Coolnomix® Solution

Reducing carbon emissions locally and globally

Contents

About Emissis

Reducing carbon emissions locally and globally

We are an energy and cleantech company with over 120 years' electrical engineering experience, providing proven technology to businesses worldwide. We design, supply, install and maintain a range of solutions aimed at helping private and public sector businesses to achieve more with their energy reduction strategy and the transition to becoming a net zero carbon operation.

Our management team have developed a wealth of experience and technical expertise in electrical, mechanical and energy related services and technology. Whilst our head office is based in the UK we work across Europe and other regions of the world alongside trusted partners.

Our core solution for reducing carbon emissions is COOLNOMIX®; an air-conditioning and refrigeration energy optimisation technology. Emissis is the exclusive supplier of the COOLNOMIX device in the UK + Ireland and several other regions around the world including mainland Europe, the Middle East and United States. We also supply, design and project manage commercial battery energy storage systems, domestic solar + battery systems and electric vehicle charging poles and stations at business premises via our strategic partnership with Enel X.

We are proud of our team of experienced power engineers and project managers who offer best in sector engineering, installation, commissioning and maintenance capabilities; and our global COOLNOMIX partners.

Reducing Emissions

Decarbonisation

Climate change is the most serious and threatening global environmental problem. It is a fact that our modern lives and industrialisation are contributing significantly to climate change through the emission of carbon dioxide and other dangerous greenhouse gases (GHG).

To keep the increase in global temperature below 2°C, compared to pre-industrial levels, the European Council's objective is to reduce GHG emissions by 80-95% by 2050 as compared to 1990. Taking into account the necessary efforts from developing countries, this should enable a global reduction of 50% in GHG emissions by 2050.

The UK government has set the global benchmark by enshrining into law a target of net zero by 2050 and is the first major economy to do so. Many more governments are expected to follow this move. In fact, the EU is now actively working on plans to also go climate-neutral by 2050.

Emissis believe that while the UK has net zero in place and the path ahead is not yet completely clear, businesses both large and small can start to navigate their own transition to net zero today and reap the benefits immediately.

Environmental awareness is increasing rapidly amongst the public and within the business community. In particular, many large and intensive energy users have seen this shift in opinion, felt the pain with ever-increasing energy prices and have also faced the brunt of many government decarbonisation policies and are therefore placing more emphasis on reducing carbon emissions and sustainability, but not all businesses treat sustainability and decarbonisation equally.

continued...

In recent times, large businesses have had to report on GHG emissions through regulations and EU directives such as the Carbon Reduction Commitment (CRC) and the Energy Savings Opportunity Scheme (ESOS). In the UK, more businesses than ever before are now having to report on carbon emissions due to the introduction of the Streamlined Energy and Carbon Reporting (SECR) which will affect an estimated 11,900 businesses starting on or after the 1st April 2019, depending on each business' accounting year.

SECR builds on, but does not replace, existing requirements that companies may face such as mandatory GHG reporting for quoted companies, ESOS, Climate Change Agreements (CCA) Scheme, and the EU Emissions Trading Scheme (ETS). SECR extends the reporting requirements for quoted companies and mandates new annual disclosures for large unquoted and limited liability partnerships (LLPs).

These requirements, and others like them outside the UK, are all important in the journey to decarbonise our economies and enable governments and stakeholders to see what progress is being made.

more businesses than ever before are now having to report on carbon emissions

Emissis believe that every business, no matter how small, has a role to play in tackling emissions from making simple sustainability goals to deploying technology that can cut energy usage and therefore reduce emissions.

We all need to take our share of the load in decarbonisation, even if it is not a legal requirement for your business.

While it's easy to say this, Emissis understands that solutions need to be practical and cost-effective with an attractive payback. Acting today will reward you with cost and carbon savings, as well as other benefits such as reputational uplift which can lead to more customers, attracting ethical investment and more.

True Cost of Cooling

"Growing demand for air-conditioners is one of the most critical blind spots in today's energy debate. If left unchecked, energy demand from air-conditioners will more than triple by 2050. The answer lies first and foremost in improving the efficiency of air-conditioners, which can quickly slow down the growth in cooling-related electricity demand. Indeed, the opportunity for efficient cooling lies in the market's current inefficiencies: there are huge disparities in the efficiencies of air-conditioners sold today across the globe."
Fatih Birol, Executive Director, IEA (2018)

'Rising demand for space cooling is already putting enormous strain on electricity systems in many countries, as well as driving up emissions...increased AC loads push up not only overall power needs, but also the need for generation and distribution capacity to meet demand at peak times, placing further stress on the power system.

	Europe	United States
Output - installed capacity	654 GW	2,430 GW

Non-residential air-conditioning and cooling installed stock, 2016

Averaged across all countries, space cooling accounted for around 14% of peak demand in 2016. Building, maintaining and operating electricity capacity to meet that peak demand is very expensive because it is used only for limited periods, and this drives up overall costs. Meanwhile, CO2 emissions from cooling have tripled since 1990 to 1,130 million tonnes (Mt), equivalent to the total emissions of Japan.

Final energy use for space cooling in buildings worldwide more than tripled between 1990 and 2016 to 2,020 terawatt hours (TWh). The share of cooling in total energy use in commercial buildings rose to 11.5% in 2016, up from 6% in 1990...energy efficiency offers a cheaper path to a sustainable energy solution for growing cooling demand, rather than thinking simply in terms of building additional clean power supply to meet inefficient AC demand.' IEA, Future of Cooling report (2018).

	TWh			
	1990	**2000**	**2010**	**2016**
European Union	63	100	149	152
United States	339	448	588	616
Japan	48	100	119	107
Korea	4	17	34	41
Mexico	7	16	23	37
China	7	45	243	450
India	6	22	49	91
Indonesia	2	6	14	25
Brazil	10	19	26	32
South Africa	4	6	6	8
Middle East	26	49	97	129
WORLD	608	976	1,602	2,021

World final energy consumption for space cooling in all buildings by country/region.

COOLNOMIX can save up to 40% of the energy consumption on all types of air-conditioning units. Installed across all commercial settings, COOLNOMIX could save 6.9 TWh in Europe alone.

Coolnomix

Reduce the energy consumption of your air-conditioning and refrigeration without affecting the output you need

Stay cool, save money and reduce your business' carbon emissions
We can deliver up to 40% electricity savings without getting hot

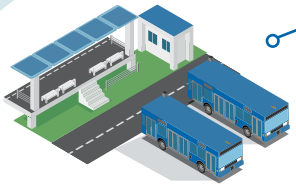
We help businesses to make big energy and carbon savings without changing cooling needs so that your building users are kept comfortable, equipment stays cool and your produce remains chilled.

COOLNOMIX is British designed technology that is maintenance free and can be easily installed by our qualified engineers with no disruption to your operation. You can expect up to 40% energy saving on your air-conditioning and up to 30% on your refrigeration without your cooling output being affected.

We keep your people, equipment and produce cool, and your energy budget from overheating

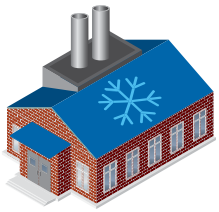
Industries

COOLNOMIX can help any business who uses air-conditioning to cool environments or refrigeration to keep produce chilled. We have installed COOLNOMIX in many different businesses. Here is an example of just some of the sectors that can benefit from energy savings and a reduction in carbon emissions with COOLNOMIX.

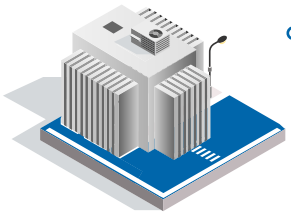


Airports / Transport Hubs

Cold Stores



Data Centres



Hotels

Hospitals / Health Centres

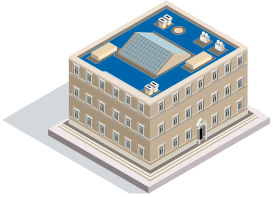
Supermarkets / Retail

Manufacturing

Offices / Commercial

Universities / Education

Venues / Museums



Applications

Air-Conditioning

- Commercial split type air-conditioners e.g. wall-mounted and cassette based
- Package based and double expansion DX units up to the largest sizes
- Ducted air-conditioners with AHUs
- Inverter based VRV and VRF air-conditioners

Refrigeration

- Industrial refrigerators used in the manufacturing sector e.g. food processing and pharmaceuticals
- Walk-in refrigerators used in the food and beverage sector
- Retail sector refrigerators e.g. vegetable and dairy display units, cold drink cabinets, wine warehousing refrigeration

Cooling

- Data Centres
- Comms Rooms
- Server Rooms

World beating energy and carbon savings

In operation COOLNOMIX delivers

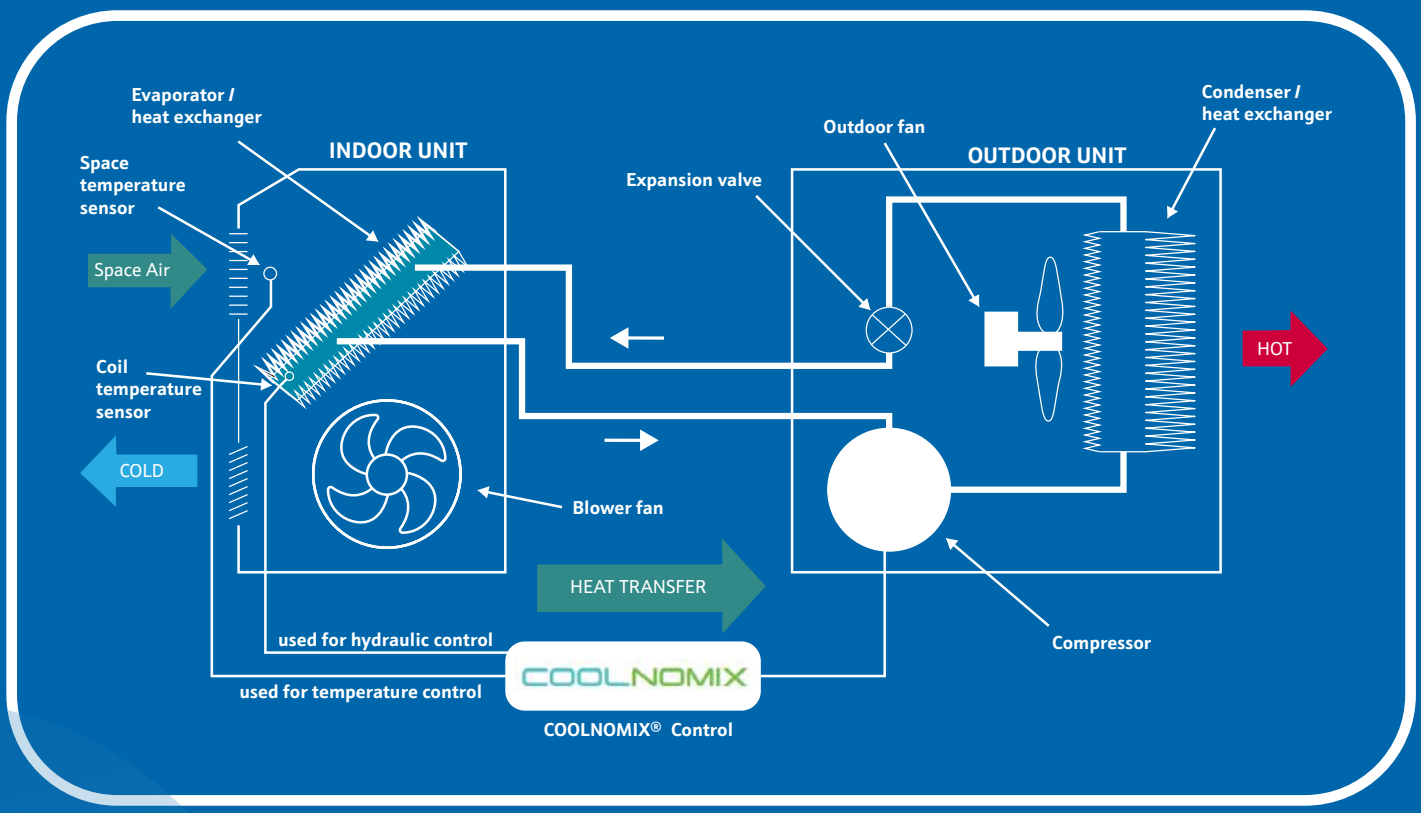
- Does not affect the air-conditioning unit as it is installed inline with the thermostat and provides more accurate temperature control
- Responds dynamically to any change in heat load optimisation of the running time of the compressor to minimise energy consumption
- Outstanding energy savings, even on the largest and most modern inverter-based cooling technologies
- A rapid return on investment, paybacks are typically within 12 months
- Reduced carbon emissions

Technical

In most air-conditioning applications, a lot of energy is wasted because the unit's compressor (the main running cost component) runs much longer than is needed. Using our patented process called Optimized Refrigerant Supply® (ORS®) the advanced COOLNOMIX® control device reduces the run-time of the cooling system compressor, therefore, reducing electricity consumption even in the most demanding high and humid environments.

The COOLNOMIX® ORS® technology uses two temperature sensors in an algorithmic energy trading control arrangement to monitor the thermodynamic (room or space temperature) and the hydraulic (refrigerant supply) performance of the connected air-conditioning or refrigeration system.

In operation, this algorithmic energy trading approach first uses the room or space temperature sensor to ensure that a required setpoint has been achieved. Subsequently, this temperature sensor ensures that the space is maintained within +/-0.5°C (+/-0.9°F) of the required setpoint. Meanwhile, a second temperature sensor connected to the indoor evaporator coil is used to identify when the compressor has done its useful hydraulic work in producing a supply of high-pressure liquid refrigerant. Using the built-in algorithmic energy trading control, the COOLNOMIX® ORS® advanced system then starts and stops the compressor at appropriate times to optimise running costs.



Main features

- Non-invasive Intelligent thermostat with dual temperature sensors
- Auto-detection of cooling and reverse cycle operation
- Sixteen user selectable operating temperatures
- Built-in audible alarm in the event of a cooling failure (alarms can be silenced or turned off)
- COOLNOMIX App. for monitoring and remote control
- Retrofit solution installed in 2 hours by qualified installer with no disruption
- Local isolation bypass on/off switch

Main benefits

- Unrivalled energy-saving performance
- Up to 40% reduction in electricity use
- Reduced carbon emissions
- Fast Return on Investment
- App. displays kWh/CO2e data and remote switch
- Improved temperature stability
- Improved air quality and comfort assurance
- Zero dripping or icing up
- Reliable high-impact technology
- 24-hour support and a three-year warranty

Funding

Smith Bros (CAER CONAN) WHOLESALE LTD

AngloScottish ASSET FINANCE

Our distribution and logistics partner Smith Bros provide a range of funding solutions tailored to meet your business' needs.

The minimum term rental agreement is proving to be the most popular solution with benefits including:

- Low initial outlay - For a minimum capital outlay you can receive the immediate benefits of reduced energy bills and significantly reduced carbon emissions
- Flexibility - Rental payments and lease periods can be designed to match your cash flow
- Tax-efficient - Lease/rental agreements can usually be set off against pre-tax profits
- Reduce costs - Reclaim VAT on rentals

Working together with the Anglo Scottish Asset Finance team you can be assured of finding a solution that works best for your business.

Sample Trial Data Report

Midlands University, UK

Report compiled by Tim Twohig, UK General Manager, Emissis.

Introduction

Emissis were invited to conduct a site survey to assess the suitability of COOLNOMIX being integrated into the existing university's DX cooling systems, and any other potential issues that could improve the efficiency within the rooms.

A COOLNOMIX device was fitted to a Mitsubishi PKA.RP71KAL unit for a trial period and monitored with a standard kWh meter. The trial took place across April & May.

Room Overview

The room being surveyed was a lift motor room and comms room with multiple racks and a lift motor plus control panels. The cooling unit was blowing cold air from high level towards the racks.

The air-conditioning unit was set to 22°c.

The general opinion of the current room layout and cooling is that it is sufficient for the load currently seen.

Temperature Readings

The unit within the room was set to 22°c and running adequately.

The below readings were taken to ascertain suitability for the COOLNOMIX device.

Data Hall	Unit 1		Unit 2		Unit 3		Unit 4	
Environment	Min	Avg	Min	Avg	Min	Avg	Min	Avg
Set Point	22.0							
Cooled Room Temp		23.0						
Return Air Temp		21						
Min Cold Air Temp		13.7						
Temp Delta	9.3							

Having a temperature delta of >7 gives us confidence that COOLNOMIX is suitable.

COOLNOMIX Energy Optimisation Systems

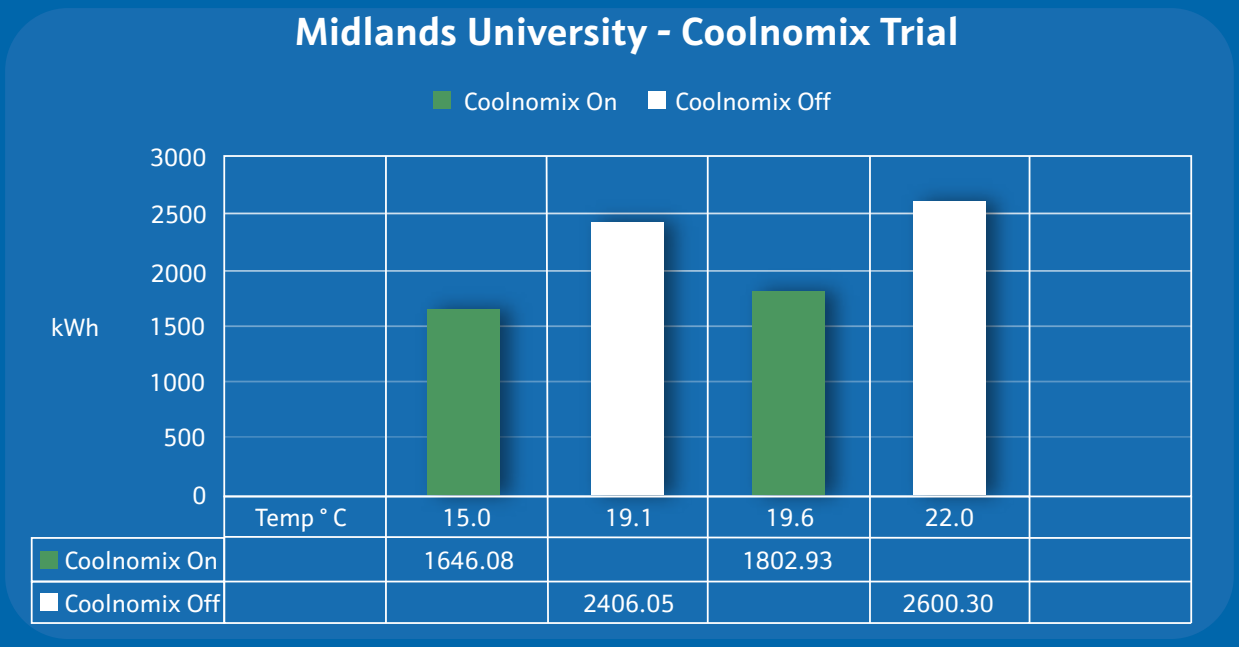
With the unit having some spare capacity suitable for the COOLNOMIX installation, the test was set up to operate on COOLNOMIX and in 'normal' operation, with on-site monitoring reading kWh usage and environmental conditions during the trial. The data below shows that good savings are achievable.

Calculation results

The kWh usage of one unit clearly show good savings over both periods with COOLNOMIX attached and having been tested for both on/off scenarios over a 6-week period.

kWh Readings		Status	kWh Usage	Temperature
19/04 – 02/05 (12days)	26.0 – 83.5	On COOLNOMIX	57.5	15.0°C
02/05 – 11/05 (10days)	83.5 – 142.3	Normal operation	58.8	19.1°C
11/05 – 25/05 (12days)	142.3 - 213.1	On COOLNOMIX	70.8	19.6°C
25/05 – 06/06 (12days)	213.1 - 298.3	Normal operation	85.2	22.0°C

By extrapolating the data, creating equal usage periods, into a graph format we can show that over time COOLNOMIX is making a considerable saving on the energy usage.



	Temp ° C	15.0	19.1	19.6	22.0	
Coolnomix On		1646.08		1802.93		
Coolnomix Off			2406.05		2600.30	

This is clearly shown, when comparing similar outside temperatures, the graph shows that when COOLNOMIX is not connected the air-conditioning unit was using 33.5% more energy than when COOLNOMIX is connected and operating.

As outside air temperatures also increase during the summer season, COOLNOMIX will deliver significantly more energy savings during this warmer period.

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Services

DISCOVERY

Initial discussion to evaluate and review COOLNOMIX and benefits to client business & operations.

ASSESSMENT

Desk based review of client business:

- Energy/carbon targets
- Energy costs/rates
- Requirement for cooling/chilling
- Hours of operation

BUSINESS CASE

Energy and carbon savings, cost analysis and expected ROI; wider benefits.

SITE EVALUATION

Site visit or sample site reviews to plan installation and meet project team.

EXECUTION

Project Management and Installation.

Discovery & Assessment

Initial discovery and desk assessment will evaluate and review if and how COOLNOMIX can help your business to reach its energy and carbon emissions reduction strategy. We will collect relevant data from you in order to get a strong understanding of your operation/site(s). This will allow us to quickly verify the potential of COOLNOMIX and the immediate direct benefits in line with your goals.

Business Case

Using the information gathered from Discover & Assessment we will build a business case demonstrating the direct benefits of COOLNOMIX and how it can help you achieve your energy and carbon emissions reduction goals. The business case will outline the Return-on-Investment projection and payback.

Site Evaluation

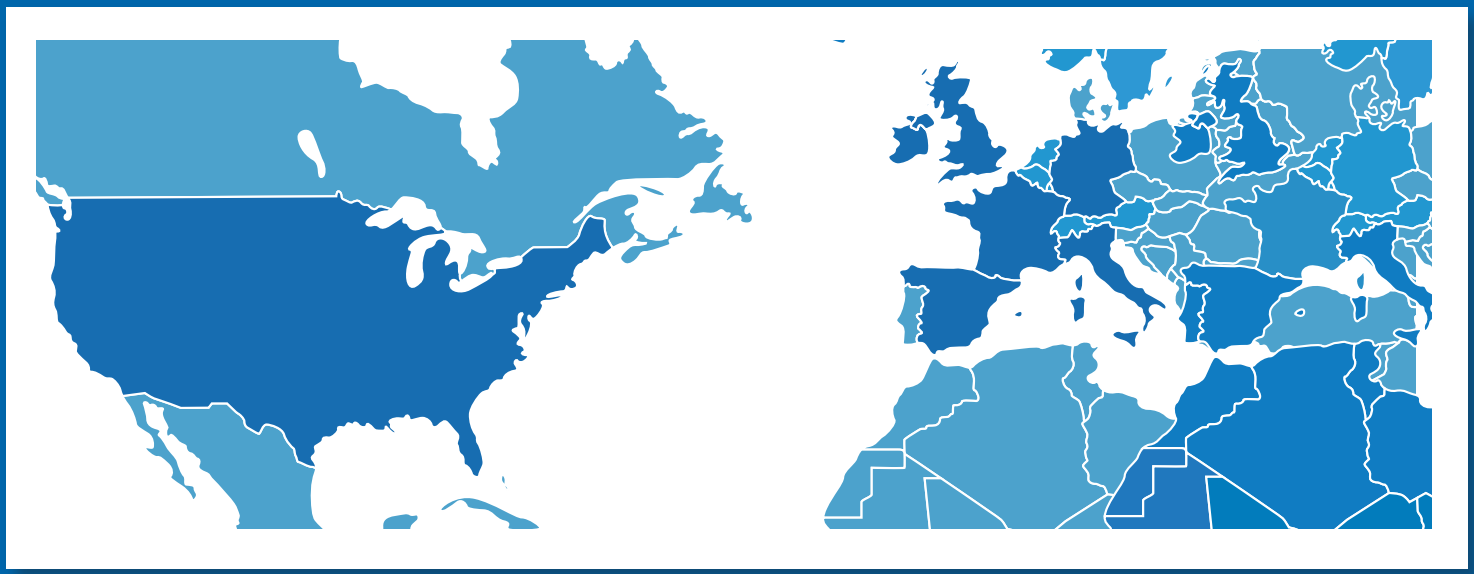
We offer a 'no charge - no obligation' assessment programme that will explore your operation/site(s) suitability for COOLNOMIX. We can arrange to meet you and your team at your site(s) to make a physical and engineering assessment.

Execution

Professional project management processes are critical to the timely and effective delivery of projects. You can be rest assured that our team of project managers and installation team of qualified engineers will deliver the project as planned and agreed. We will manage all aspects of your project, with emphasis being on expert workmanship carried out safely and to the highest standards.

Exclusive Distribution

- United Kingdom
- Ireland
- France
- Italy
- Germany
- United States
- Spain
- Lebanon
- Egypt
- Cyprus



"The European Union has already started the modernisation and transformation towards a climate-neutral economy. The European Commission is stepping up the efforts as we propose a strategy for Europe to become the world's first major economy to go climate-neutral by 2050. Going climate-neutral is necessary, possible and in Europe's interest."

MIGUEL ARIAS CAÑETE, Commissioner for Climate Action and Energy, European Commission.

Quality Policy

We continually aim to provide excellent services to our customers and deliver solutions & projects both on time and within budget. We operate under a Quality Management System that has attained ISO9001:2008 certification.

We are committed to

- Consistently achieving and improving the Quality Management System
- Continually improving the effectiveness of the Quality Management System

We have a continuing commitment to

- Ensure that customer needs and expectations are determined and fulfilled with the aim of achieving excellence in customer satisfaction
- Communicating throughout the organisation the importance of meeting customer needs and legal requirements
- Establish the Quality Policy and its objectives
- Conduct management reviews of the effectiveness of the implementation of the Quality Management System
- Ensure the availability of resources

All personnel understand the requirements of the quality policy and abide with the contents of the quality manual. In addition to all UK and EU legislation and regulations, Emissis complies with all legislation specifically related to its business activities.

We constantly monitor the quality performance and implement improvements where appropriate to ensure our quality policy's continuing suitability.

Environmental Policy

Emissis is committed to preventing pollution and to complying with all relevant environmental legislation, regulations and other environmental requirements relevant to each region of the world we operate within.

We regularly evaluate the environmental impact of our activities, products and services and we strive to continually improve our environmental performance in relation to changes in best practice and legal requirements.

It is our policy to

- Minimise the use of energy, water and natural resources
- Minimise waste through prevention, re-use and recycling where possible
- Dispose of waste safely and legally
- Avoid the use of hazardous materials, where practical
- Work with environmentally responsible suppliers
- Prevent environmental damage and minimise nuisance factors such as noise and air pollution

We will define environmental objectives, targets and improvement actions that are related to this policy and to our significant environmental aspects. We will regularly evaluate progress.

We are committed to providing relevant environmental training and promoting environmental awareness to employees and, where appropriate, to suppliers and to communicating our environmental performance.

We will implement processes to prevent environmental non-conformities and to ensure that we are prepared to deal with potential environmental emergencies.

This policy will be regularly reviewed and updated to take account of organisational priorities and changes, environmental legislation and best practice.

Industry Certification

ISO 9001 - 2008 (Quality Management System) for the Supply, Installation and maintenance of electrical power resilience and energy management equipment. Certificate number 14122140.

ISO 14001 - 2004 (Environmental Management System) for the Supply, Installation and maintenance of electrical power resilience and energy management equipment. Certificate number 14122141.

NECEIC approved electrical contractor meeting BS7671 regulations. Certificate number 607974000.

Constructionline. Pre-qualification system and standards for public sector and private procurement. Registration number 00315887.

SafeContractor Approved -
Alcumus Certificate number UG3970.

Portfolio

We have enjoyed working closely with many private and public businesses both large and small over the years. We pride ourselves on expert workmanship and excellent service, keeping customers delighted. Here are just a few of them...

Testimonials

"I am very happy with the substantial energy savings that your system has provided on our air conditioning and I am keen to keep working with you on installing more units."

Tariq, Director, SUBWAY

"I didn't realise how inefficient our airconditioning units were until we saw the data you provided for the Coolnomix trial. It was also good to see the energy savings you achieved in our cold rooms."

Paul, Facilities Manager, Food Company

"The energy savings you suggested before the refrigeration trial and the actual bigger savings during the trial have given me and the team confidence to start planning more work with you using your Coolnomix. Thank you"

Simon, Energy & Sustainability Manager, Food Retailer

"I am very impressed with the Coolnomix device, in particular with its proven performance to deliver energy and cost savings continuously for our clients. Coolnomix has surpassed my expectations and we are actively endorsing it to our entire client base."

Alex, Global Energy Manager, Sodexo

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