Example name: Asphalt carbon nano-tube roof integrated solar water heating collector

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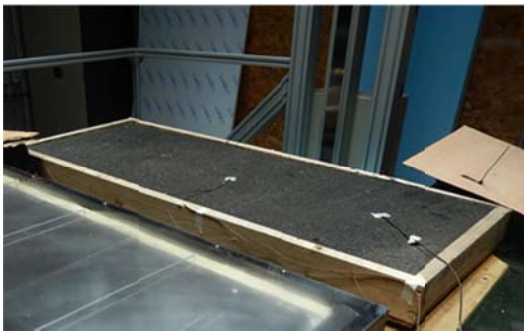


For installations

BISTS *Location: Ireland, 52N, 7W*
Climate Type: *Cfb*
Building Use: *commercial*

Level of BISTS integration
Rush level 2 / Reijenga level 1

~~O~~ New Build
O Refurbishment
O Other: ……

Type of BISTS:

Active/~~Passive/Hybrid~~

Function(s):
O Air heating
O Water heating
~~O~~ Combi-system
O Cooling/ventilation/shading
O PV/T
O linked to another system (e.g., heat pump)
O Other: ……

Building element:

O Facade
~~O~~ Roof
O Other: ……..

BISTS characteristics:
The Lawell 'Asphalt Carbon Nano-Tube' (ACNT) solar water heating collector is a building integrated solar collector designed to offset traditional roofing elements. The ACNT collector design is based upon a simple and robust concept of using asphalt to create the solar absorptive surface. A serpentine coil of copper tubing is embedded within the asphalt to act as the heat transfer fluid channelling element. The prototype was made from asphalt that contained carbon nano-tubes. The presence of the carbon nano-tubes is intended to increase the solar collection performance by:

- Improving the solar absorption and emittance characteristics of the absorber materials by making them partially spectrally selective.
- Improving thermal conductivity.

The asphalt was set into a wooden tray base and was uncovered. The finished active absorbing surface of the collector was 1.605m x 0.600m.

Stage of Development:		Responsible:
⊖	Idea/Patent	Lawell Asphalt Co Ltd
⊖	Prototype	Centre Sustainable Technologies, University of Ulster
O	Demonstration	……..
⊖	Integral building element	Lawell Asphalt Co Ltd
O	Commercially available	……..

BISTS description and context

Prototype testing and demonstration stage. The concept is being developed by a roofing contractor as an additional product range that they can offer commercial and industrial clients, both as a pre-heat for domestic hot water or air space heating systems. The system is fully integrated into the roof (flat structures only) and is envisages to cover an entire roof surface covering the entire building footprint. The collector will not be visible from an architectural perspective.

System viability

No costing has been conducted, maintenance will be minimal and the system will only be employed in applications that an asphalt roof would be specified, thereby implying that the embodied energy and the environmental impact will be mimimal.

Modelling and simulation tools developed/used

Not available

BISTS Performance data

Based on:
O Estimation
O Detailed simulation
Θ Measurement/testing
O Long-term monitoring

Performance parameters

For integrated systems:
key performance indicators -

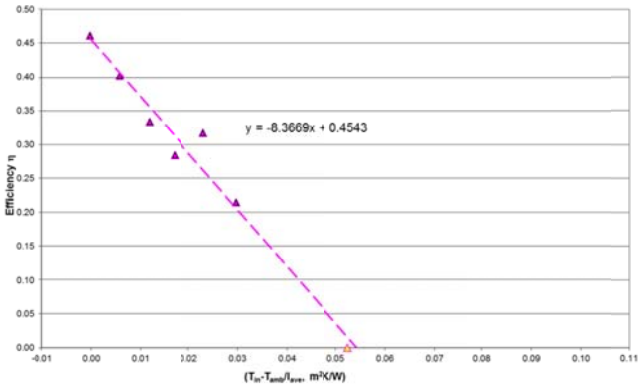
Not examined

For separate collectors:
performance rating coefficients -

BS EN 12975-2 2006 'Thermal solar systems and components solar collectors - Part 2', although the tests were not undertaken in strict accordance with the standard.

$\eta_0 = 0.454$
$F_R U_L = 8.367$ W/m^{2}K

Other:



Additional information:

Sources and references: