BUILDING PERFORMANCE - HEATING

With increased pressure on businesses to become more proficient both financially and environmentally, many companies are looking towards highly efficient, holistic heating solutions which can be combined with established renewable technologies as part of their sustainable building strategy and drive towards energy efficiency and reduced CO_2 emissions. Members of the Metal Cladding and Roofing Manufacturers Association (MCRMA) are at the forefront of developing innovative solutions, such as perforated Transpired Solar Collectors (TSCs) which have been successfully supplied to over 10,000 buildings across 35 countries for almost 30 years.

MCRMA member CA Group began manufacturing the SolarWall® system in 2006 and many buildings (both new and existing) such as commercial, manufacturing, distribution, education and healthcare developments have all been successful in providing significant reductions in heating costs and energy usage.

SolarWall was used at Jaguar/Land Rover at Leamington Spa

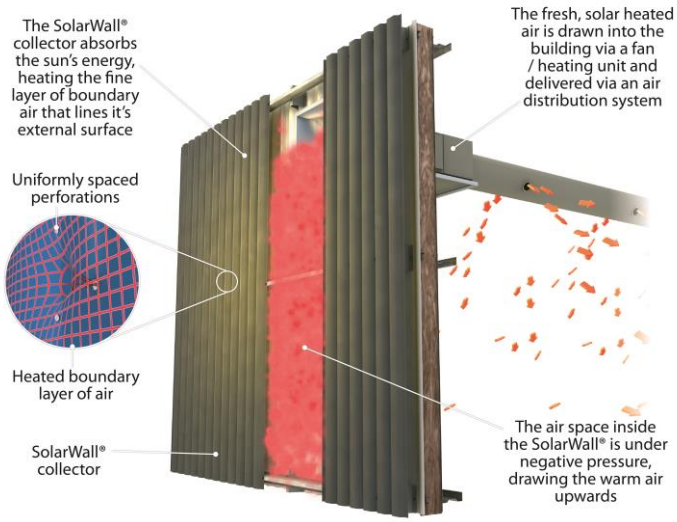
The SolarWall® technology was the world's first TSC when it was developed back in the 1980s by Canadian company Conserval Engineering Inc. and has since revolutionised the solar air heating industry.

The SolarWall® TSC is an open-loop, active, ambient air-heating solar collector, which harnesses the sun's energy to heat fresh, outdoor air for buildings. With no moving parts, the SolarWall® collector provides a truly renewable heat source and with solar collection efficiencies as high as 80% the system offers one of the fastest return on investments of any solar technology currently available, delivering proven payback periods as low as three years.

Installed as an additional skin to a building's southerly elevation(s), the SolarWall® TSC consists of a pre-coated steel or aluminium collector with thousands of carefully engineered perforations spread across its surface.

As sunlight strikes the surface of the SolarWall® (in the form of visible and non-visible solar radiation) the energy is absorbed, heating its external surface. In turn, by means of conduction, the fine layer of air which lines the outside face of the collector is heated, creating a film of warm air known as the thermal boundary layer.

This heated boundary layer is carefully drawn through the perforations within the surface of the collector into a uniquely designed air cavity that is created between the SolarWall® collector and the building's original elevation behind, before the heat can escape by convection, or is lost to external wind.



How SolarWall works

From the air cavity, the fresh, solar heated air can then be introduced directly into the building as make-up /ventilation air for industrial applications, or ducted into a centralised HVAC unit for commercial and residential applications, where it can be used as a pre-heater to the building's main heating system.

During its development, the SolarWall® TSC was extensively tested and refined at the Exova (formerly Bodycote) National Solar Test Facility, Ontario, Canada and is one of only a few solar air heating technologies currently available which has had its performance tested and proven to a recognised test standard (Canadian Standards Association (CSA F378) -1987, updated September 2011).

As well as testing throughout the U.S. and Canada, the performance of the SolarWall® TSC has also undergone independent monitoring in the UK by BSRIA, delivering proven reductions of 50% in a building's heating requirement.

The system has also been independently thermally modelled by Battle McCarthy Consulting Engineers & Landscape Architects, highlighting that the technology can provide up to 20% of a building's total energy requirement, in line with stringent targets set by many local authorities.

The only standard calculation tool for analysing TSCs is the RETScreen® software developed by Natural Resources Canada (NRCan) which has become the standard global modelling software.

Empirical data obtained from independent testing at the National Solar Test Facility, along with several active field trials, enabled NRCan to develop the RETScreen® Solar Air Heating software package of which v3.1 is specific to the SolarWall® technology. This software package contains all of the SolarWall® performance data pre-loaded and is combined with a NASA weather database, allowing a comprehensive assessment of SolarWall® performance anywhere in the world.

The Simplified Building Energy Model (SBEM) software, developed by BRE, (on behalf of the Department for Communities and Local Government (DCLG) – responsible for the Building Regulations) now has the capability to analyse the performance of the SolarWall® TSC, allowing funders, designers and building owners to witness first-hand the significant benefits that the SolarWall® system delivers.

Developed in order to accommodate the changes to Part L of the Building Regulations in 2010, the most recent version of the SBEM software is capable of directly analysing the improvement in building energy performance and subsequent EPC ratings than can be achieved by incorporating the technology into the building design.

The environmental and sustainable benefits of metal are now recognised by clients, designers and engineers alike and have led to a much wider use of metal in construction. MCRMA and its members will show you how to create imaginative and innovative building designs that offer cost-effective and sustainable solutions which will benefit future generations.

SolarWall was specified at Marks & Spencer, Castle Donington

This article was prepared for MCRMA by Andrew Brewster, product development manager for C A Building Products. This article first appeared in RCi Magazine September 2013.

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