# Free Cool Solutions

## Energy Efficient By Design

**Providing High Performance Free Cooling Technology for:**

- Data Centres
- Education
- Warehousing & Distribution
- Retail
- Commercial Buildings

freecool®

Workspace Technology Limited

Data Centre Solutions Expertly Engineered

# FreeCool® Overview

**According to the Carbon Trust, air conditioning can use a huge amount of energy. In fact, air conditioning can increase a building's energy consumption and associated carbon emissions by up to 100%.**

'Reducing energy makes perfect business sense; it saves money enhances corporate reputation and helps every one in the fight against climate change' – The Carbon Trust

**FreeCool®** Evaporative Free Air Cooling is a low cost, low carbon alternative to traditional mechanical air conditioning

**FreeCool®** can be installed as new, or retrofitted within existing buildings

**FreeCool®** evaporative cooling systems can be designed for most building applications from Data Centres, Education, Warehousing and Retail to Factories and Offices

**FreeCool®** delivers significant energy reductions. The operating costs of Workspace Technology's FreeCool® evaporative free air cooling solutions are up to 90% less than other traditional air conditioning technologies.

**FreeCool®** Evaporative cooling units have been specifically designed for the cooling of industrial and commercial buildings and can give an amazing 35kW of air cooling for every 1.5kW of electricity consumed.

**FreeCool®** is an environmentally safe solution - evaporation is a natural process and requires no refrigerants.

**FreeCool®** Eliminates odours and stale air instead of re-circulating them.

**FreeCool®** Saves up to 10,000kg of carbon per year compared to an equivalent air conditioning system.

**FreeCool®** Provides a natural environment and improves air quality, and improves the workplace experience.

**Currently SMEs can obtain interest free loans from the Carbon Trust which can cover the whole installation cost of a FreeCool® system.**

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# Data Centres

**‘Cooling of the Data Centre is frequently the largest energy loss in the facility and as such represents a significant opportunity to improve efficiency. Free or economised cooling designs use cool ambient conditions to meet part or all of the facilities cooling requirements hence compressor work for cooling is reduced or removed, which can result in significant energy reduction.**

**Cooling plant should be installed in a modular fashion. Planning a data centre for modular (scalable) expansion and then building out this capacity in a rolling program of deployments is more efficient’.**

2011 Best Practices for the EU Code of Conduct on Data Centre Energy Efficiency

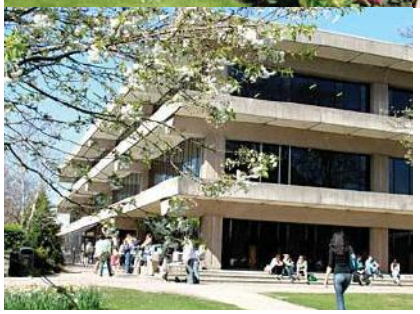
**FreeCool®** Evaporative Free Air Cooling is a low cost, modular, scalable, low carbon alternative to traditional mechanical air conditioning.

**FreeCool®** delivers significant energy reductions for data centre and server room cooling. The operating costs of Workspace Technology’s FreeCool® evaporative free air cooling solutions are up to 90% less than other traditional air conditioning technologies.

**FreeCool®** evaporative free air cooling technology makes the use of external air to cool server room and data centre equipment. Unlike simple air economizers which require supplemental DX or Chilled water cooling when external ambient temperatures exceed 21ºC the FreeCool® system engages the evaporative cooling mechanism which reduces external air temperature by simply passing the airflow through wet filter pads.

**FreeCool®** deployment benefits include:

- Reduced $CO_2$ emissions
- Significantly reduced energy consumption and operating costs
- Supports existing cooling technologies
- Improved DCiE / PUE ** Efficiency Ratings
- Improved company “Green Credentials”
- Improved resilience with practical support by UPS systems.
- Flexible airflow configuration options



# University of St. Andrews

**St Andrews is Scotland's first university and the third oldest in the English-speaking world, founded in 1413.**

Over six centuries it has established a reputation as one of Europe's leading and most distinctive centres for teaching and research, and is considered one of the UK's foremost Universities. Many famous people have attended St. Andrews University including Prince William.

The School of Mathematics and Statistics, together with the School of Physics and Astronomy wished to enhance their activity through the acquisition of a High Performance Computing Facility. HPC servers produce increased amounts of heat and so it was important to deploy an efficient, scalable and dynamic cooling system to meet the demands of HPC.

St. Andrews University made it clear that sustainability, environmental impact and energy conservation played a key role in the determination of their data centre infrastructure. Workspace Technology's **FreeCool®** evaporative free air cooling was specified by St. Andrews University based upon its clean technology, low carbon footprint, and frugal energy use.

Workspace Technology an approved EU Code of Conduct for Data Centre Energy Efficiency "Endorser" deployed an **ecodesign™** solution (ecodesign is fully compliant with the EU Code of Conduct Best Practices) utilising 4 x **FreeCoolers®** providing 90kW of N+1 cooling, the **FreeCoolers®** were integrated with Workspace Technology's **DCC** ("Dynamic Cooling Control").

A PLC (Programmable Logic Controller) combined with thermostats and humidistats delivers dynamic management of air flow and cooling. **DCC** creates synergy between the HPC and the cooling system ensuring the system delivers the precise amount of air flow and cooling in-line with the real time performance of the HPC. **DCC** maximises the efficiency of the **FreeCoolers®** improving energy efficiency and further reducing carbon emissions.

Workspace Technology's **FlexAisle®** containment system was deployed in a HARP configuration to ensure precise airflow management, the system integrating seamlessly into the **DCC** and **FreeCool®** infrastructure, and producing a PUE figure of 1.1.

Workspace Technology undertook enabling and construction works during the build-up and implementation phases of the data centre, partnering with other specialist contractors and the suppliers of the HPC equipment – **Bull Information Technology Solutions**.

# Education

Educational establishments like any other complex workplace with high concentrations of personnel, computers, lighting, other work activities and building solar gain will produce heat and $CO_2$. Good ventilation and cooling will reduce the build up of $CO_2$ and heat, creating a fresh, comfortable, conducive and safer working environment.

Workspace Technology's **FreeCool®** system provides 100% natural fresh air cooling and ventilation for classrooms, lecture halls, kitchens, computer suites, gymnasiums and refectories, without the need for refrigerants.

The energy use and carbon emissions of Workspace Technology's **FreeCool®** is approx. 10% of traditional mechanical air conditioning systems, whilst delivering a cooling effect of between 10-12°C.

Workspace Technology's **FreeCool®** systems are deployed at educational establishments across the UK providing cooling and ventilation for a number of differing applications.

Workspace Technology's **FreeCool®** systems comply with Building Bulletin 101 –Ventilation of School Buildings published by The Department for Children, Schools and Families in support of the Building Regulations and the School Premises Regulations, and as such provides a guide to the legal requirements for ventilation and the control of overheating in school buildings.

# University of Westminster

## Cooling the University

**Fyvie Hall at the University of Westminster and its associate board room were consistently uncomfortable during periods of hot weather. As with all universities the carbon impact of any cooling system needed to be minimised.**

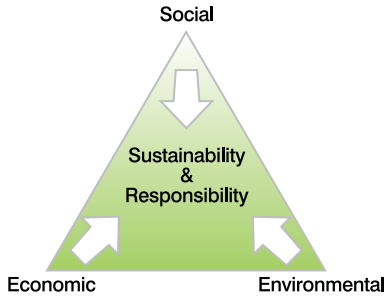
Fyvie Hall dates from the rebuilding of 309 Regent Street in 1910-1912. The architect responsible for the new building was George Mitchell, later to become Head of the School of Architecture at the Polytechnic. This very special building hosted the first public viewing of a motion picture.

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

Above Fyvie hall is the board room. This is a semi glazed building with natural ventilation.

Two side discharge **FreeCoolers®** 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 **FreeCool®** 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 a 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.



# Warehousing & Distribution

At warehouse and distribution sites where large building structures are attracting high levels of solar gain, and housing high density storage systems, mezzanine floors, motorised conveyors and materials handling equipment, personnel and other work activities will produce high levels of heat and $CO_2$. Good ventilation and cooling is essential and will reduce the build up of $CO_2$ and heat, creating a fresh, comfortable, conducive and safer working environment.

Energy use and carbon emissions of Workspace Technology's **FreeCool®** is approx. 10% of traditional mechanical air conditioning systems, whilst delivering a cooling effect of between 10-12°C.

Workspace Technology's **FreeCool®** system provides 100% natural fresh air cooling and ventilation for warehouses, distribution hubs, and general storage areas.

Workspace Technology's **FreeCool®** systems are deployed at Warehousing and Distribution sites across the UK providing cooling and ventilation for a number of differing applications from high bay warehousing to pick towers, automated handling and bulk storage.

Workspace Technology's **FreeCool®** systems can be integrated into existing BMS systems or combined with a range of power and environmental monitoring infrastructure and software solutions provided by Workspace Technology.

# Case Study

## Stylo plc

### Cooling the Warehouse

**Stylo Barratt shoes are one of the most recognisable brands on the UK High street. The West Yorkshire Company services the 200 shops in the chain from a single distribution warehouse adjacent to the group Head Office.**

The storage and distribution is spread over three levels of an extensive site in the north of Bradford.

In recent years the growth of the group has lead to greater stock holding and faster turn round of product.

The top floor of a three floor warehouse measuring 85 x 75 metres is the main picking area and, due to a large number of skylights and single skin roof, the working conditions were oppressively hot during summer.

Stylo wanted an energy efficient and effective solution to cool the area down. Having previously explored the options of air conditioning which had been dismissed out of hand purely on installation costs, Nigel Booth (Group Property Manager) required a solution that would both cool the environment down and increase air quality.

After discussions through consultants and contractors and a complete assessment of running costs and annual servicing cost, 15 **FreeCool®** ECP07D down discharge coolers and six extract fans were installed in May 2007.

A basic control system ensures that the air input and extract systems work together and simple time clocks ensure that the system shuts down at the end of each day.

The air is distributed down the main picking aisles and over the unpacking and dispatch zones.

Site Facilities Manager Keith Pemberton confirmed that conditions in the warehouse during summer 2007 had been “beautiful” and there were noticeable decreases in absenteeism and a better working atmosphere both literally and metaphorically since the completion of the installation.

# Retail

Modern retail premises must be energy efficient, sustainable, and cost effective with a keen eye on reducing carbon emissions, energy consumption and operational costs, within this competitive sector.

According to the Carbon Trust, the retail sector comprises about 7% of the total UK building energy consumption and emits over five million tones of carbon dioxide per year.

Workspace Technology's energy efficient **FreeCool®** cooling systems will reduce carbon emissions. Energy use and carbon emissions of Workspace Technology's **FreeCool®** is approx. 10% of traditional mechanical air conditioning systems, whilst delivering a cooling effect of between 10-12°C.

**FreeCool®** can be deployed in both front and back of house retail environments, providing 100% natural fresh air cooling and ventilation for sales floors, stockrooms, and staffroom areas.

Deployment of Workspace Technology's **FreeCool®** cooling systems will reduce operating costs by 90% against traditional mechanical air conditioning systems.

Workspace Technology's **FreeCool®** systems can be integrated into existing BMS systems or combined with a range of power and environmental monitoring infrastructure and software solutions provided by Workspace Technology.

# Matalan

## Cooling Retail Premises

**Matalan, one of the UK's largest value clothing retailers, consisting of 190 stores across the UK. Its store in West Thurrock suffered from intolerable overheating in summer.**

Temperatures in the men's department reached over 40°C. This made working conditions for the staff very difficult and obviously affected customers' shopping experience.

In common with many businesses Matalan required a low capital cost and low operating cost cooling system. There was an additional constraint of limited spare electrical supply capacity to the site.

Seven down discharge, roof mounted, **FreeCool®** units were installed. The fresh, cooled air is brought into the store using a simple distribution system terminating in 8-way plenum chambers. Existing smoke extraction fans were linked to each **FreeCool®** unit to provide a balanced ventilation system.

Each **FreeCooler®** and extraction fan combination is linked to a thermostat to provide temperature control. The system automatically sets the air speed and cooling mode to reflect the internal and external conditions.

With a system set point of 22°C the store is maintained at a comfortable temperature. The fresh air system further improves internal conditions in contrast to the stale air conditions provided by air conditioning systems which recycle air.

Due to the simplicity of the system design the total project was installed and commissioned within 2 weeks of the order being placed.

The 8-way plenums are installed to allow direction of air flow to be changed should merchandising change thus giving a completely flexible air flow system

The **FreeCool®** units provide 200kW of cooling into the store and maintain a pleasant environment for shopping without the use of refrigerants. **The installation cost 25% of the cost of a refrigerant based system and the running costs are anticipated to be 90% less.**

The cost of the project was kept even lower by the use of existing air vents for extract making this a very cost effective, environmentally friendly project for Matalan.

# Commercial & Industrial

Complex commercial and industrial workplace premises with high concentrations of personnel, computers, lighting, manufacturing, other work activities and solar gain will produce heat and $CO_2$, good ventilation and cooling will reduce the build up of $CO_2$ and heat, creating a fresh, comfortable, conducive and safer working environment.

Workspace Technology's **FreeCool®** system provides 100% natural fresh air cooling and ventilation for offices, manufacturing plants, call centres, data centres, canteens, laboratories and research facilities

Energy use and carbon emissions of Workspace Technology's **FreeCool®** is approx. 10% of traditional mechanical air conditioning systems, whilst delivering a cooling effect of between 10-12°C.

Workspace Technology's **FreeCool®** systems are deployed at commercial and industrial sites across the UK providing cooling and ventilation for a multiple applications.

According to the Carbon Trust Air conditioning can use a huge amount of energy. In fact, air conditioning can increase a building's energy consumption and associated carbon emissions by up to 100%.

Deployment of Workspace Technology's **FreeCool®** cooling systems **will reduce operating costs by 90%** against traditional mechanical air conditioning systems.

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# GKL

**Low carbon, low energy cooling solution for high tech Office development**

GKL required a cooling solution for the new Headquarters in Peterborough. The building is a modern open plan style building of tailor made A1 office space. Glazed panels with stem leaf motifs throughout help to give the space a work and people friendly atmosphere graphically illustrating the companies aim to grow and its commitment to reducing $CO_2$.

In-line with this commitment **FreeCool®** evaporative cooling has been used for the top floor offices and glazed atrium to provide a cool fresh internal environment for the workforce. The building was developed as part of a complete fit out which meant that the contractors worked as part of the team of architects, designers and shop fitters to produce the finished building.

**FreeCool®** was chosen because of its advanced control system and its minimisation of energy usage. Thermostats and humidistat's control the internal environment by opening as required one or all of the six fresh air vents in the ceiling of the atrium, which if left un-cooled would act like a giant green house trapping hot air in the top floor offices, creating unbearable conditions.

The system was carefully designed to fit in aesthetically with the office layout and to minimise duct work whilst maximising the energy efficiency gains from both an electrical and $CO_2$ prospective. GKL received a grant from the Carbon Trust which covered 25%of the installation cost of the coolers. Running costs are expected to be 90% less than an equivalent air con system.

The grille system, unique to this project in the UK allows a steady flow of cooled air to circulate the building and complies with the architect's specification for a modern and pleasingly aesthetic approach to ducting. The air plenums were designed into the existing bulkhead scheme so that the ceiling is used to channel the air flow with the grilles directing the air where needed.

# Making the difference

## Connecting with our clients

**Workspace Technology offers clients intelligent building infrastructure services which include Communications, Power, Security and Cooling technology. By engaging with you and taking the time to understand your business and performance related issues, Workspace Technology is able to effectively address the demands of your business.**

Workspace Technology welcomes this opportunity to connect with you as a valued client. We would like to share our vision and expertise through a partnership approach. Our ability to deliver integrated, scalable, energy efficient solutions has made us the preferred choice for many public sector and commercial businesses today.

Operating throughout the UK, Workspace Technology offers clients an enthusiastic and refreshing approach, combined with teamwork that takes performance and service to new levels of excellence.

Further details of Workspace Technology's products and services can be found at **www.workspace-technology.com**.


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