building is in Jebel Ali Free Zone in Dubai, UAE. The building occupies 5000 m2 of space, including a 3500 m2 air handling unit factory, two office floors for its regional functions, and a state-of-the-art training academy.

► Sustainability Approach

Daikin's approach to the building retrofit is in line with its goal towards achieving its Environmental Vision 2050 with a target of reducing greenhouse gas emissions to net zero by 2050.

The retrofit solutions focused on facilitating the functions that will be performed in the building, with specific attention to the building users' comfort, the building's environmental impact, and the alignment with the national and global energy conservation regulations and strategies.



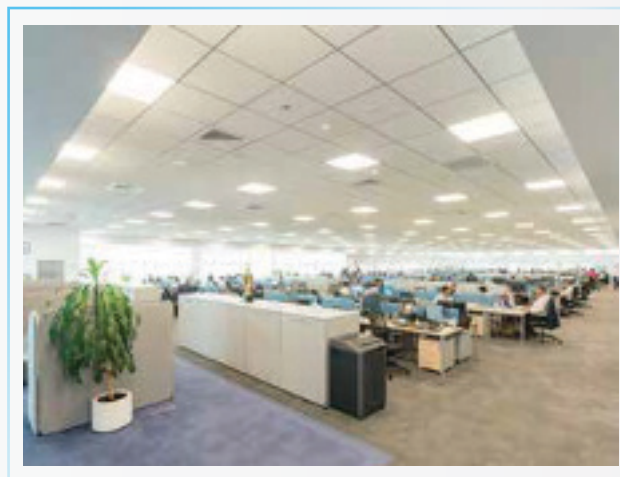
This has been achieved by focusing on the following areas:

- Energy-efficient air conditioning equipment
- High-level of indoor air quality
- Energy management systems
- Efficient lighting and controls
- Innovative environmental solutions

» Air Conditioning Systems

It is commonly known that the air conditioning systems' energy consumption is the highest in a building while operating in high ambient temperatures. Daikin has selected in-house designed and manufactured systems to achieve the highest part load efficiency throughout the year with emphasis on high ambient performance and compliance with ESMA Energy Efficiency Performance regulations.

In the offices' open space and meeting rooms, Daikin has selected a multi split VRV system with a total cooling capacity of 341 kW. A total of 13 outdoor unit modules are connected to 54 different indoor units across the open space office and meeting rooms. While achieving a high level of temperature control for the different zones, this system can adjust its power consumption to allow for the highest levels of partial load energy efficiency. All thermostats are set at 25°C and have a built-in function to limit the minimum set point to 20°C as per ESMA guidelines.



In the factory and academy facilities, the cooling system needs to cover the heat load of the same area. An air-cooled inverter liquid chiller is installed and connected to the air handling unit and water fan coil units located in many parts of the ground floor. The factory area is maintained at 27°C when ambient temperature is above 33°C. When the temperature falls below 33°C, the cooling system is not utilized, but rather the ventilation system only. The inverter AC chiller adjusts its power consumption in relation to the building heat load as well as the outside air temperature.

In the individual function rooms, cooling requirements could be independent from the office and factory areas. For this reason, Daikin has selected a standalone wall mounted inverter split system using inverter technology and low Global Warming Potential (GWP) refrigerants to achieve the lowest carbon emissions while ensuring a high level of comfort.

► Energy Management Systems

The energy efficiency of the air conditioning systems is enhanced by a group controller known as the Intelligent Touch Manager that allows the limiting of temperature set points and scheduling of the operation in line with the building occupancy to avoid energy wastage. Usually, all thermostats are set at 25°C.

Energy consumption is demonstrated in a graph format, which displays the expected and real data. The Energy Navigator function allows wasted energy detection, while showing units operating out of operation period limits or having too high or too low set points.

Also, different energy consumption related data are recorded in case further analysis is required. It is also worth mentioning that all system operating parameters and malfunction alarms in the Building Management Systems (BMS) could be accessed remotely via Daikin's VRV Cloud and Daikin On-Site Monitoring Programs.



► Efficient Lighting and Controls

The indoor high efficiency LED lighting is controlled through a local switch, sensor, or through the BMS. Daylight harvesting is implemented in areas near the glassed exteriors of the building. Unnecessary lights are switched off during non-activity hours to conserve energy. Open office area lights are primarily operated through a weekly timer based on office hours. After office hours, these lights are controlled using presence detection. In case there is no movement for more than 20 minutes, the lights of the covered zone switch off automatically. The same applies for meeting rooms, which are equipped with presence sensors and intelligent switches. Upon entering the room, the person can turn on the lights using the intelligent switch.



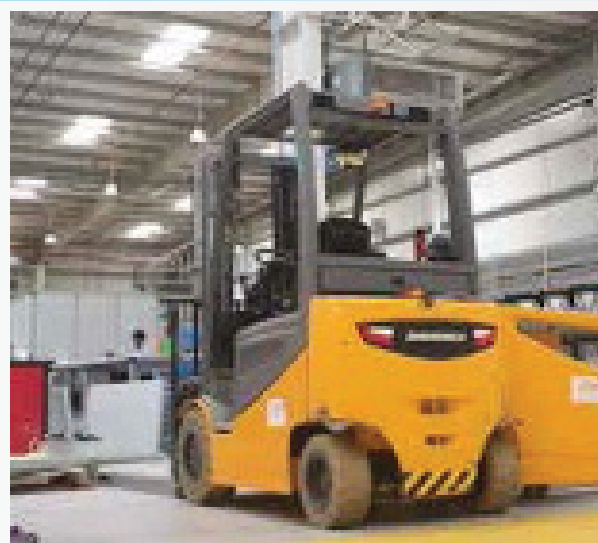
► Innovative Environmental Building Solutions

- To reduce water consumption, condensate water that forms in the indoor unit is channeled towards a tank and is used to irrigate the plantation around the building. Approximately 45 gallons of condensate water per day is used to irrigate the company's employees' farm through drip irrigation tubes.
- Led by Daikin's chairman, a bio farm has been grown in the office grounds with seasonal plants such as tomatoes, roses, and sunflowers and permanent plants such as Baobabs.
- To reduce waste, wooden packaging from incoming deliveries is used to produce wooden chairs and tables for use in the employees' garden and to manufacture wooden green plant pots.
- Office waste paper is collected on a regular basis by a recycling company. Up to date, 1,624 Kgs of paper has been recycled which is equivalent to saving 27 trees or 11,368 gallons of water.



- The factory wasted material is segregated properly. Metal waste is collected on a regular basis by an authorized recycling company. More than 3 tons of metal has been recycled this year. Hazardous waste, which does not count for more than 0.001% of total waste, is collected by an authorized waste disposal company.

- The factory's warehouse uses two permanent all-electric forklifts to avoid carbon emission generation from fuel-burning.



- To reduce emissions and to encourage the use of public transportation, office group transportation was set with pre-defined and regular schedules to and from the closest metro station.



- The car park is shaded and equipped with solar-powered lighting that automatically operates in low-light conditions.

► Indoor Air Quality

The rise in energy-efficient building designs is increasing the need for proper ventilation systems. Energy efficient buildings require more insulation to reduce heating and cooling loss. This means that the air inside the building lingers longer and becomes stale. The stale air also puts the building at a greater risk of allergies, residual odors, condensation, mold and more.

The Fresh Air Handling Units (FAHU) that are installed in the building and manufactured on the same site are designed as per ASHRAE ventilation guidelines to bring in fresh air, filter it from volatile particles, and cool it on a chilled water coil supplied by the Inverter Air Cooled chillers. Fresh air is supplied into the different work areas in the building. The FAHU ensures sufficient and more frequent air changes per hour as a COVID-19 countermeasure to increase the building ventilation rate.

Air flows into a sand separator to reduce the dust level of PM 2.5 before going through high efficiency MERV8 filters. The sand separator elongates filter life and helps in maintaining its efficiency.

Also, two CO2 sensors are placed in the return air duct. These sensors trigger an increase in the fan speed in case the CO2 level is higher than the set limit. In addition, a double heat recovery wheel is added to the Air Handling Unit to recover cool air from the returned air to the building and this ensures saving energy in normal times.

Ventilation equipment use high efficiency fan motors that ensure lower sound levels, reduced power loss, increased longevity and variable speed as compared to traditional fans.

The COVID-19 situation imposed certain modifications to the ventilation system, and these include the following:

- Increase the rate of fresh air changes by 20%
- Continuous operation of the FAHU system
- Upgrade to MERV 11 filters for the FAHU system
- Disable the heat recovery wheel to stop returned air circulation
- Disable CO2-based demand ventilation since the supply is 100% fresh air



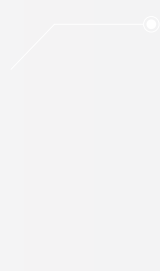
► Next Steps towards Retrofitting

Green building retrofit is a continuous journey of checking, acting, and involving all building occupants to further reduce the building's power consumption and its carbon emissions, and ultimately, reduce its negative environmental impact.

Currently, Daikin is consuming an average of 78,000 kWh per month, and if projected on a yearly basis, this gives a power consumption of 178 kWh/m²/year.

Daikin is continuously tracking opportunities to reduce the building's energy consumption and as Daikin will shortly complete one year of operating its retrofitted building, through the tracking of its energy bills, Daikin intends to take the first year's consumption as a baseline for future comparison. Daikin targets a 10% reduction of energy consumption in the following year.

Daikin's next ambition that is currently under study is to generate solar electric power by installing PV panels on the roof of the building. This is to further reduce the building's carbon footprint using renewable energy as the main power supply, which also feeds back to the grid any excess solar power generated.



The Retrofitting of Food Point, Linencraft, and Employee Accommodation at Emirates Flight Catering

Emirates Flight Catering (EKFC)'s initiatives support the Dubai Clean Energy Strategy 2050, which was launched by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Ruler of Dubai, in 2015. Under the Clean Energy Strategy, the Emirate aims to produce 75% of its energy requirements from clean sources by 2050. His Highness Sheikh Ahmed bin Saeed Al Maktoum, Chairman and Chief Executive of Emirates Airlines and Group, said: "Sustainability is an important pillar of the Emirates Group strategy. We are committed to responsible business and environmental stewardship, and we apply eco-efficient technologies across our operations to minimize our impact even as we continue to grow. Emirates Flight Catering's latest initiatives open new opportunities to improve resource efficiency, underpinning Dubai's strategy to become a global center of clean energy and green economy."

EKFC's solar rooftop power plant, launched in 2019, is a 2.78 MW solar power plant and comprises of 8,112 individual solar panels. It is expected to generate 4,195 MWh of electricity annually, allowing the company to reduce traditional energy consumption by 15% across its laundry, food manufacturing and employee accommodation facilities. Consequently, CO2 emissions will decrease by 3 million kgs annually - the equivalent of the annual electricity use of 518 family homes. EKFC recognises that environmental responsibility is core to its long-term success and is committed to using resources in a sustainable manner and minimising the environmental impact of its operations across all activities.

The solar power plant project is the company's corporate social responsibility initiative and response to the launch of Dubai Clean Energy Strategy 2050. The solar project mainly consists of rooftop solar panels that generate DC electrical energy and then convert it into AC electrical energy using inverters. The converted AC electrical energy is connected directly to DEWA's grid (on the grid connection), and KW electricity production of the solar power plant is then measured through the electrical meter installed. Cumulative savings from August 2019 are 3,893,948 KWh against a target of 3,790,348 KWh.

➤ Fast Facts on the Solar Rooftop Power Plant

- The solar rooftop power plant reduces EKFC's CO2 emissions per year by 2,968,568 kg.
- Reduced CO2 emissions are equivalent to 1,264,130 liters of petrol fuel consumption and the annual electricity consumption of 518 family homes.
- 8,112 individual solar panels are installed.
- Eight EKFC facilities are included in this solar power project.
- The solar power project produces 4,195 MWh of electricity annually.

There are also other initiatives that have proven to bring a significant reduction in energy consumption, in line with environmental sustainability and allowing for long-term environment quality. These initiatives include:

- Installation of LED lights in operational areas at Food Point, which includes replacement of existing lights with less power consuming LED lights, as per the below table.

| Area | Old Lights | New Lights |
|--|-------------------------------|------------------------------|
| Complete Operations Area | Fluorescent Lamp - 90 W | Tube Light - 30 W |
| Goods In, Goods Out, Freezers & Dry Stores | Sodium Vapor Lamp - 300 W LED | High Bay Light - 120 W |
| Raw Material Fridges, Defrost Rooms, Batch Fridges, Blast Chillers & Holding Fridges | Metal Halide Lamp - 180 W LED | Low Bay Light - 80 W |
| External Perimeter | Halide Lamp - 300 W LED | Solar with Batteries - 120 W |

- Compressed air leaks were reduced by replacing Galvanized Iron (GI) Network with light alloy material in Linencraft operation areas.

Air compressors were operating during longer hours generating more volume of compressed air than required due to the corroded GI pipe network. Corroded GI pipes were equipped with anti-corrosion material to reduce the power consumption of compressors.

- Air Handling Units – shutdown during cold season in Linencraft operations

During the cold season (November to March), 3 Air Handling Units (AHU's) are shut down. Switching off AHU's has reduced power consumption, as the room temperature during the cold season is less than the summer season.

- Implementation of infra touch screens for dryers in Linencraft operations - minimising the drying time as per the real time conditions of the linen.

Existing process of drying wet linen is based on set timings, and fluctuation of moisture content can result in overheating and wastage of utilities. With the installation of sensors, the drying process is optimised to diminish the wastage.



- Utility reduction in health care section of Linencraft operations - increasing the capacity efficiency of washing machines

With the availability of raw volumes of linen for processing, machine capacity can be optimised when there is less volume.

Generally, there are two business models for laundry services:

A- COG (Customer Own Goods): in this model, customer owns his linen and will send it to be processed in EKFC laundry. The turnover time is usually short and each customer's linen should be loaded separately into the washing machines, reducing the chances of washing full loads at 100% capacity. For example, a washer with 100 kg capacity of linen may sometimes process only 70 kg based on linen availability and will consume the same utilities as that of 100 kg. This increases the wasted utilities used for daily volumes.

B- EKFC's initiative is to follow linen-leasing model that ensures 24/7 availability of the "raw material" = "soiled linen to be washed" as EKFC provides its own stocked linen. This means that operations are planned and machines are loaded at 100% capacity and with this full utilisation, wasted water, heat (LPG), chemicals and electricity are reduced.

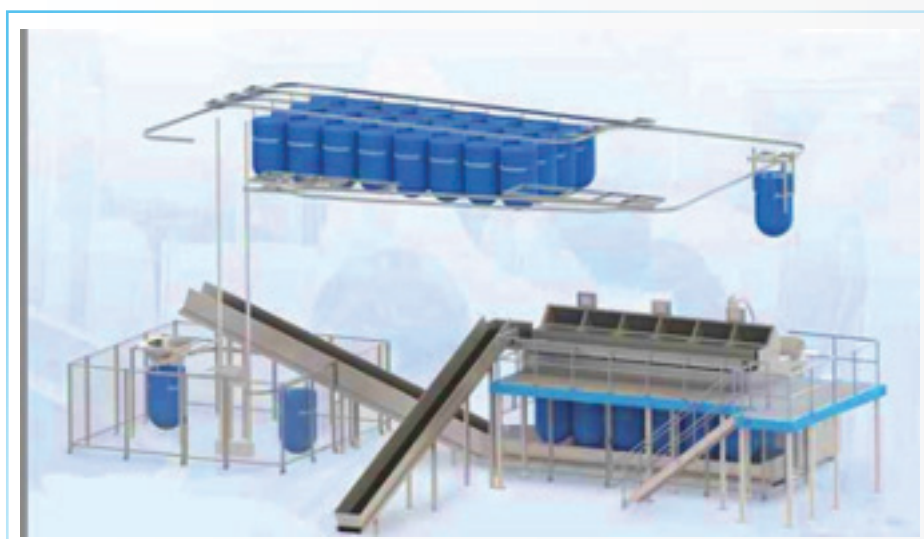
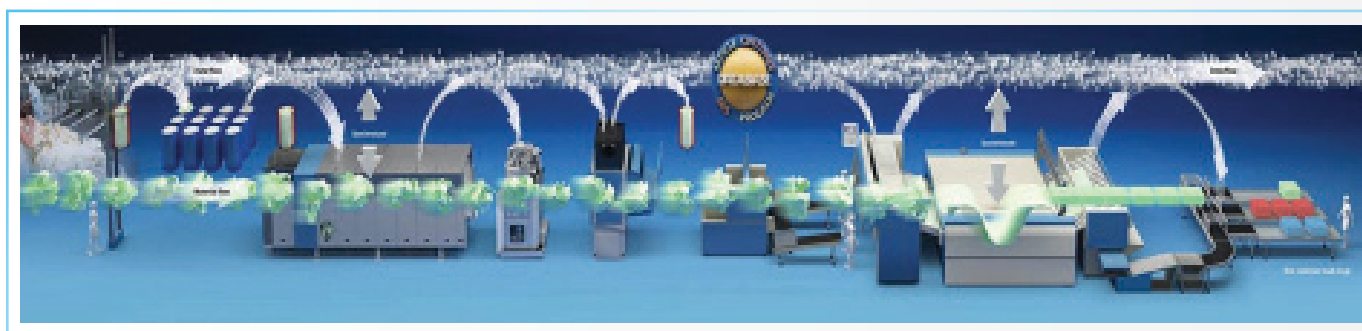
- Monorail bagging system implementation in Linencraft operations

Electricity, water, and LPG consumption is reduced by decreasing manual handling & washing machines' operations in unproductive times. This is achieved by providing in-time delivery of soiled linen to tunnel washer.

The type of tunnel washers at EKFC is 14-compartment industrial washers, with the capacity to process 1.4 tons of linen per hour. This is equivalent to huge volumes processed per day (80 tons/day); however, the manual loading process slows down the entire operation by creating a bottleneck, as if soiled linen is not readily available to be loaded to the washer. This results in washers being switched on with zero productivity, thus leading to flatwork ironers also slowing down while waiting for linen to be ironed. Ironers keep a consistent heating energy consumption to maintain the roller temperature while the machine is not in a productive mode, resulting in wasted LPG & water.

By implementing the monorail bagging system, the bottleneck is eliminated and around 4.5 tons of soiled linen are pre-sorted, loaded and stored in bags. Ready to be loaded with full-automated control, bags are being driven by machine learning intelligence to load the washer whenever required and all equipment is synchronized and always work in harmony to cut unproductive time and eventually reduce the energy wastage of water, LPG, chemicals and electricity.

The below photo demonstrates what the monorail system looks like.



- Washing System Enhancement in Food Point Crate washer is now equipped with better technology because the older technology was consuming more water for cleaning. The new technology is based on high pressure washing with steam & water, and a sanitisation process is included in the machine.

Trolley washing process was manually done before, and it is now replaced with a system of high pressure washing with steam & water. This has resulted in reduced water consumption.



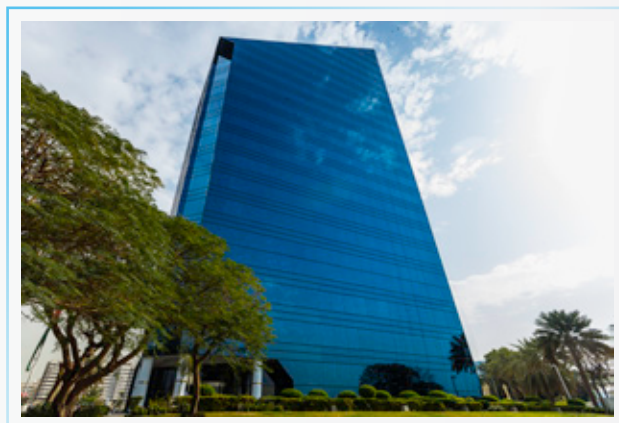
➤ **Linencraft Indoor Air Quality Monitoring**

Lint in the dryer/finishing area of a laundry is generated from the drying process as well as created in handling linens while processing for use. Industrial Hygiene (IH) and Indoor Air Quality (IAQ) Contaminants monitoring was carried out at Linencraft 1 and Linencraft 1.5 in 2019 through an ENAS and DAC accredited testing laboratory. Samples were taken from various locations considering suspected areas of heavy employee traffic, suspected downwind of source amplification, and suspected lint-emitting equipment presently in use in order to achieve the most accurate analytical results. Based on these results, various measures were adopted to reduce the level of cotton dust to Permissible Exposure Level and to reduce the accumulation of cotton dust. These measures include an increase in frequency of cleaning and use of N95 masks during cleaning activities.

Dubai Chamber of Commerce & Industry: A Case Study of the First LEED EBOM-Certified Building in the Arab World

Dubai Chamber's head office is a prime example of how an existing building that consumes large amounts of energy and water can be transformed into a green one.

Dubai Chamber's head office has achieved the ENERGY STAR label with a “most efficient” rating of 91, that is, it consumes less energy than 91% of similar buildings in the US. It is also the first LEED Existing Building Operations and Maintenance (EBOM) in the Arab world, certified to the Platinum level, and has obtained ISO14001 and OHSAS18001 certifications.

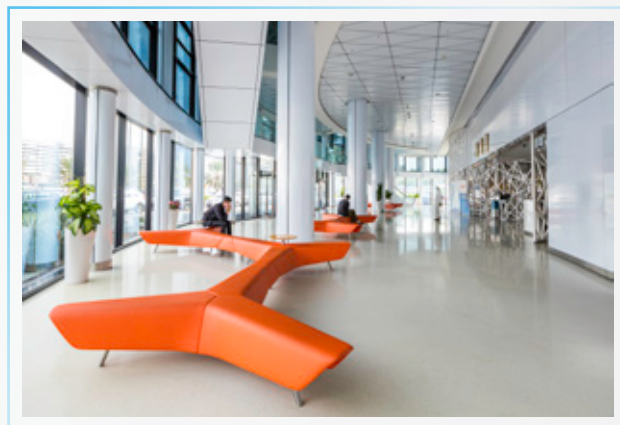


Since Dubai Chamber started its energy and water savings back in 1998 and until the end of 2014, energy and water consumption per person has decreased by 63% and 91% respectively, which is an estimated financial saving of AED 27.7 million. These savings were achieved using low-cost/no-cost initiatives. During the process of retrofitting, numerous benefits have been achieved including huge financial savings, higher occupant satisfaction, global publicity and significantly reduced pollution levels.

» The Strategies Followed to Green Dubai Chamber's Building

- Recycled water is used in toilets and this allows Dubai Chamber to reduce its desalinated water consumption by 69%, equivalent to over 1.1 million imperial gallons of water per year. The Chamber is the first organization in Dubai that was given the permission from Dubai Municipality to treat and use the municipal recycled water, which is used for irrigation and for flushing toilets. It is also worth noting that Treated Sewage Effluent (TSE) is used for flushing toilets rather than potable desalinated water. Installing it is costly however, payback saves liters of water and millions of Dirhams.
- Other pioneering innovations introduced earlier, such as condensate capture, greatly assisted in contributing to the water efficiency of Dubai Chamber. Water condensate from AC systems in Dubai Chamber is collected and utilized in fountains, to clean the windows, as well as flush the toilets.
- A technique called “free cooling” is used in 30% of the building during winter months, and this allows the chillers to be switched off during cooler times of the year.
- Drip irrigation is used to water the landscape, and only desert plantations that require less water are planted. Drip irrigation is more water saving as the water does not evaporate, unlike sprinkling that loses 35% of water to evaporation.

- Custom-designed air cooled chillers were installed in Dubai Chamber's building. There are only 3.5 chillers in the building, and during winter months, only half a chiller is used. This has resulted in around 25% reduction in energy consumption. It is important to optimize the efficiency of chillers as they consume a huge load of energy; in Dubai Chamber's building, optimizing pumps and chiller loads as well as switching off AC and lighting after office hours resulted in significant savings.



- In terms of the installation of sustainable building materials, Dubai Chamber's rooftop is covered with 75% white tiles in order to reduce Heat Island Effect and reflect the hot sun rays, known as the albedo effect. In addition, all windows are double glazed to reduce heat and energy consumed by AC's and increase indoor comfort.
- All taps in washrooms and pantries are equipped with aerators to reduce water consumption by up to 40%. A maximum amount of liters was systemized per flush to reduce water usage. Bricks/bottles were put inside toilet tanks to save 1.5 liters of water per flush. In addition, all faucets are equipped with hand sensors to minimize water consumption.
- Indoor air quality is maintained at Dubai Chamber at all times for the comfort of its building occupants. Sensors are installed in the building to ensure good air temperature, CO₂, and Ozone levels. An indoor temperature of 24°C is maintained during working hours and 27°C after working hours. High efficiency and energy conservative light bulbs are installed in the building as well as light and motion sensors. Energy is saved by around 47% by switching off the lights at night.
- All electronic devices used in the building are equipped with the Energy Star ecolabel. Materials are sourced based on how sustainable and non-emitting of air pollutants are they. For instance, all office desks are purchased with the FSC ecolabel for wood components. Also, materials used such as pens and notebooks are produced from recyclable materials. Paints and carpets are low-emitting of VOC's. Printers are segregated in designated rooms inside the building as this reduces the chemical and noise pollution produced by printers.

➤ The Key Successes for Retrofitting Dubai Chamber's Building

Beyond LEED certification, the green building journey of Dubai Chamber has brought numerous other benefits. These include financial savings, the enhancement of knowledge concerning greening existing buildings in the Middle East, and a cleaner environment in line with the vision of the UAE's leaders.

Since Dubai Chamber first began communicating its green building efforts within and beyond its organization back in 2008, hundreds of media articles and videos have been published, and several tours and presentations have been made every year using the example of Dubai Chamber within the UAE and abroad.

HVAC Retrofit: A Transguard Group Energy Management Project

Transguard has firm, strategic commitments that define its facility management services, each of which is incorporated in its Energy and Asset Management approach for both its owned properties and for its clients.

Transguard takes environmental protection very seriously, and the reduction of carbon emissions through eliminating energy waste from its processes and facilities is high on its list of priorities. In fact, Transguard is focused on the areas of its business where it can make positive changes and contribute to the UAE's Energy Strategy 2050 by producing clean energy.



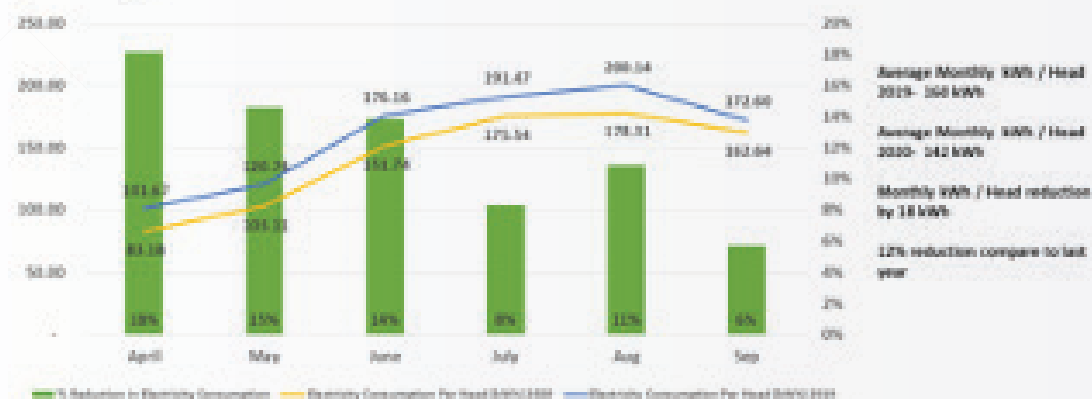
Transguard's aim is to increase the energy efficiency in its accommodation facilities by bringing cultural changes through robust training plans and by eliminating Hydrochlorofluorocarbons (HCFC's) and Chlorofluorocarbons (CFC's) from the air conditioning equipment by 2030. This is in line with Dubai green building regulations and UAE Ministerial Decree No. 33/2012 Article 7, which states the following regarding the reduction and phase out of HCFC:

- 10% reduction by 2015
- 35% reduction by 2020
- 67.5% reduction by 2025
- Consumption phase out by 2030, 2.5% allowed for existing equipment for service until full phase out by 2040.

From April 2019 to September 2020, Transguard Facility Management not only maintained group properties to high-class standards but also saved 3.51 kWh of electricity. This has resulted in an electricity reduction of 12%, with a further 3% reduction by the end of March 2020.



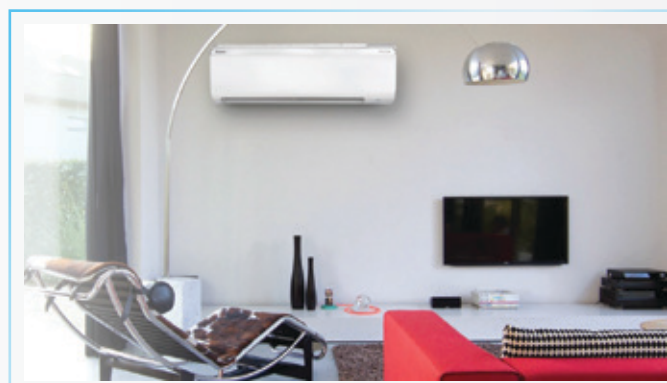
Electricity Consumption 2020 vs 2019



Graph 1: Electricity Consumption in 2020 vs 2019 at Transguard

The above results in graph 1 were achieved through a number of projects, including Transguard's HVAC Retrofit project.

As part of Transguard's Energy management strategy, energy audits were conducted in all Transguard accommodations. These audits revealed that in two Transguard accommodations, 80% of the energy was being consumed by AC units due to their low efficiency and deteriorated asset life.



The existing AC units were window-types, which used the refrigerant gases (R22) or (HCFC-22). These refrigerants are already being phased out in developed countries due to the compound's Ozone Depletion Potential (ODP) and high Global Warming Potential (GWP). As an additional environmental concern, R-22 is a powerful greenhouse gas with a GWP equal to 1810 (which indicates 1810 times as powerful as CO₂).

This was rectified by phasing out these window AC units with highly efficient inverter type AC units that rely on the more environmentally friendly gas R32, which has no ODP. In fact, this highly efficient refrigerant has been shown to reduce CO₂ emissions by as much as 72%.

➤ Retrofitting to Improve Indoor Air Quality and Reduce CO₂ Emissions

The results are very promising and with just 10 months of replacing 1300 AC units, Transguard has benefitted from a savings of 3.16 million kWh of electricity and AED 1.45 million. Not only that, but Transguard has been able to provide the residents of these accommodations with cleaner, better smelling air thanks to the units' washable antimicrobial filters that eliminate various air borne particles, mold and germs. This has also resulted in the avoidance of 2240 metric tons of CO₂ emissions, which is equivalent to 95,297 trash bags of waste being recycled instead of landfilled.

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