

HANDBOOK OF ELECTRICITY & WATER CONSERVATION MEASURES



HE SAEED MOHAMMED AL TAYER
MD & CEO - Dubai Electricity & Water Authority

MD & CEO MESSAGE

Sustainability has always been an integral part of the culture of the United Arab Emirates. Thanks to our visionary leadership, the UAE has undertaken important steps to reduce global warming, due to its international responsibility to address climate change. Dubai has been a pioneer in the implementation of programmes and initiatives that contribute to reducing the carbon footprint.

Dubai Electricity and Water Authority (DEWA) plays a pivotal role in protecting the environment by increasing the share of clean and renewable energy and launching several programmes and initiatives that encourage the sensible use of electricity and water. This supports the Dubai Clean Energy Strategy 2050 to produce 75% of Dubai's total power output from clean energy by 2050 and make Dubai's carbon footprint the lowest in the world, and the Demand Side Management Strategy to reduce demand for electricity and water by 30% by 2030.

The Etihad Energy Services Company (Etihad ESCO), a leading company in energy services owned by DEWA, has been making Dubai a leading example in energy efficiency for the region and the world, since its establishment in 2013. It works on retrofitting buildings, conserving and monitoring energy consumption, and installing clean and renewable energy technologies. The company aims to retrofit more than 30,000 buildings in Dubai by 2030 to ensure energy efficiency.

We are keen to engage all society members in efforts to protect the environment. Our year-round conservation programmes include many innovative awareness initiatives and activities that encourage consumers to adopt a sustainable lifestyle in electricity and water use. The conservation programmes and initiatives launched by DEWA for past 10 years between 2011 and 2020 have achieved cumulative savings of 2.44 (TWh) of electricity and 6.7 billion gallons of water. This is equivalent to saving AED 1.35 billion and reducing 1.22 million tonnes of carbon emission.

DEWA has developed this Handbook of Electricity and Water Conservation Measures to show the available technologies that its customers and society can use to reduce their electricity and water use. I hope it will help you make a positive change and start saving electricity and water to contribute to protecting the environment and natural resources and ensuring their sustainability for generations to come.



Our Vision

A globally leading sustainable innovative corporation.

Our Mission

We are committed and aligned to Dubai's 8 Principles and 50-Year Charter supporting the UAE's directions through the delivery of global leading services and innovative energy solutions enriching lives and ensuring the happiness of our stakeholders in a sustainable manner.

Our Motto

For generations to come.



DISCLAIMER

The Handbook informs but does not advertise any particular technology. DEWA does not endorse any of these technologies. This handbook only discusses the technical aspects of conservation measures and does not recommend any specific brand.

This handbook is NOT a replacement for the energy audit process. DEWA recommends that a proper viability study to be carried out on the commercial and technical elements for any property or premises and their suitability for the site in question.

DEWA is not accountable and liable for any failure of operation or any of the measures mentioned in the handbook. Customers should carry out a due diligence and analysis process before implementing any of the measures covered in this handbook.

The potential and maximum savings percentages mentioned in the handbook are representative and indicative, the exact savings for the measures specific to the project, can be best estimated by conducting an Energy Audit of the premises.

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LIST OF ABBREVIATIONS

AHU

Air Handling Unit

BMS

Building Management System

CFL

Compact Fluorescent Light

CHW

Chilled Water

CPM

Chiller Plant Manager

CRI

Colour Rendering Index

DCP

District Cooling Providers

DP

Differential Pressure

HVAC

Heating, Ventilation, and Air Conditioning

DX

Direct Expansion

FAHU

Fresh Air Handling Unit

FCU

Fan Coil Unit

IDEC

Indirect Evaporative Cooling

LPM

Litre Per Minute

VFD/VSD

Variable Frequency Drives/Variable Speed Drives

VPS

Variable Pressure System

VRF

Variable Refrigerant Flow



ELECTRICITY & WATER CONSERVATION MEASURES

These are projects and technologies to reduce electricity and water use in a building. This handbook covers the measures that require the installation of devices or equipment as a retrofit or a replacement.

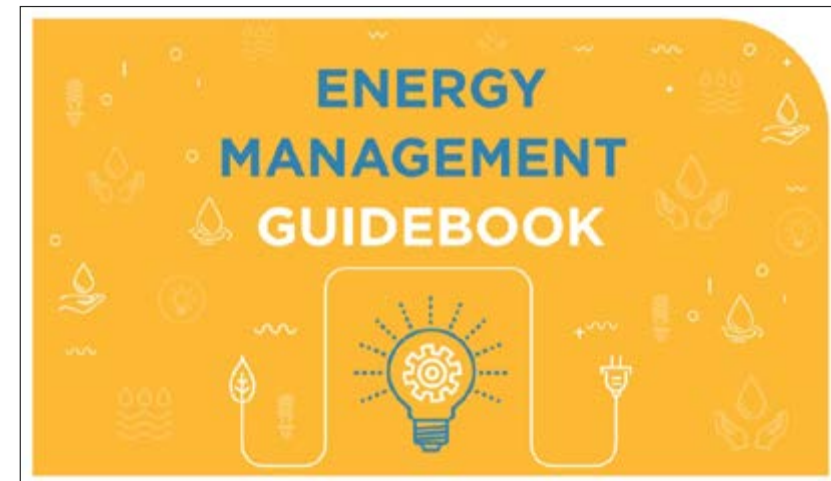
Retrofitting is the act of replacing a component of a system to improve efficiency and performance, while replacement refers to completely replacing a system or equipment with a more efficient one.

Measures such as advice, ideal forms of behaviour and best practices in maintenance, design, and operations, are not included in this handbook.



Please refer “Taqati’s” Energy Management Guidebook for more information on how to implement electricity and water conservation measures and better understand the energy management journey

See link: <http://www.myenergymyresponsibility.ae/awareness-material.html>



WHO SHOULD READ THIS?

This handbook is for:

- Facility Owners
- Facility Management companies
- Engineering and Maintenance Teams
- Individuals and Homeowners.





1. SUMMARY

The following table summarises all the conservation measures in this handbook, with their typical range of savings, compiled from various vendors and technology providers.



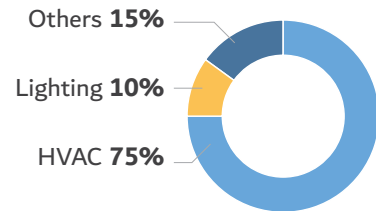
Colour Code	Conservation Measures	% Savings on End-use Consumption
Lighting	Lighting Retrofit or Replacement	Up to 80%
	Solar Tubes	Up to 80%
	Lighting Control Devices	Up to 20%
HVAC	AC Replacement – VRF System	Up to 20%
	AC Replacement – Inverter Split	Up to 25%
	AC Compressor Optimisation Retrofit	Up to 12%
	Refrigerant Additive	Up to 10%
	Evaporative Cooling For Chiller	Up to 14%
	DC Motors for FCUs	Up to 25%
	Vortex Condenser Sub-cooler	Up to 20%
	Hybrid Evaporative Cooling	Up to 20%
	Programmable Thermostats	Up to 20%
	Chiller Plant Manager (CPM)	Up to 25%
	VFDs/VSDs for AHUs & FAHUs	Up to 30%
	VFDs/VSDs For Chilled Water Pumps	Up to 35%
	Differential Pressure Optimisation	Up to 15%
	Chilled Water Pump Operation Optimisation	Up to 25%
	CO Sensors For Basement Exhaust Fans	Up to 20%
	Timers For Exhaust Fans	Up to 20%
Water	Low Flow Fixtures	Up to 60%
	Sensor Control Faucets	Up to 20%
Building Insulation	Paint-based Insulation & Coating	NA
	Advanced Window Controls	NA
	Window Film	NA
General	Energy Management Systems	Up to 8%
	Heat Pumps For Swimming Pool Heating	Up to 20%

Please note that the project specific savings and applicability will be different and can only be estimated after an internal assessment or an energy audit.

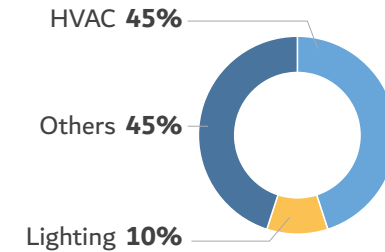


SECTOR WISE ANNUAL ELECTRICITY END USE CONSUMPTION BREAKDOWNS

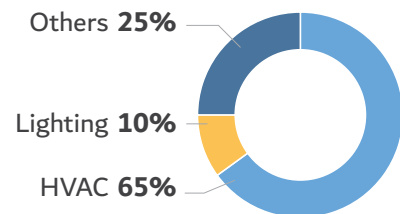
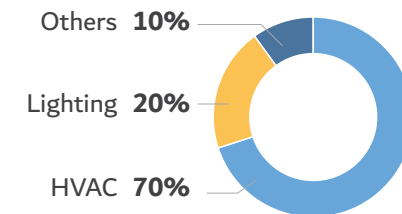
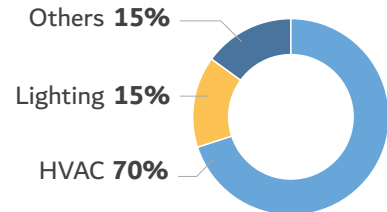
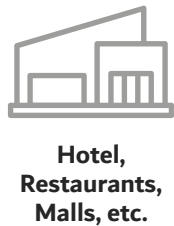
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These consumption breakdowns are typical for these types of building. Actual breakdowns may be different for individual buildings.



2. LIGHTING SYSTEMS

This section of the Handbook covers different types of lighting systems that save energy.

TECHNOLOGY

Improving the technology used by retrofitting or replacing conventional lighting with energy-efficient ones.

- Lighting Retrofit or Replacement
- Solar Tubes

CONTROL

Optimising the operation of lighting systems by using lighting control devices.

- Dimmers
- Timers
- Photocell
- Motion and occupancy sensors



LIGHTING TECHNOLOGIES

LIGHTING RETROFIT/REPLACEMENT

DESCRIPTION

Light Emitting Diode (LED) lamps have revolutionised energy efficient lighting. They are solid-state lighting elements that are extremely energy-efficient. Retrofitting existing lighting such as fluorescent tubes, incandescent lamps, and halogen lamps with LED lighting will result in substantial energy savings.

Advantages of LED Lights:

- Increased lifetime: LEDs last up to 30,000 hours - 50,000 hours, reducing the need for frequent replacements.
- Reduced heat generation: LEDs generate less heat than the conventional light sources, reducing the facility's cooling load.
- Substantial power reduction: LEDs require lower power compared to conventional light sources resulting in savings of up to 80%.



BUILDINGS OF APPLICATION



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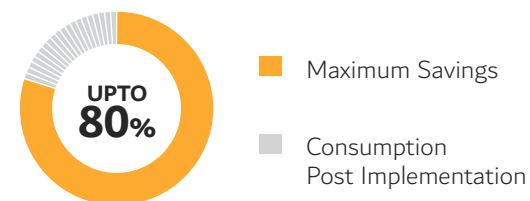


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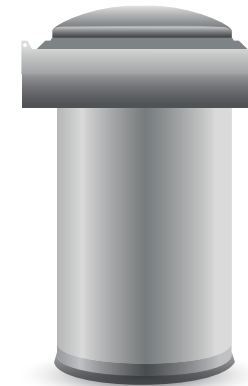
LIGHTING TECHNOLOGIES

SOLAR TUBES

DESCRIPTION

Solar tubes are reflector tubes that help capture sunlight and harvest daylight without increasing the thermal load of the building.

The solar tube is a simple device consisting of a collector dome assembly that collects sunlight. Light is then diverted to the required area using a tube made of different reflective materials. The diffuser at the end reduces the glare and helps remove the heat of the light.

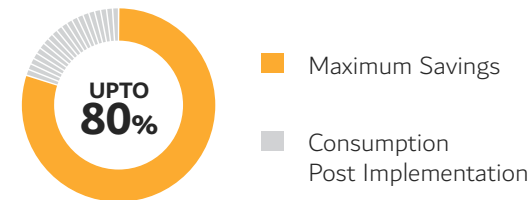


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LIGHTING CONTROL

LIGHTING CONTROL DEVICES

DESCRIPTION

Lighting control devices in rooms and areas can optimise their operations, improve efficiency, and make energy savings. Various typical lighting control technologies are summarised here:

Control	Description	Benefits	Drawbacks
Dimmer	Gives user the ability to vary the intensity of the light level.	<ul style="list-style-type: none">• Can be inexpensive• Fairly easy to install• Provides flexible light levels• Increases lamp life	<ul style="list-style-type: none">• Fluorescent dimming can be expensive
Timer	Keeps lights ON for a specific period of time. Once the countdown is complete, the lights turn off.	<ul style="list-style-type: none">• Fairly inexpensive• Mechanical or electronic• Electronic types can be programmable and adjust to daylight	<ul style="list-style-type: none">• Electronic type timers may not work with all fluorescent lamps due to incompatibility with their electronic ballasts.
Photocell	Senses change in outdoor light (lux) levels so exterior lights turn ON at dusk and OFF at dawn.	<ul style="list-style-type: none">• Can be integral to fixture, switch or stand alone	<ul style="list-style-type: none">• For best operation, they must be exposed to bright sunlight.• If not clean, will not sense sunlight and will keep lights switched-on during daytime.
Motion Sensor	Turns lights ON based on motion detection.	<ul style="list-style-type: none">• The lighting function and operation time is generally programmable.• Can be integral to fixture, switch or stand alone	<ul style="list-style-type: none">• If aimed improperly, small animals can trigger it to turn ON.
Occupancy Sensor Switch	Detects when a room becomes occupied and turns ON the lights automatically. If no occupancy is detected for a specified time, the lighting automatically switches OFF.	<ul style="list-style-type: none">• No need to remember to turn the lights OFF• Can be useful if the physical switch is inaccessible	<ul style="list-style-type: none">• Typically more costly than timer• False OFFs can occur if sensor placement is not appropriate

Note: It's always recommended to check the lamps/lights compatibility with the control device before installation.

All the above control devices can be installed in a stand-alone configuration as well as, can be integrated with a Building Management Systems (BMS). The BMS integration will promote better overall integration and monitoring of the operation of the field control devices and of the lighting equipment.

BUILDINGS OF APPLICATION



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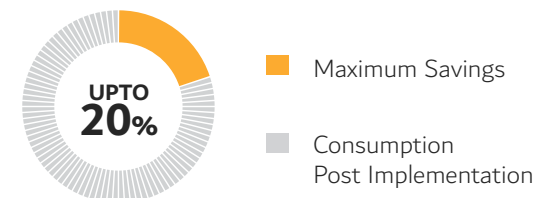


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3. HVAC SYSTEMS

HVAC systems are responsible for about 70% of the building energy consumption, and is the primary focus of energy efficiency activities.

TECHNOLOGY

Efficient technologies focus on improving system performance.

Measures Include:

- AC Replacement - VRF System
- AC Replacement - Inverter Split
- AC Compressor Optimisation Retrofit
- Refrigerant Additive
- Evaporative Cooling For Chiller
- DC Motors for FCUs
- Vortex Condenser Sub-cooler
- Hybrid Evaporative Cooling

CONTROL

Control technologies help conserve energy by optimising system controls.

Measures include:

- Programmable thermostats
- Chiller Plant Manager (CPM)
- VFD / VFD for AHUs & FAHUs
- VFD / VSD for chilled water pumps
- Chilled Water Pump Operation Optimisation
- Differential Pressure Optimisation
- CO Sensors for Basement Exhaust Fans
- Timers for Exhaust Fans





TYPES OF COOLING SYSTEMS

Primarily, three types of cooling technologies are used

DIRECT EXPANSION

Also known as DX systems, these use the refrigerant cycle to directly cool air from the evaporator. These include:

- Window-mounted air conditioners
- Split air conditioners
- Inverter Split units
- Variable Refrigerant Flow (VRF) units
- Packaged AC
- Ducted split- air conditioners

CHILLERS

These systems use the refrigerant cycle to cool the water that in turn cools the air via air-side equipment.

Essentially all chillers will produce chilled water which cools the air inside in the building.

The condenser of the chiller itself needs cooling. In case the condenser of the chiller is cooled using air - the chiller is classified as an air-cooled chiller.

In case the condenser of the chiller is cooled by water, the chiller is classified as a water-cooled chiller.

DISTRICT COOLING

District Cooling Providers (DCP) provide chilled water to a group of buildings.

This chilled water is transported in insulated underground pipes where they cool the buildings with a heat exchanger.

The heat exchangers and secondary pumps are in customers' buildings, which provide chilled water to the local building circuit.

Generally, large water-cooled chillers are used, in district cooling plants.



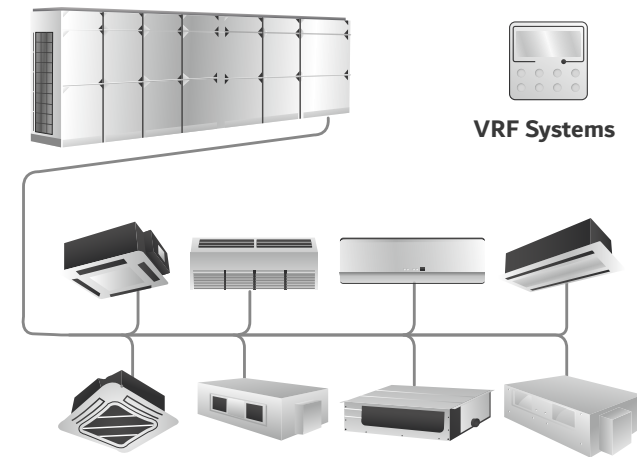
HVAC TECHNOLOGY

AC REPLACEMENT - VRF SYSTEM

DESCRIPTION

Variable Refrigerant Flow (VRF) systems are the latest technological advancement in Direct Expansion (DX) type air conditioners. The basic principal of operation is that the compressor operates according to the load requirement, as the compressor is installed with variable speed drive and able to regulate refrigerant flow rather than simply perform ON/OFF operations.

Typically, these units usually have multiple indoor units installed on a single outdoor unit.



BUILDINGS OF APPLICATION



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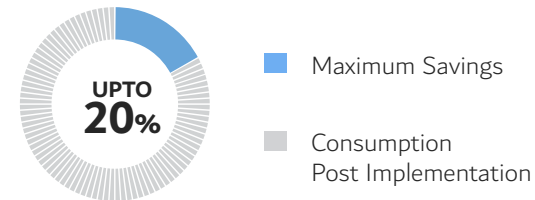


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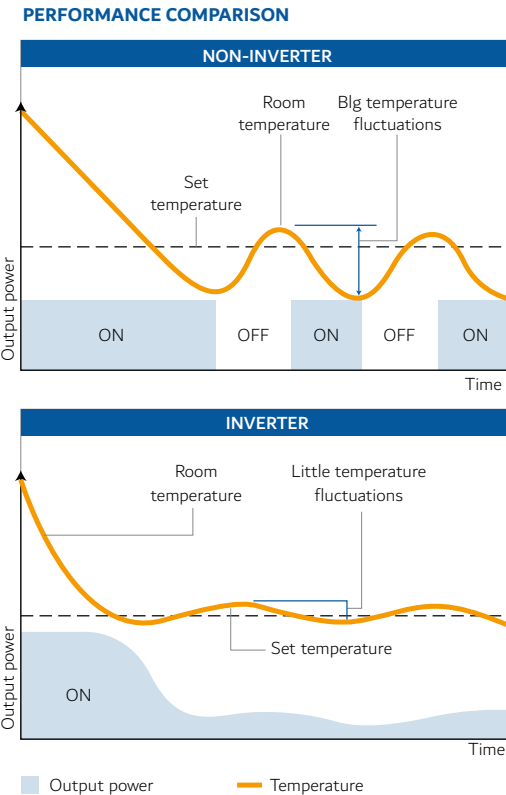
HVAC TECHNOLOGY

AC REPLACEMENT - INVERTER SPLIT

DESCRIPTION

This type of compressor uses a variable speed drive to control the compressor motor speed to modulate cooling capacity. Capacity modulation is a way to match cooling capacity to cooling demand.

These types have one indoor unit to every outdoor unit.



BUILDINGS OF APPLICATION



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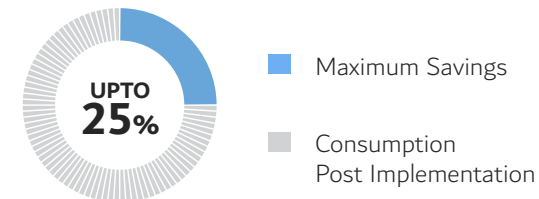


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HVAC TECHNOLOGY

AC COMPRESSOR OPTIMISATION

DESCRIPTION

AC compressor optimisation devices are retrofitted to the compressors of the existing ACs.

These devices are sensor driven and have software algorithms designed to detect the phases of thermodynamic saturation on the evaporator and accordingly optimise compressor operations.

Savings are made by reducing the overall runtime of the compressor, without changes in comfort conditions of the rooms.

These retrofits are usually installed on split or window air conditioners.

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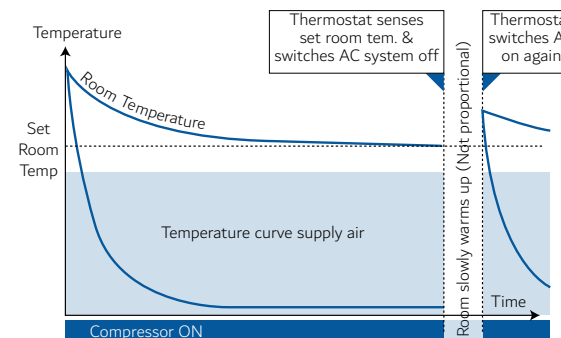


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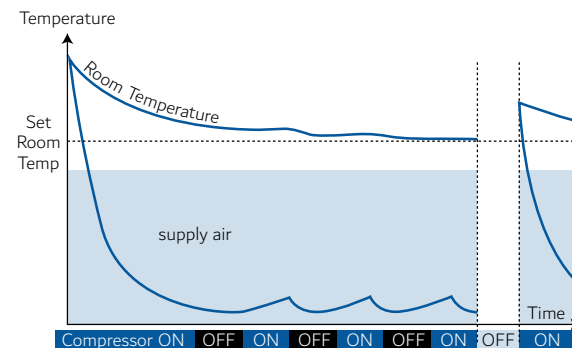


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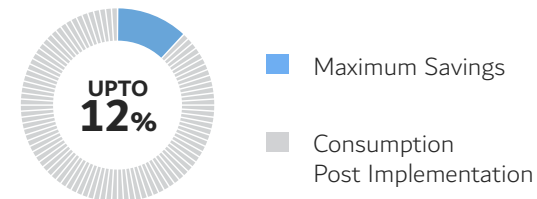
BEFORE OPTIMISATION



AFTER OPTIMISATION



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HVAC TECHNOLOGY

REFRIGERANT ADDITIVE

DESCRIPTION

Refrigerant additives are oil additives for the refrigerant cycle in the DX systems and chillers. They are chemicals that dislodge the layer of stagnant sludge that builds up inside the refrigerant's pipeline. It then forms a protective coating to reduce the possibility of future build-ups of sludge.

This will enhance the condenser's heat transfer capacity and lead to higher efficiency. This can save up to 10% for cooling equipment consumption: chillers, package units, split units and big refrigerators.

BUILDINGS OF APPLICATION



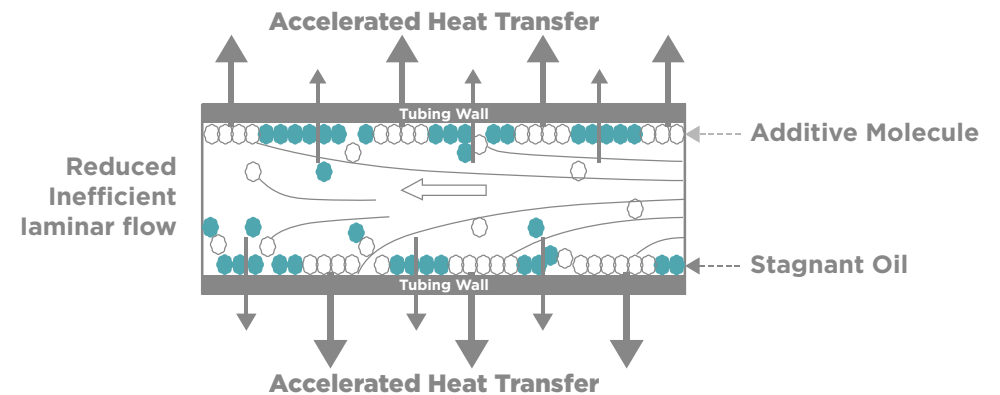
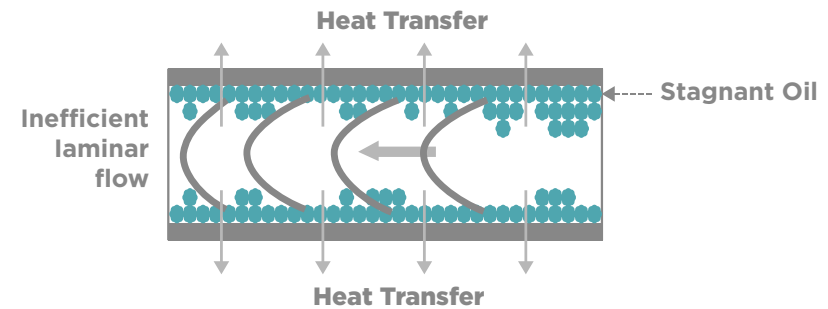
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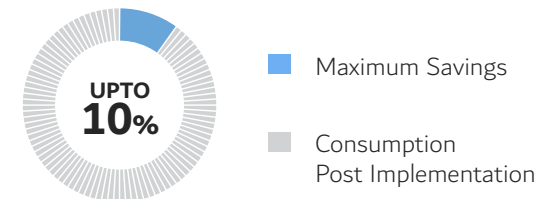
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HVAC TECHNOLOGY

EVAPORATIVE COOLING FOR CHILLER

DESCRIPTION

Evaporative cooling devices are retrofits for existing air cooled chillers. These create a cooler micro climate around the chiller by spraying fine droplets of water in a controlled manner onto specialised material surrounding the unit, resulting in cooler condenser air inlet temperatures.

Evaporative cooling systems should be linked to chiller operations and operate under the following conditions:

- Ambient temperature 28°C: start operation
- Relative humidity 70%: stop operation

There are two types of cooling systems:

- **Misters** produce a mist (droplets of water) onto a mesh that cool the air.
- **Wet Walls** - these are walls made up of special materials. Water passes over these walls, which surround the chillers. As air passes through them, it cools.

BUILDINGS OF APPLICATION

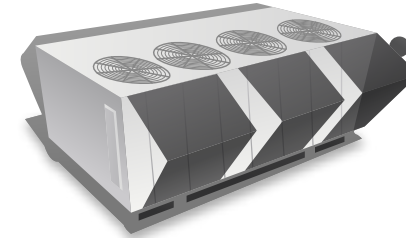


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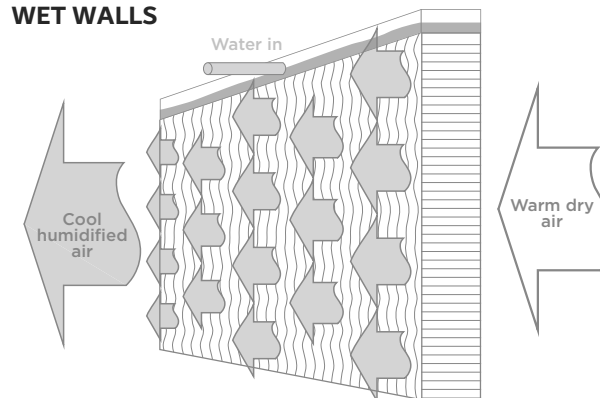


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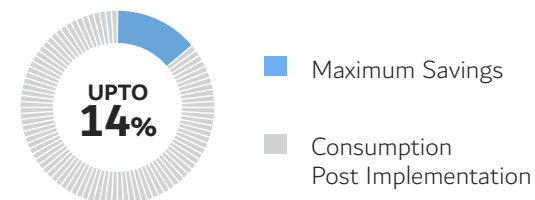
WATER MIST



WET WALLS



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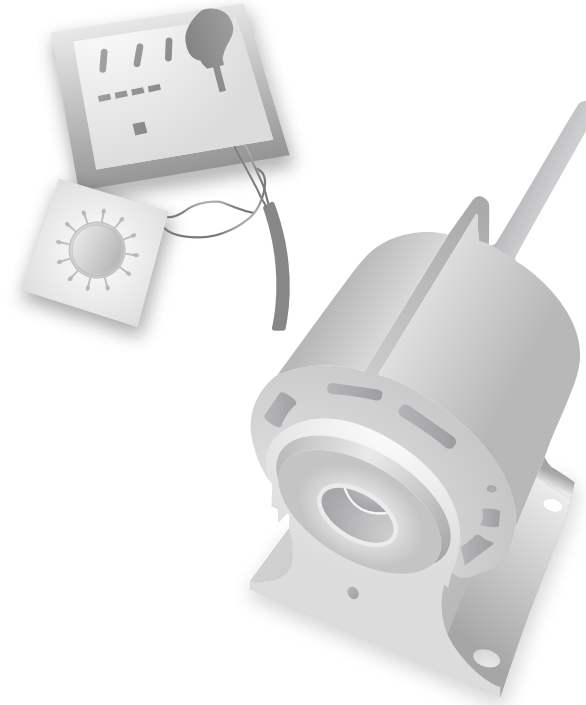
HVAC TECHNOLOGY

DC MOTORS FOR FCUs

DESCRIPTION

DC (Direct Current) motor saves energy in terms of capacity of the motor and its control as follows:

1. For the same airflow output of the FCU (Fan Coil Unit), DC motors use 30% less energy compared to conventional AC motors. DC motors are available with built in converters and can replace existing AC motors.
2. DC motors can be controlled to a greater degree of precision. They can integrate with Building Management Systems and operate at variable speeds depending upon demand and load.



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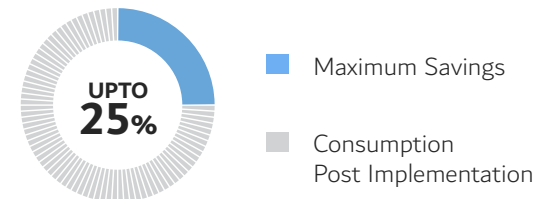


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HVAC TECHNOLOGY

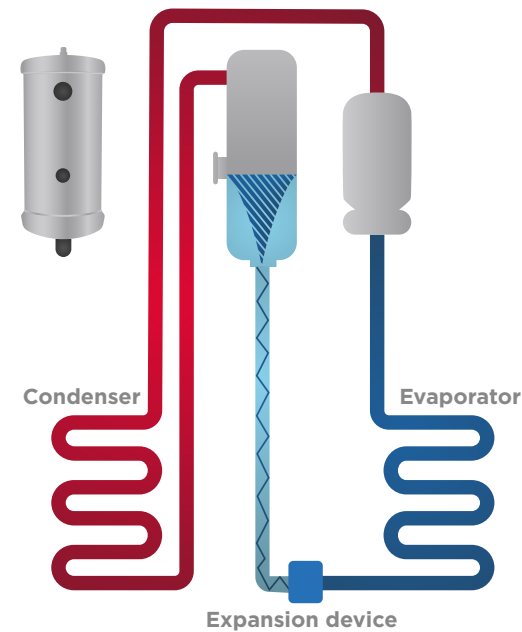
VORTEX CONDENSER SUB-COOLER

DESCRIPTION

A Vortex Condeser sub-cooler is a device that improves the performance of an air conditioner. Its main function is to increase the condenser's capacity by further sub-cooling the refrigerant. Due to this additional sub-cooling action, the overall load on the compressor decreases, resulting in increased capacity and lower energy consumption.

Vortex condenser devices can couple with a refrigerant volume control function, which also manages the volume of the refrigerant passing through the condenser. This increases its capacity and reduces energy consumption.

The retrofit is usually applicable to chillers.



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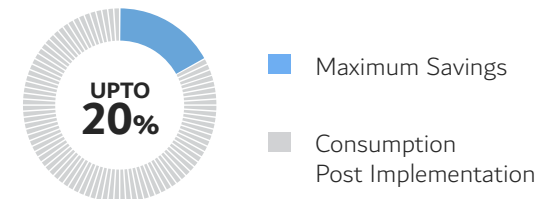


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HVAC TECHNOLOGY

HYBRID EVAPORATIVE COOLING

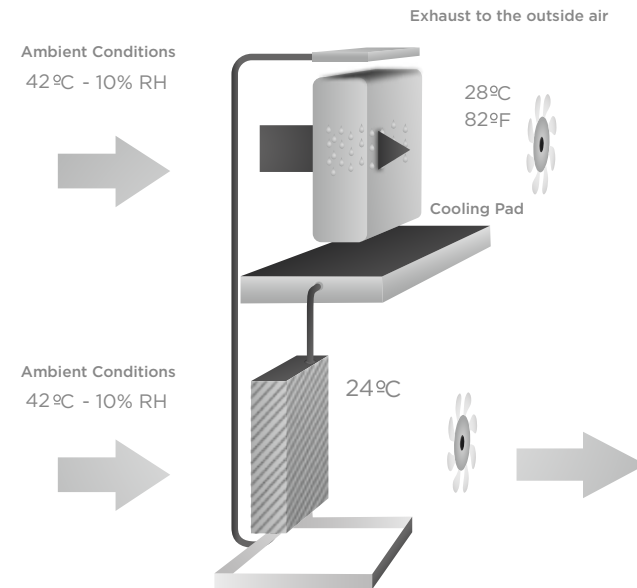
DESCRIPTION

The Hybrid Evaporative Cooling systems are standalone systems that can replace the Package unit (DX AHU) or ducted split unit.

It is called Indirect Evaporative Cooling (IDEC), as it uses evaporative cooling indirectly to pre-cool the primary air stream (supply air) without adding any moisture.

It uses secondary air / ambient air to cool the water by evaporative cooling. Then, this cooled water goes through a heat exchanger, where it cools the primary air stream (supply air). A fan then circulates the cooled primary air stream.

In Hybrid-IDEC systems, both indirect evaporative cooling and DX systems manage the cooling load. This increases the energy efficiency and reliability of the unit.



BUILDINGS OF APPLICATION

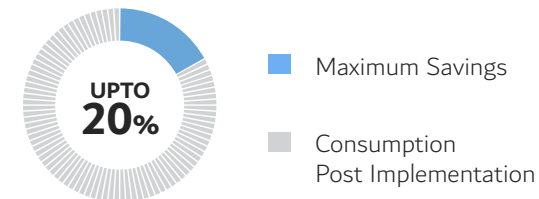


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HVAC CONTROLS

PROGRAMMABLE THERMOSTATS

DESCRIPTION

Programmable thermostats are devices that optimise the operation of air conditioners, by avoiding over-cooling and idle running in air conditioned areas to improve efficiency.

These are retrofit systems for existing thermostats. Users can programme the more advanced thermostat to meet their requirements.

This allows control of the set point temperature automatically by using sectionalized spaces and time schedules to make sure that the temperature is at optimum-energy-saving levels.

Some of the products can also allow the customer to centrally monitor all the AC operations and consumptions, over a smart phone or PC.



BUILDINGS OF APPLICATION

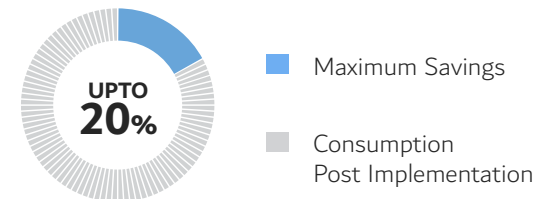


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HVAC CONTROLS

CHILLER PLANT MANAGERS (CPM)

DESCRIPTION

Chiller Plant Managers (CPM) can be installed independently or with a BMS. They manage the chillers and improve their operational efficiency. Their functions include:

- Chiller operation scheduling and sequencing: this is based on run time and loading.
- Loading management and load balancing: this maintains equal loading for all operating chillers.
- Dynamic Chilled Water Supply Set-point resetting: this depends on load, so as to maintain delta T.
- Managing Primary & secondary pump operation.

BUILDINGS OF APPLICATION



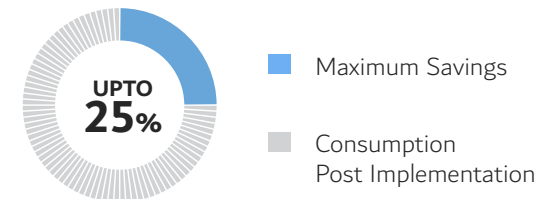
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HVAC CONTROLS

VFD/VSD FOR AHUs & FAHUs

DESCRIPTION

Variable Frequency Drives (VFD) or Variable Speed Drives (VSD) are installed on the supply fan of the Air Handling Units and Fresh Air handling Units to operate it at variable speeds according to a varying schedule or demand. This helps reduce unnecessary running of AHUs and FAHUs. This reduces consumption. It also indirectly affects/reduces the chillers' consumption.

The VFD / VSD can be installed with a feedback from field temperature sensors or CO₂ sensors to maintain CO₂ concentration in the recommended range of 800 PPM.

The VFD / VSD can be installed in a stand-alone configuration or can be installed and managed using a Building Management System.



BUILDINGS OF APPLICATION



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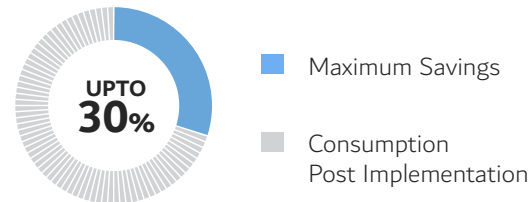


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HVAC CONTROLS

VFD/VSD FOR CHILLED WATER PUMPS

DESCRIPTION

Installing Variable Frequency Drives (VFD) or Variable Speed Drives (VSD) on Chilled Water Pumps (primary, secondary, etc.) allows them to operate at variable speeds according to a varying schedule or demand. Demand is sensed using a differential pressure sensor between the chilled water supply and return header. The differential pressure will change according to the demand in case of a system installed with two-way valves. In other cases with BMS, other feedback inputs like delta T can also be added to govern the VFD / VSD operation.

This helps to reduce both unnecessary running and consumption of the chilled water pumps.

BUILDINGS OF APPLICATION



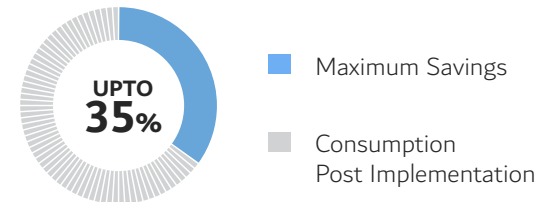
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POTENTIAL SAVING



HVAC CONTROLS

DIFFERENTIAL PRESSURE OPTIMISATION

DESCRIPTION

Differential pressure optimisation slows the operation of chilled water pumps, without any resulting cooling issues, for the best performance and the lowest energy use.

The differential pressure in the line ensures the optimum speed operation of the VFD / VSD. As the load decreases, the Differential Pressure (DP) also decreases. This means that VFD / VSD reduce pump speeds, to maintain the set- point of the DP.

DP set points can be over-engineered, so it is necessary to check the DP setting to avoid unnecessary running of the chilled water pumps.

In this case, it is best to install a DP sensor in the line and link the Sensor to the chilled water pump VFD / VSD. To optimise the differential pressure, the best thing to do is manually reduce its setting to achieve the lowest possible speed that meets users' cooling requirements. Repeat this process twice a year.



BUILDINGS OF APPLICATION

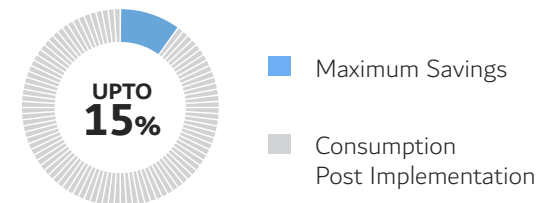


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HVAC CONTROLS

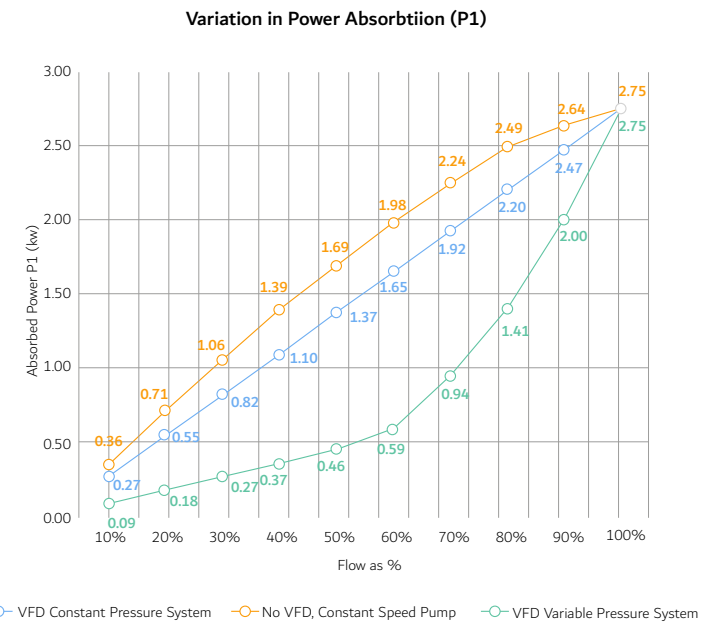
CHW PUMP OPERATION OPTIMISATION

DESCRIPTION

Chilled water pump optimisation provides better control of a pump to improve its efficiency.

Variable Pressure Control in Variable Flow Pumping Systems improve these controls. A variable pressure system (VPS) also allows the pump to oscillate between a maximum and minimum pressure, according to the flow requirement. This functionality results in operation nearer to the best operating curve of the pump, and save energy.

Pump operation optimisation is an alternative control measure to differential pressure optimisation and are not systems that work in parallel.



BUILDINGS OF APPLICATION

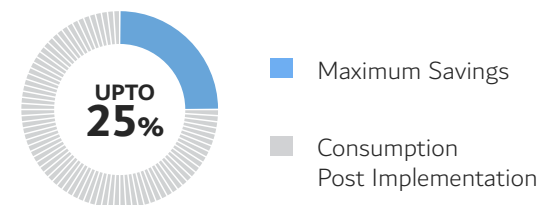


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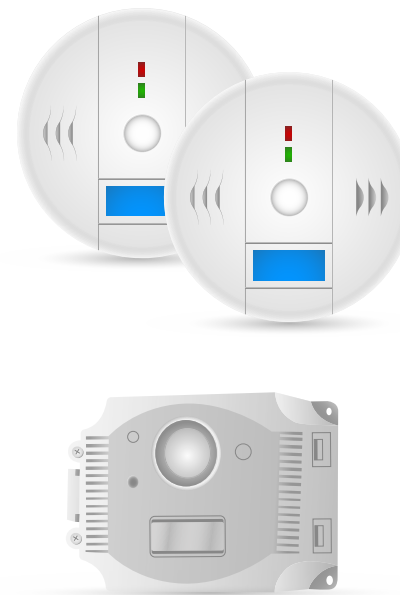
HVAC CONTROLS

CARBON MONOXIDE SENSORS FOR BASEMENT EXHAUST FANS

DESCRIPTION

Exhaust fan automation based on Carbon Monoxide (CO) sensors modulates its operation depending upon CO concentration inside the basement car park and only runs the fan when required. These systems are available as stand-alone systems or can be integrated with the existing BMS system.

CO concentration should be maintained below 50 parts per million as per Latest Dubai Green Building System (AI SA'FAT)



BUILDINGS OF APPLICATION

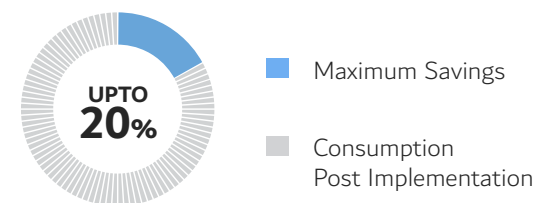


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HVAC CONTROLS

TIMERS FOR EXHAUST FANS

DESCRIPTION

Timers are a very low cost and effective solution to control the operation of exhaust fans. The exhaust fans can be switched off when not in use, such as at night or early morning.



BUILDINGS OF APPLICATION



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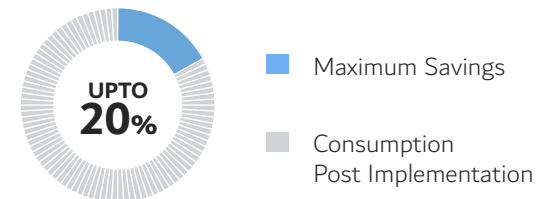


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4. WATER SYSTEMS

This section presents typical measures for water systems.

TECHNOLOGY

Water conservation measures use the following technologies.

- Low-flow fixtures
- Sensor-controlled faucets



WATER TECHNOLOGIES

LOW FLOW FIXTURES

DESCRIPTION

Most water-flow reducers are aerators. They mix air and water to maintain the pressure and to reduce water consumption. They can be installed on the faucet. Inline aerators can be installed directly in the water supply line. Currently, aerators with flow rates as low as 2 litres Per Minute (LPM) are available.

Fixture Type	Standard flow rate in LPM as per Dubai Green Building System (AI SA'FAT)
Basin faucet	6 LPM
Kitchen sink faucet	7 LPM
Health faucet	7 LPM
Shower	8 LPM
Dual flush	6 liters full flush, 3 liters part flush

The flow rates identified in the table are the maximum recommended flow rates. In practice, it is recommended to use further efficient (minimum) market available flow rates, as applicable.

BUILDINGS OF APPLICATION



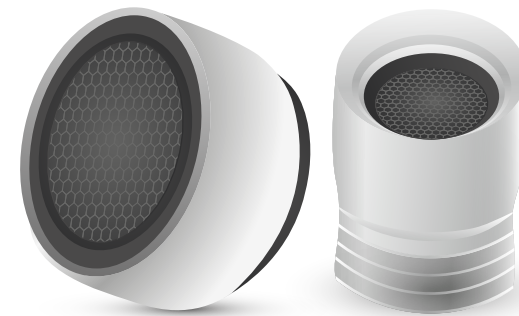
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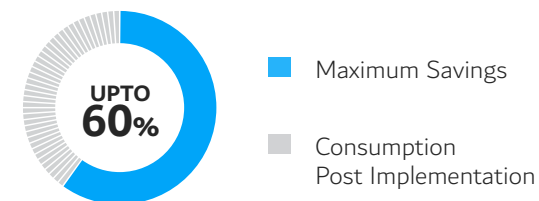
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WATER TECHNOLOGIES

SENSOR-CONTROLLED FAUCETS

DESCRIPTION

Sensor-controlled water faucets are an efficient way of limiting the overuse of faucets. These devices automatically cut off the water flow from the faucet, either after a lack of motion or a set time.

The faucets optimise operation times and save up to 20% on faucet water.



BUILDINGS OF APPLICATION

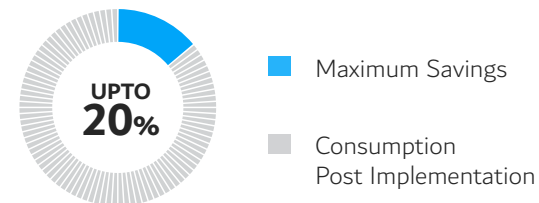


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5. BUILDING ENVELOPES

This section presents typical improvement measures for building envelopes: the elements of the outer shell that maintain a dry, heated, or cooled indoor environment and facilitate its climate control.

TECHNOLOGY

There are three technological measures for building envelopes:

- Paint Based Insulation and Coatings
- Advanced Window Control
- Window Tint



BUILDING ENVELOPE TECHNOLOGIES

PAINT-BASED INSULATION & COATING

DESCRIPTION

Paint base insulation are coatings sprayed or painted onto walls and roof of buildings to improve their thermal performance. With increased wall insulation, the heat load of the building reduces and leads to savings on HVAC loads.

Insulation coating:

- Increases wall insulation
- Reduces degradation of building elements resulting from excessive heat
- Protects against moisture, thermal bridging and conduction

BUILDINGS OF APPLICATION



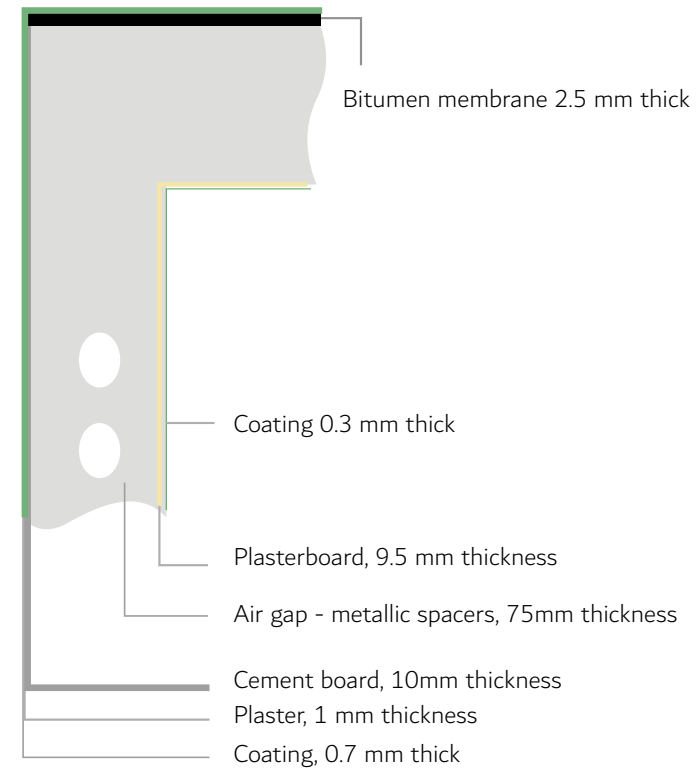
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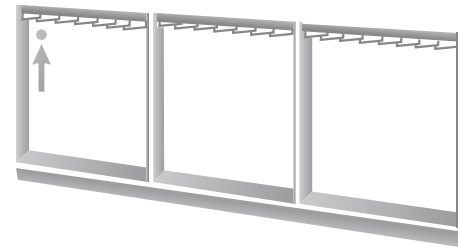


BUILDING ENVELOPE TECHNOLOGIES

ADVANCED WINDOW CONTROLS

DESCRIPTION

These new highly-insulated windows use sensors and microprocessors to automatically adjust shade based on available sunlight and the time of day. This provides the proper lighting and comfort, and saves energy and money.



BUILDINGS OF APPLICATION



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BUILDING ENVELOPE TECHNOLOGIES

WINDOW FILM

DESCRIPTION

Window film is a thin laminate installed on the interior or exterior of glass in buildings. It is a thermoplastic polymer resin made from polyester. It is used because of its clarity, tensile strength, dimensional stability, and ability to accept a variety of surface-applied or embedded treatments.

Films applied to the interior of flat glass windows reduce heat, infrared and visible light and ultraviolet radiation entering through the windows.

Due to their heat insulating properties, window films reduce the thermal load of the building and conserve energy. The savings potential depends on the Window-to-Wall Ratio of the building and the orientation of the application window.



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6. OTHER ELECTRICITY CONSERVATION MEASURES

This section covers general technologies for reducing electricity use.

TECHNOLOGY

- Energy management systems
- Heat pumps for heating swimming pools



OTHER ELECTRICITY CONSERVATION MEASURES

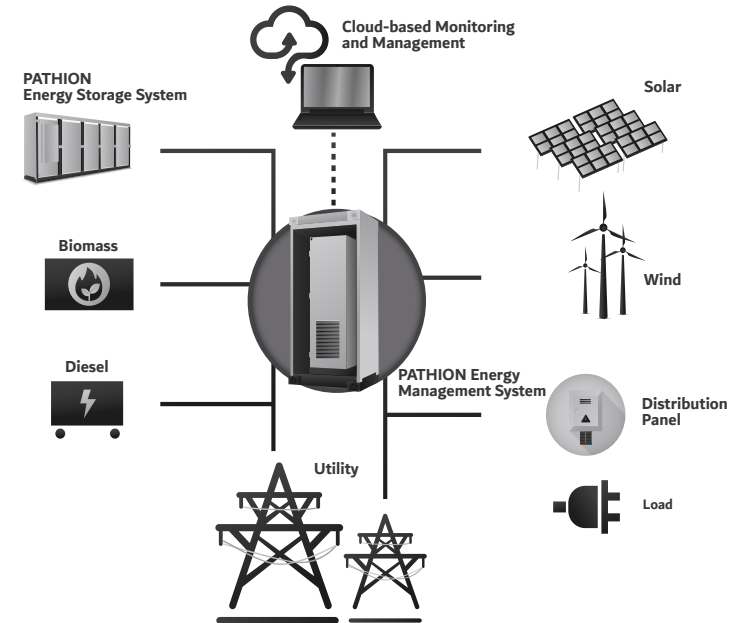
ENERGY MANAGEMENT SYSTEMS

DESCRIPTION

Energy Management Systems are comprehensive integrated web-based energy-management software with some peripheral hardware, such as non-invasive transducers, that measure electrical use. They help establish best practices across all energy functions including energy monitoring, scrutiny and surveillance. Some Energy Management Systems do not come with equipment controls. This means they require a building management system to operate them.

The EMS software collects data from the electricity used in buildings to analyse operational consumption patterns and identifies ways to reduce it when used inefficiently, or unnecessarily. As well as reducing electricity bills, a BMS can help prolong the life of electrical equipment in buildings.

This system can be installed independently or integrated with existing BMS.



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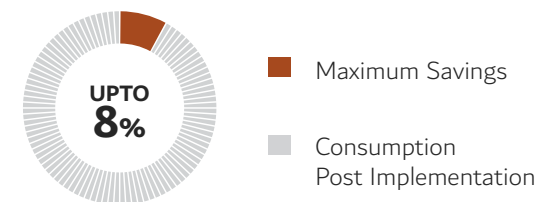


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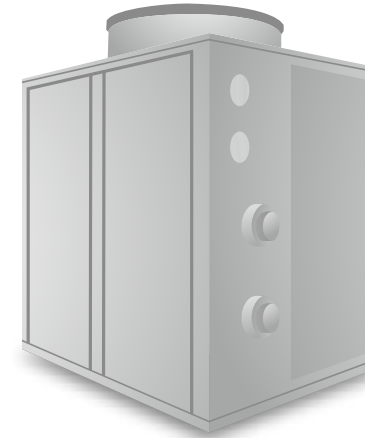
OTHER ELECTRICITY CONSERVATION MEASURES

HEAT PUMPS FOR SWIMMING POOL

DESCRIPTION

Pool heat pumps can cool as well as heat water. When heating water, pool heat pumps transfer the heat from the ambient air surrounding the unit to the water. When cooling it, the pumps remove the heat from the water.

Generally, heat pumps are more expensive than normal gas or resistance electric heaters. However, the cost to run a heat pump is dramatically lower than the gas or electric heater.



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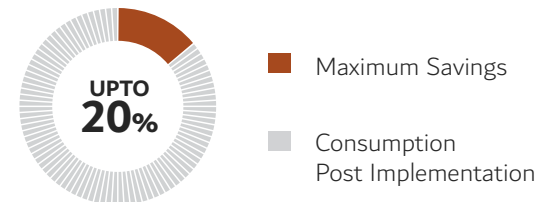


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7. NEXT STEPS

We hope that you have found these explanations of the various electricity and water conservation measures useful and informative.

If you are considering installing or implementing any of these measures, we do recommend that you arrange for a feasibility study for your premises.

If you need a comprehensive solution starting from energy auditing to performance contracting, such as financing, implementation, operation, maintenance and saving guarantee, you should approach specialised energy service companies like **EtiHAD ESCO**.



CONTACT DETAILS OF ETIHAD ESCO

Address

EtiHAD Energy Services Company (EtiHAD ESCO)
PO Box. 37578, Dubai,

United Arab Emirates.

TEL: +971 (0) 4 820 9066

<https://etihadesco.ae>

Additional Tips

You can also find low- and no-cost energy efficiency tips on our website, which outlines the sustainable habits and best practices, at:

<https://www.dewa.gov.ae/en/consumer/Sustainability/sustainability-and-conservation>





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