

The SOLCER House

Low carbon, energy positive full scale building demonstrator

The Welsh School of Architecture, at Cardiff University, in partnership with the SPECIFIC Innovation and Knowledge Centre, based at Swansea University, has designed and built Wales' first low cost 'energy positive' house. The Solcer House is capable of exporting more energy to the national electricity grid than it uses, effectively turning the building into a power station. Despite the UK Government dropping its 2016 zero carbon homes target, the Solcer House shows that it is possible to achieve this now, and all at an affordable cost.



The house uses the Buildings as Power Stations concept developed at SPECIFIC. SPECIFIC initially constructed a demonstrator 'pod' combining generate, store and release technologies under one roof to function as an off grid building.



The Solcer House has taken this concept further to create an energy positive house at an affordable cost. The house has been designed by the Welsh School of Architecture to meet social housing standards and was constructed in 16 weeks using local supply chains.

The energy systems combine solar generation and battery storage to power both its combined heating, ventilation, hot water system, and its electrical power systems which includes appliances and LED lighting.



Exhaust air is passed through the MVHR and then through an exhaust air heat pump, which heats the thermal water store. The thermal store heats domestic hot water (DHW). The heat pump is powered by the PV and battery storage system.

In winter, space heat is provided by passing external air through the upper south facing transpired solar air collector (TSC), then through a mechanical ventilation heat recovery unit (MVHR), and then delivered to the space.



The house uses grid electricity supply when the PV - battery system is exhausted. The predicted energy performance is 70% autonomous, with a 1.75 grid export-to-input energy ratio.



The low carbon systems have been designed to be affordable and replicable, for local developers to build houses, using market available technologies. This systems approach aims to use a very low amount of energy to provide a comfortable environment for the building's occupants.

The components of the building have been sourced from Welsh manufacturers and installers where possible, and the house will be used as a demonstration of advanced Welsh construction technologies.

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SOLCER House Benefits

 <p>Affordable</p>	 <p>Achievable</p>	 <p>Energy Positive</p>	 <p>Low Carbon</p>
<p>built for £120000 with the team expecting reductions of 10 to 15% for building at scale</p>	<p>built in just 16 weeks using local supply chains</p>	<p>for every 1kWh it imports from the grid, it exports 1.75kWh to the grid during sunny weather. Over a year, the house is energy positive</p>	<p>built using commercially available low carbon technologies</p>

The key task now is to ensure that all the measures that have been put in place are monitored to assess operational energy use. This information will be used to inform future projects and industry with the aim of ensuring that Wales remains at the heart of the development of a zero carbon housing future. The building demonstrates leading edge low carbon supply, storage and demand technologies at a domestic scale which we hope will be replicated in other areas of Wales and the UK in the future.

The Solcer House demonstrates the successful collaboration between academia, industry and government that has taken place as a result of the LCRI's HEFCW Reconfiguration and WEFO Convergence Programmes (2008 to 2015).

*It brings together two major research initiatives – LCRI and SPECIFIC – as well as academic and industrial partners **confirming Wales as a leader in low carbon technologies.***

The House is one output of the SOLCER (Smart Operation for a Low Carbon Energy Region) research project that ran from 2012 to 2015. SOLCER was funded by the European Regional Development Fund and forms part of the Low Carbon Research Institute (LCRI) programme, set up to unite and promote energy research in Wales and help deliver a low carbon future by uniting the diverse range of low carbon energy research across Welsh universities, working closely with industry and government.

The SPECIFIC Innovation and Knowledge Centre was established in 2011 comprising grants from EPSRC, Innovate UK and the Welsh Government, together with investment from Swansea University and strategic industrial partners Tata Steel, BASF and NSG Pilkington.



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SOLCER House Project Partners



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