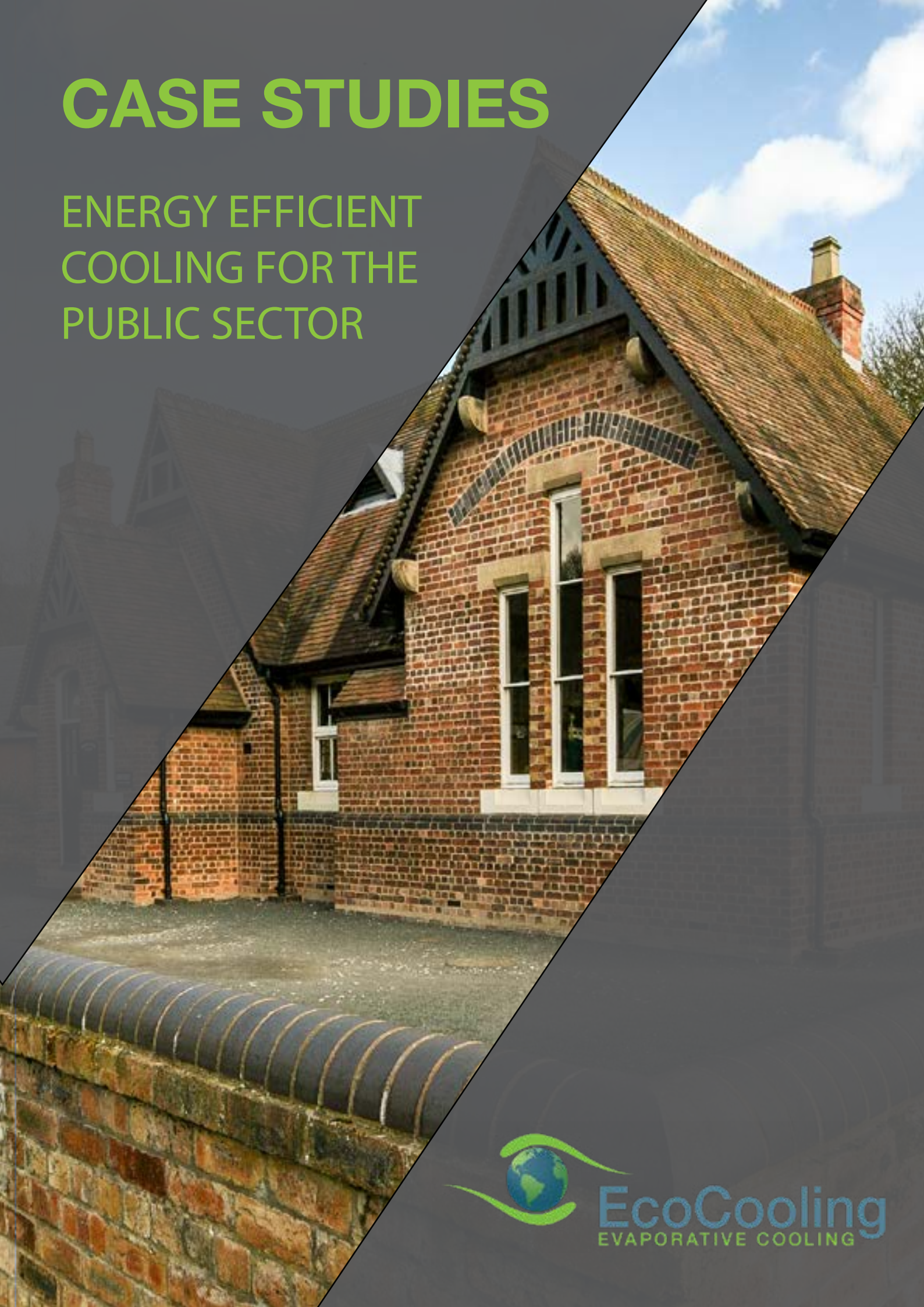


CASE STUDIES

ENERGY EFFICIENT COOLING FOR THE PUBLIC SECTOR



EcoCooling
EVAPORATIVE COOLING

Testimonials

“I am so impressed with the evaporative cooling system. We had a demo of it working at full blast and you could not hear a thing. It is a beast of a machine in terms of the ducting pipes (which will be hidden in the ceiling void) but the actual box is not as cumbersome as I expected. I think its genius.”

Jo Dursley - Bristol City Council

“We estimated a £5,000/annum saving on the loan agreement and we are getting £6,200 / annum at 11p/unit, with the server room not operating anywhere near full capacity. As they install more server units the savings will grow...”

Bill Johnson - Warwickshire County Council

“The Simpson Suite now feels fresher and the previous odour problems have been banished due to the high air change rate that the EcoCooling system provides. The old costly air conditioning is now no longer needed”

Centre Manager - High Wycombe Leisure Centre



AWARD WINNING EFFICIENCY

‘Innovators in Fresh Air and Direct Adiabatic Solutions’

At EcoCooling our mission is to save the country 1% on its total energy bill. That’s equivalent to shutting down a power station.

Evaporative cooling is a simple, safe and natural alternative to refrigeration which can result in up to 90% reduction in operational cooling costs.

Our evaporative cooling and ventilation systems are designed to be used across the UK and Europe.

Applications include data centres, UPS, telecoms, retail, warehousing, manufacturing, gyms, leisure centers and commercial cooling.

EcoCooling Cardiff Metropolitan University

Cardiff Metropolitan is one of the leading universities for student sport in the UK offering excellent facilities and an extensive range of activities to cater for everyone.

This building - like all gyms, suffers with extreme heat during summer periods and needs to be effectively cooled. During winter months ventilation is required to banish odours. Having a system which can prevent the build up of CO2 is essential.

In normal conditions where CO2 levels are not measured, building regulation guidelines state that there must be 10 litres per second of air per person entering the building. This equates to over 1000 litres per second in a gym which can cater for 100 people. At a required design temperature of 20C inside when the outside temperature is 0C, it takes 2kW of central heating to heat the air that is coming in, to get it to the correct temperature.

The EcoCooling system minimises the heating energy by measuring the CO2 in the building at all times, bringing fresh air in only when the CO2 levels rise over 1000ppm. External air is heated using a radiator system at the point of entry and this air is

then re-circulated to keep the chill off the building when there are only a few occupants. 2 large fabric ducts stretching the length of the gym distribute the air draft free into the gym maintaining consistent conditions.

As occupancy increases, CO2 levels rise. Only when the level reaches 1000ppm is fresh air unit activated. This air is mixed with the external hot air to provide the correct temperature. This approach uses the minimum amount of energy. When the air no longer requires heating the radiator is switched off automatically and the hot air is extracted through the fans on the side wall of the gym again saving energy.

As occupancy increases the heat load in the building increases along with the cooling requirement. The introduction of evaporative cooling, therefore, coincides with the need to increase CO2 levels.

Refrigerant free and using only 50/60W of electricity, the system is controlled using a Crouzet/Schneider PLC designed by EcoCooling. An added advantage of this system is that during busy times odours are expelled out of the building with the hot air.

Leisure Centre Cooling - Telford and Wrekin

Telford and Wrekin Council save 80 tonnes of carbon a year by using the EcoCooling system in their leisure centre.

Telford and Wrekin Council worked with EcoCooling installers Celsius Design to install a system of EcoCoolers at its new 'state of the art' leisure centre. Leisure centres experience high temperatures during the summer and during high use periods which can become uncomfortable for users. Gym environments should be kept at a temperature below 23C, even on the hottest days of the year.



Evaporative Cooling in the Fitness Centre Public Sector facilities have strict Carbon targets, this drove the council to look at new cost effective and efficient alternatives to refrigeration for their cooling solution.

EcoCooling evaporative cooling systems use up to 90% less power than a conventional air conditioning system, while also maintaining a temperature of less than 21C all year round. These factors combined makes it the ideal alternative for energy conscious public sector.

EcoCooling was chosen for its low carbon credentials, industry credibility (over 3500 installations worldwide) and also because it can be controlled to provide the problem areas with filtered, cooled, fresh air.

The system uses 80 tonnes less carbon than a comparable air conditioning system and it was 20% less of the capital cost of an alternative refrigeration solution.

To increase efficiency further the area is heated using a ground source heat pump and they also have a biomass boiler and solar water heating for the swimming pool, all proven low carbon technologies.

**Telford & Wrekin
Leisure Services**

Cooling Westminster University Lecuture Theatres

The University of Westminster's associate board room, Fyvie Hall were struggling with heat during summer periods. Their aim was to find a carbon friendly, energy efficient and cost effective cooling system.



Fyvie Hall dates from the rebuilding of 309 Regent Street in 1910-1912. The architect responsible for the new building was George Mitchell, later to become Head of the School of Architecture at the Polytechnic. This very special building hosted the first public viewing of a motion picture.

The room is now used for education and conferences with a capacity of up to 150 people. The design of any cooling system had to comply with all of the constraints associated with a Grade 1 listed building.

Two side discharge EcoCoolers and an extraction system were installed to provide cooling for both rooms. The existing ventilation ducts and openings were utilised to avoid any listed building implications. The EcoCooling air supply fans are installed with pre and post sound attenuation to meet the internal requirement of NC40 and local restrictions.

A combined thermostat and humidistat in each room automatically controls the temperature with maximum relative humidity.

This solution has satisfied the cooling requirements of these rooms. With less than 20% of the energy use and carbon impact of an equivalent refrigeration based cooling system this will contribute to the University of Westminster's Sustainability and Responsibility Programme.



Cooling Lavenham Priamary School

Suffolk County Council approached an EcoCooling Installer to tackle excessive heat in classrooms at Boxford Primary School near Lavenham in Suffolk.

Their first floor classrooms were unusable during afternoons in the summer term due to excessive solar gain and natural latent heat build up. During these months the children were taken outside to the playing field for afternoon lessons outside.

To overcome this problem the installer suggested using a EcoCooling evaporative cooler as the best solution.

The upstairs classrooms were fed via ceiling diffusers from the large ceiling void. The system provided large quantities of fresh filtered, cooled external air, creating a pleasant comfortable teaching environment.

Using open windows as natural extract the rooms purged with a continuous pressurised supply of cold fresh air dropping previously recorded temperatures in excess of 35 to 40 degrees to a

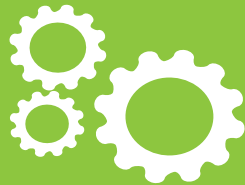
pleasant 22 to 25 degrees centigrade.

In manual operation there are five fan speeds and the option of pure ventilation or evaporative cooling. In automatic mode a combined thermostat/humidistat automatically controls the operation of the EcoCooler to achieve a set classroom temperature.

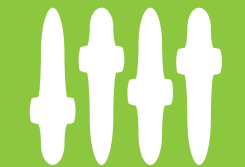
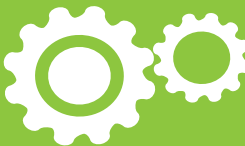
This resulted in the cooler mainly running at around speed 2 to 3 with the cooling section only operational in the summer months.

An inline damper and second duct feed provided fresh air to ground floor classrooms as the EcoCooler capacity by far exceeded the 8 to 12 air changes per hour required to keep the building cool.

Evaporative Cooling For The Public Sector



Solutions Overview - EcoCooling's internal and external fresh air, direct evaporative cooling products have been developed alongside an advanced control system to be used for public sector environments, whom may have energy standards or carbon regulations to meet. With over 3500 installations worldwide, we have provided the cooling systems for clients including; Westminster University, Leicester City Council and Aberdeen University. Our products capitalise on energy savings, affordability and having a low carbon footprint.



Energy Efficient Cooling NEEDS CHANGING- EcoCooling's control system can maintain a cold aisle temperature of 18°C for the majority of the year without any compromise in energy efficiency. During warmer ambient conditions the system simply allows the temperature to gradually rise, falling back again as external temperatures reduce.



Good Design Principles - Filtration - Filtration is essential to any fresh air data centre installation, we offer filtration options up to Grade F7.



Increasing Efficiency - EC Fans - The fans consume the most energy in an EcoCooling system. The use of new EC fans in all of the data centres featured has allowed for reduced running costs. Operating the EcoCooling system at half speed reduces the fan energy use by over 85%, which means partial population and redundancy can in fact increase efficiency.



Award Winning Public Sector Data Centres

ABERDEEN DC IS SET TO DELIVER 100K OF SAVINGS IN FIRST YEAR

- **Shared Services**
- **Targeted PUE - 1.2**
- **No external space**
- **150kW I.T Load**
- **Redundancy (N+1)**

As part of a joint venture between the University of Aberdeen, Aberdeen College, Robert Gordon University and Banff and Buchan College it was agreed to create a "Shared Services" data centre facility to replace the existing facility.

The previous facility was running at a PUE of 2.6. With a new EcoCooling system, the facility is now reported to be running with a PUE of 1.15 during the summer months.

The whole facility is predicted to deliver energy savings in excess of £100K per annum.

LEICESTER COUNTY COUNCIL ACHIEVE PUE OF 1.1

- **Shared services**
- **Targeted PUE < 1.1**
- **Limited floor space**
- **250kW I.T Load**
- **Redundancy (N+1)**

In 2014 LCC were tasked with moving their legacy data centre to an old training centre identified within the city boundary. Energy efficiency was central to the design requirements of the new facility. Not only was a PUE of below 1.1 demanded, but also the implementation of renewable energy technology and the utilisation of waste heat.

The low power requirements and flexibility of the proposed EcoCooling system meant it could easily be retrofitted to the new building and achieve operational energy savings of up to 90% less than the refrigeration based alternatives. An additional advantage was the units and fans can be powered using a photo voltaic system, further reducing the demand for power from the grid.

EcoCooling's Cooling and Ventilation Range

How our systems work:

Ventilation Mode: Fresh air is brought into the system though EU4 pre-filters and Munters CELdek® pads.

Cooling Mode: Evaporative cooling operates during warm periods to cool external air.

Attemperation Mode: During winter periods warm exhaust air is mixed with cold fresh air. EcoCooling describe this mixing process as attemperation.



WetBoxes contain inbuilt evaporative cooling pads and should be used as part of a mechanical ventilation system or air handling solution with a paired supply and extract fan. They are designed to be externally mounted and the standard configuration is down flow, where air is supplied from the base of the cooler into the area that requires cooling.

Characteristic/Feature	Value/Detail
Power Supply	240v 50Hz. 12A start 8A running.
Cooling Capacity in Adiabatic Mode	N/A this is a ventilation unit
Design Flow Rate	1850l/hr (intermittent)
Dimensions (h x d x w)	950mm x 1150mm x 1150mm
Design Power Usage : Ventilation Mode	70kg



The **ECP** is part of EcoCooling's external evaporative cooling product range. It is designed to suit diverse installation requirements. The different configurations allow for discharge of supply air through the top, side or base of the unit, meaning the range is suited to roof mounted, wall mounted and floor standing arrangements. A wall mounted controller is supplied with the cooler.

Characteristic/Feature	Value/Detail
Power Supply	1~ 230V 50Hz 0.25A
Design Supply Flow Rate ECP/WB - T & ECP/WB ECP/WB - S	12,600m³/hr 9,450m³/hr
Dimensions (h x d x w)	950 x 1170 x 1170mm
Cooling Capacity in Adiabatic Mode	60kW

Savings and Performance Calculations

EcoCooling developed a calculator to estimate the possible energy savings for all of their systems, inputs include historical weather data and fan data. Cost analysis can be performed for any size data centre or telecoms room in most locations worldwide. Please contact us for more information.

Example Savings Calculator Report

Cooling Demand (IT):	100kW
Flow Rate Required:	8.3Kg/s or 7m³/s
ΔT	12°C

An IT load of 100kW, with a ΔT of 12°C will require a mass flow rate of 8.3Kg/s or air flow rate of 7m³/s. This equates to 25,000m³/hr or 221 million m³/yr of air.

Running Costs and Performance (ECP standard CREC® system)

Type of System	AC	EcoCooling
Coefficient of Performance	2.0	27.0
Total Electricity Use (kW)	50	3.7
Effect on PUE	0.5	0.04

Annual Usage (IT Environment) = 8760hrs

Operating Costs	AC	EcoCooling	Savings
Electricity Use (kWhr)	438,000	32,412	405,588
Electricity Cost (£)	43,800	3,241	40,599
Water Use (m³)	0	145	- 145
Water Cost (£)	0	145	- 145

Total Cost	£43,800	£3,386	£40.414
CO ₂ Impact	235 tonnes	17 tonnes	218 tonnes



EcoCooling
EVAPORATIVE COOLING

Industrial and Computer Room Evaporative Cooling

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