Example name: Transparent solar thermal collector

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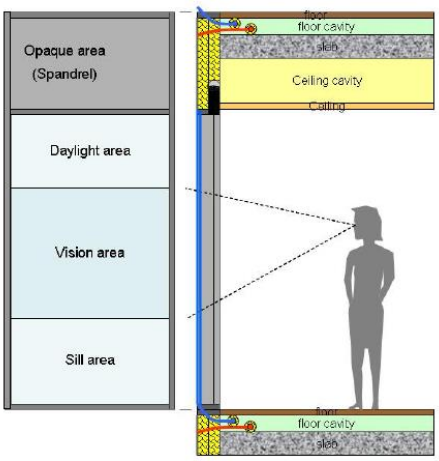


For installations

BISTS Location:
Level of BISTS integration
Rush level 2 / Reijenga level 2

- ~~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: ……

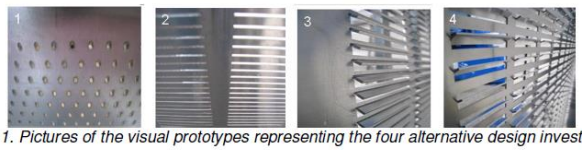


Figure 1. Pictures of the visual prototypes representing the four alternative design investigated.

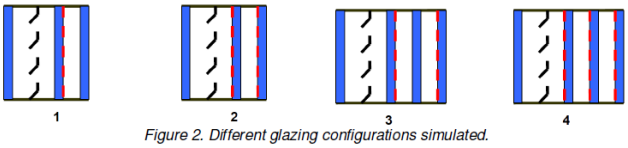
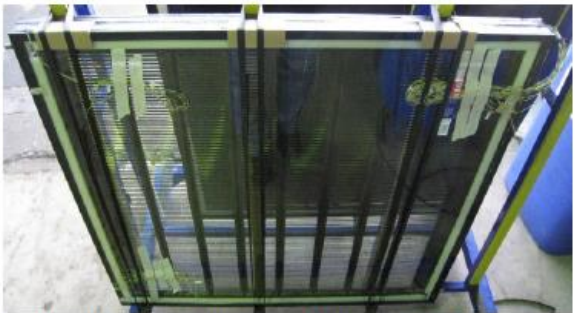


Figure 2. Different glazing configurations simulated.

Option 3 was carried forward for experimental evaluation



Building element:

- O Facade
- O Roof
- ~~O~~ Other: Window

BISTS characteristics:

The transparent solar thermal collector is based on low cost window technology. The new façade component will at the same time allow visual contact to the exterior, provide solar and glare control and it will generate heat. In the summer the collector is used as a heat source for solar cooling systems. The system approach was based on the integration of apertures with angular selective transmittance into a solar absorber, which is included in the transparent part of a façade. The solar radiation coming from directions with high solar altitude angles will be selectively shield from the external surface of the absorber, whilst visibility through the collector is retained in the horizontal or downward direction, from an internal perspective.

Stage of Development:		**Responsible:**
Ø	Idea/Patent	……..
Ø	Prototype	……..
O	Demonstration	……..
O	Integral building element	……..
O	Commercially available	……..

BISTS description and context

The proposed BISTS was to form an insulating glazing unit (IGU), air-tight and sealed to the external environment. The prototype (absorbing element) unit was constructed using aluminium, as it is light and highly conductive at the same time. The aluminium pipe was welded to a blank aluminium sheet to form the flat plate absorber. The absorber plate was punched to form a series of visualisation slots and then coated with a spectral coating with a magnetron sputter. The absorber was then integrated a triple glazed unit.

System viability

A series of optical simulations were conducted to optimize the geometry of the apertures for different alternative proposals and visual prototypes made to evaluate the architectural appearance. Option 3 was selection for fabrication and experimental evaluation.

Modelling and simulation tools developed/used

A TRNSYS model was developed to simulate the optical and thermal behaviour of the collector.
The model was run with different glazing configurations and varying working conditions (Solar radiation, altitude and intensity, mean working temperature of the absorber).

BISTS Performance data

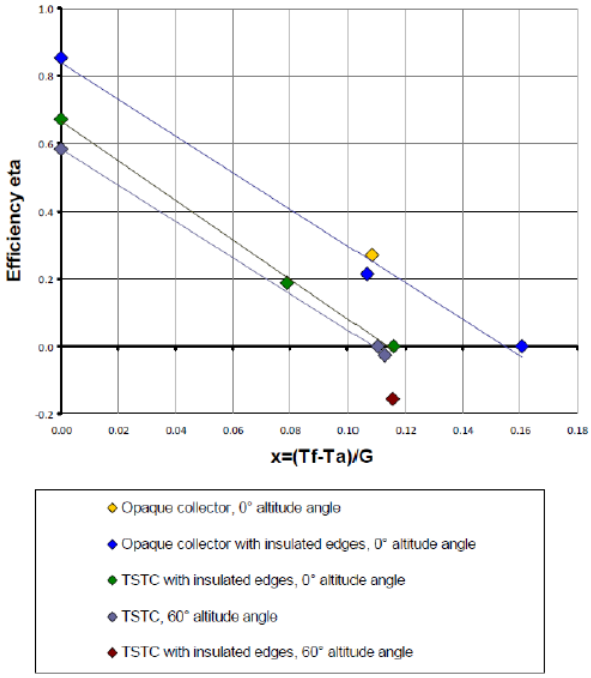
Based on:
O Estimation
⊖ Detailed simulation
⊖ Measurement/testing
O Long-term monitoring

Performance parameters

For integrated systems:
key performance indicators -

For separate collectors:
performance rating coefficients -

Other:



Additional information:

Sources and references:

SEVENTH FRAMEWORK PROGRAMME. COOPERATION - THEME 4. NMP-2007-4.0-5 Resource efficient and clean buildings. Cost-Effective. Contract No. 212206, Prototype for transparent thermal collector for window integration