

FLEXIBLE AND ADAPTABLE SYSTEMS: HOW METAL CAN PLAY ITS PART IN THE SUSTAINABLE PUSH

Since the introduction of Approved Document L2 specifiers and designers now have to look towards developing sustainable building solutions to achieve government targets in order to significantly reduce the country's carbon emissions.



A green roof on Kingston Maurward College, Dorset - image courtesy of Euroclad

Architects and designers need to consider materials and structural systems which are sufficiently flexible and adaptable to meet future changes to the building function and which will facilitate the re-use and recycling of material at the end of its life. Whilst at the specification stage, designers should also take into account life cycle costs including the cost of manufacture, construction, operation, dismantling and disposal.

Metal roofing and cladding systems contribute significantly to the sustainable design concept thanks to their high recycled content, recyclability and energy efficiency. For many years specifiers have chosen metal over other materials for its energy efficiency, low maintenance and durability. However, metal has other attributes namely its striking beauty, clean appearance and versatility; metal cladding systems offer a choice of steel or aluminium substrate which can be linked with a range of colours, shapes, panel sizes, finishes, profiles and vertical and horizontal applications. These attributes have established metal as the material of choice for both new and refurbishment construction.

Steel and aluminium offers a better life cycle return on investment than other materials. Today's metal construction products are protected by highly durable paints and coatings that now ensure a service life in excess of 40 years. Steel construction is efficient and competitive, buildings can be rapidly constructed using steel-based primary and secondary components that are efficiently manufactured off-site and therefore are dimensionally accurate and of known quality.

Steel framing and metal cladding systems provide the scope, in association with other materials, to design buildings with low overall environmental impacts. Steel-based construction systems provide flexible spaces which have the potential to be easily modified and adapted so that the life of the building can be extended by accommodating changes in use, layout and size.

Its superior strength-to-weight ratio means a little steel goes a long way, giving architects complete flexibility to achieve their most ambitious designs. Manufactured in a controlled factory environment, pre-engineered steel components are delivered to site ready for rapid assembly, with no waste.

Another economic benefit of steel framing and metal cladding systems is its speed of construction which means that buildings are completed earlier, speeding up the development process and enabling building owners to achieve a faster rate of return on their investment.

Both steel and aluminium can be reused or recycled repeatedly without losing its qualities as a building material. The recovery infrastructure for metal recycling is highly developed and highly efficient, and has been in place for decades. Current recovery rates from demolition sites in the UK are 99 per cent for structural steelwork and 94 per cent for all metal construction products – figures that far exceed those for any other construction material.

When metal is specified for a building, it is unlikely to become waste. Steel and aluminium always have a value and is only ever sent to landfill as a last resort. Waste generation is one of the least sustainable aspects of construction. Choosing a metal-framed building is the simplest and most effective way to reduce waste. Even during manufacture and fabrication, any swarf or offcuts are recovered and recycled back through the primary production process.



A Kalzip green roof at Grove Wellbeing Centre, Belfast

Metal has much to offer in the areas of green technology and sustainability and MCRMA members are at the forefront of developing innovative solutions, for example green roofing systems that can improve the thermal performance of a building by providing protection against heat loss in the winter and heat gain in the summer. Other examples include metal solar cladding systems that will enable buildings to generate their own electricity or deliver naturally warmed fresh air into the building. Members have developed functional coated steel products based on renewable energy for use in the roofs and walls of buildings.

Sheet metal systems coated with highly reflective surfaces and designed with insulation and ventilation can provide considerable cost savings for heating and cooling. Innovative cool roof coatings for metal roofs are now available which have moderate to highly reflective surfaces over a range of colours and some engineered coatings can increase the emissivity of the metal roof surface to allow solar energy and heat to dissipate quickly.

Perforated Transpired Solar Collectors (TSCs) have been successfully used around the world for almost 30 years. Used in the UK for the last six years, each system is carefully engineered to suit the specific building requirements with wall area, cavity space, porosity etc. all sized to ensure maximum performance and efficiency throughout its operational life.

The only standard calculation tool for analysing Transpired Solar Collectors is the RETScreen® software developed by Natural Resources Canada (NRCAN). This has become the standard modelling software around the world. RETScreen® v3.1 uses empirical data obtained from years of dynamic field testing performed by the Canadian government on the specific performance of the SolarWall® system (manufactured by CA Building Products).

This, combined with NASA weather data and the ability to input site specific conditions, allows the user to obtain the most comprehensive assessment of system performance. Transpired Solar Collectors are recognised in the iSBEM software using analysed data from SolarWall® installations in the UK.



*Solarwall used at Jaguar/Land Rover, Leamington Spa
Image courtesy of C A Building Products*

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