Example name: *Marks & Spencer, Leicestershire, UK*

Template completed by:
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For installations

BISTS Location: *Castle Donington, Leicestershire, UK, 52°50'22.8"N 1°21'09.9"W*
Climate Type: *Cfb*
Building Use: *Commercial Building*

Level of BISTS integration
1. Applied invisibly

√ New Build
O Refurbishment
O Other: ……
tick all that apply

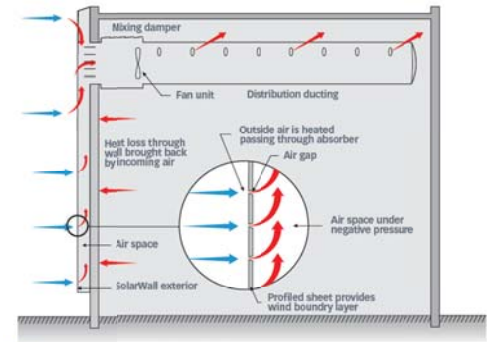
Photographs

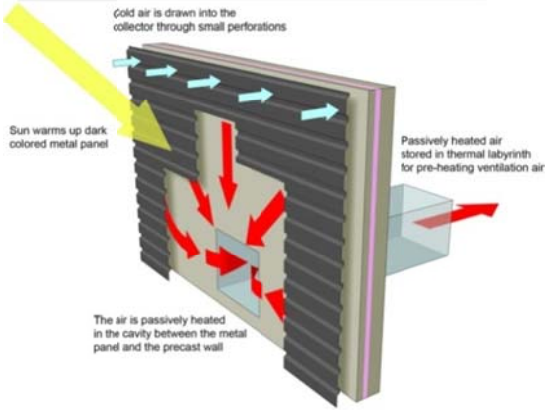
Type of BISTS:

~~Active~~/Passive/~~Hybrid~~
delete as appropriate

Function(s):
√ 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: ……
tick all that apply

Drawings/Sketches/Cross-sections





Building element:

√ Facade
O Roof
O Other: ……..
tick all that apply

BISTS characteristics:

The building is carbon neutral and has the largest SolarWall system in Europe, which has been instrumental in the designing a carbon neutral building of this size. The system is also integrated into the building, and was designed to be an attractive addition to the south facade.

Stage of Development: Responsible: *Company.*

O	Idea/Patent	…….……..
O	Prototype	…….……..
O	Demonstration	…….……..
O	Integral building element	…….……..
√	Commercially available	SolarWall

tick all that apply

BISTS description and context

It is basically a second shell which is mounted on the outer walls of the building, and heats the air and then leads it inside the building.
The SolarWall system is 4.330 m² and heats this huge building using solar energy instead of fossil fuels. The system is divided into 4 sections and is placed between the staircases, and each one is consisted of 3 different colors: Alaska Grey, Anthracite and M & S Green. Overall, the system is equal to the size of 16 tennis courts.

System viability

The system of M & S is expected to provide 1.1 GWh energy savings. This is a staggering amount of renewable energy produced on site by a technology, and will provide a basis for comparison, since the building is equivalent to the total energy used for two typical M & S stores. This will result the elimination of over 250 tons of CO_2 annually.
The SolarWall technology has successfully covered the environmental and economic requirements: It means that the impressive reductions in GHG emissions through energy production using renewable is achieved at a reasonable cost.

Modelling and simulation tools developed/used

For example….new modules/types created for established simulation programs, stand-alone modelling, use of generalised codes, model outcomes, validation and accuracy. Design tools developed

BISTS Performance data Based on: O Estimation O Detailed simulation *CANMET's monitoring report.* O Measurement/testing O Long-term monitoring *tick all that apply* **Performance parameters** For integrated systems: key performance indicators - *Solar savings fraction: %* *Light transmittance: %* *Solar transmittance:%* *Total solar energy transmittance: %:* *Solar heat gain factor: %* *Building fabric U-values: W/m^{2}K* *Noise, fire, etc ratings* *Other:* For separate collectors: performance rating coefficients - (EN12975, a0,a1,a2), ASHRAE, etc Other:	*Graphs for collector efficiency, seasonal energy gains, diurnal/seasonal solar fraction, etc.*
Additional information:	
Sources and references: *http://solarwall.com/media/download_gallery/SolarWall_SellSheet.pdf* *http://solarwall.com/media/download_gallery/cases/Marks&Spencer_Y13_SolarWallCaseStudy.pdf*	

INSTRUCTIONS

Please fill in as much information as possible.

Tick where appropriate.

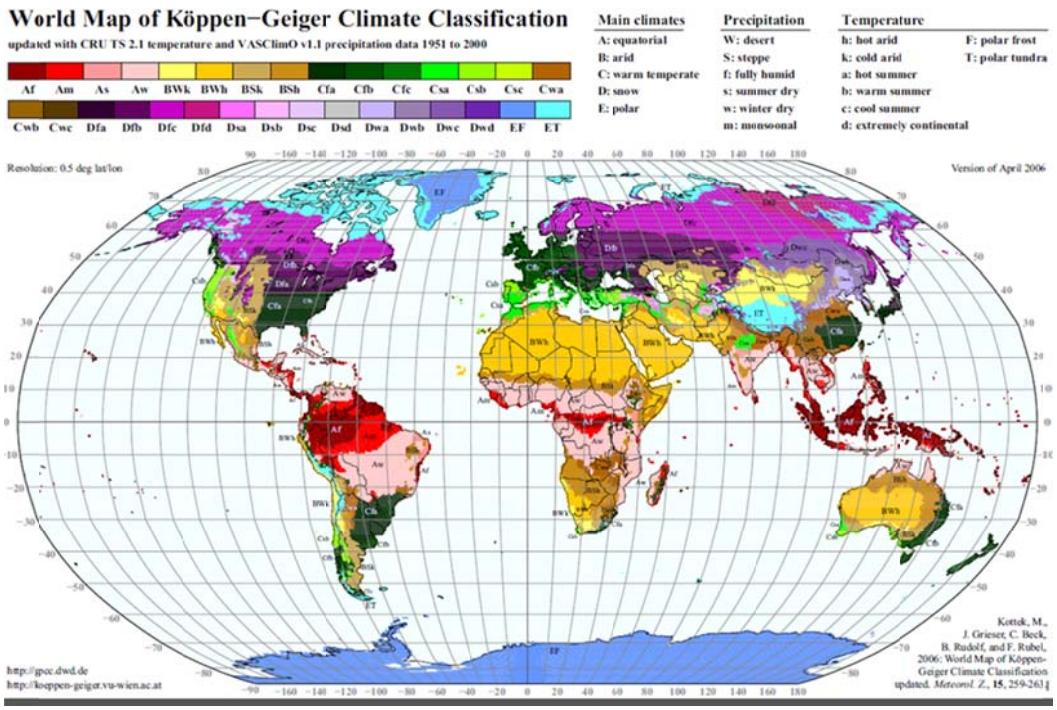
Text in red is suggested guidance. Insertinformation in provided space, removing red text as appropriate

If possible, use metric values.

If necessary, supply additional information on separate sheets

Reference listing

Köppen climate classification



(Kottek, M.,J. Grieser, C. Beck,B. Rudolf, and F. Rubel,2006: World Map of Köppen-Geiger Climate Classificationupdated. Meteorol. Z., 15, 259-263.)

Reijenga classification

The integration of PV systems in architecture can be divided into five categories:

1. Applied invisibly
2. Added to the design
3. Adding to the architectural image
4. Determining architectural image
5. Leading to new architectural concepts.

(Reijenga, TH and Kaan, HF. (2011) PV in Architecture, in Handbook of Photovoltaic Science and Engineering, Second Edition (eds A. Luque and S. Hegedus), John Wiley & Sons Ltd, Chichester, UK)

Rush classification
The architectural/visual expression of building services systems are identified as:

Level 1. Not visible, no change
Level 2. Visible, no change
Level 3. Visible, surface change
Level 4. Visible, with size or shape change
Level 5. Visible, with location or orientation change

(Rush, RD. (1986) The Building systems integration handbook Wiley, New York, USA)

Collector test standards

BS EN 12975-2 2006 'Thermal solar systems and components solar collectors - Part 2 test methods'
ASHRAE Standard 93-2010 'Methods of Testing to Determine the Thermal Performance of Solar Collectors'
ASHRAE Standard 95-1987 'Methods of Testing to Determine the Thermal Performance of Solar Domestic Water Heating Systems'