Example name: Kraftwerk B

Template completed by:
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For installations

BISTS Location: Bennau
8º 43' 46,38'' E
47º 8' 56,22'' N

Climate Type: Cfb

Building Use: Residential building

Level of BISTS integration
Rush: Level 2
Reijenga: 4

X New Build
O Refurbishment
O Other: ……..

Type of BISTS:

Hybrid

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

Building element:

X Facade
X Roof
O Other: ……..

BISTS characteristics:

Solar collector area (m2): 150

Solar collector area (m2/m2): 0,11

Thermal storage volume, l: 27000

Thermal storage per m2: 19,6

PV area (m2): 261

PV area per m2 (m2/m2): 0,2

PV capacity (kWp): 32

PV capacity per m2 (Wp/m2): 23

Stage of Development: Complete **Responsible:** *Grab Architekten AG*

O	Idea/Patent	……
O	Prototype	……
X	Demonstration	Kraftwerk B
O	Integral building element	……
O	Commercially available	……

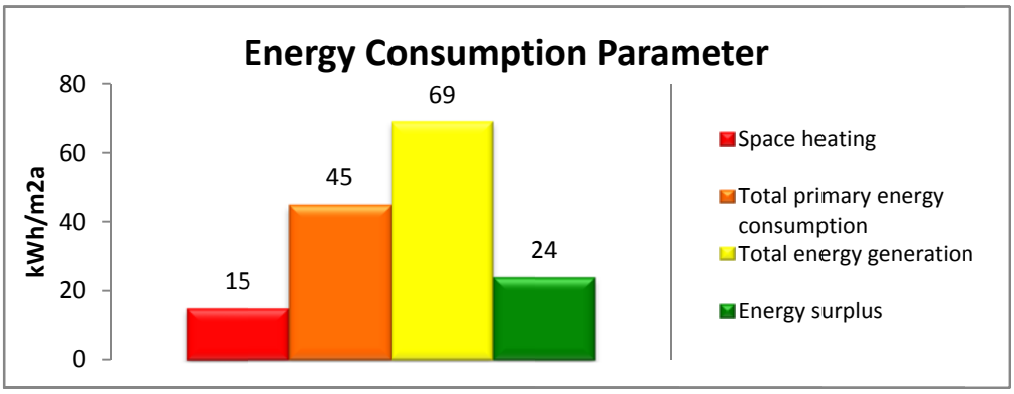
BISTS description and context

Project motivation: Achieving a high degree of energy efficiency and solar energy utilization at most optimal level. In "Kraftwerk B" photovoltaics and solar thermal collectors are integrated directly into the building envelope. The optimal thermal insulation applied permitted to produces 10 per cent more energy than it needs and thus is Switzerland's first multi-family building 'energy plus'.

Function and form: Residential buildings, parallelepiped shapes in plant

Size: 7 apartments, 23 users, 1380 m^2 of net floor area, 0,39 surface to volume ratio.

System viability



Modelling and simulation tools developed/used

BISTS Performance data

Based on:
O Estimation
O Detailed simulation

X Measurement/testing
X Long-term monitoring

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: 0,11 W/m^{2}K
Noise, fire, etc ratings
Other:

For separate collectors:
performance rating coefficients -

Other:

Additional information:

Sources and references:

[1] http://www.eurosolar.de/en/index.php/appreciation-grab-architekten-ag;
[2] https://kedarvideo.wordpress.com/2008/10/13/
[3] http://www.jenni.ch/index.html?html/Heizen%20mit%20Sonne/KraftwerkB_Bennau.htm
[4] http://www.jenni.ch/pdf/Kraftwerk_Bennau.pdf

INSTRUCTIONS

Please fill in as much information as possible.

Tick where appropriate.

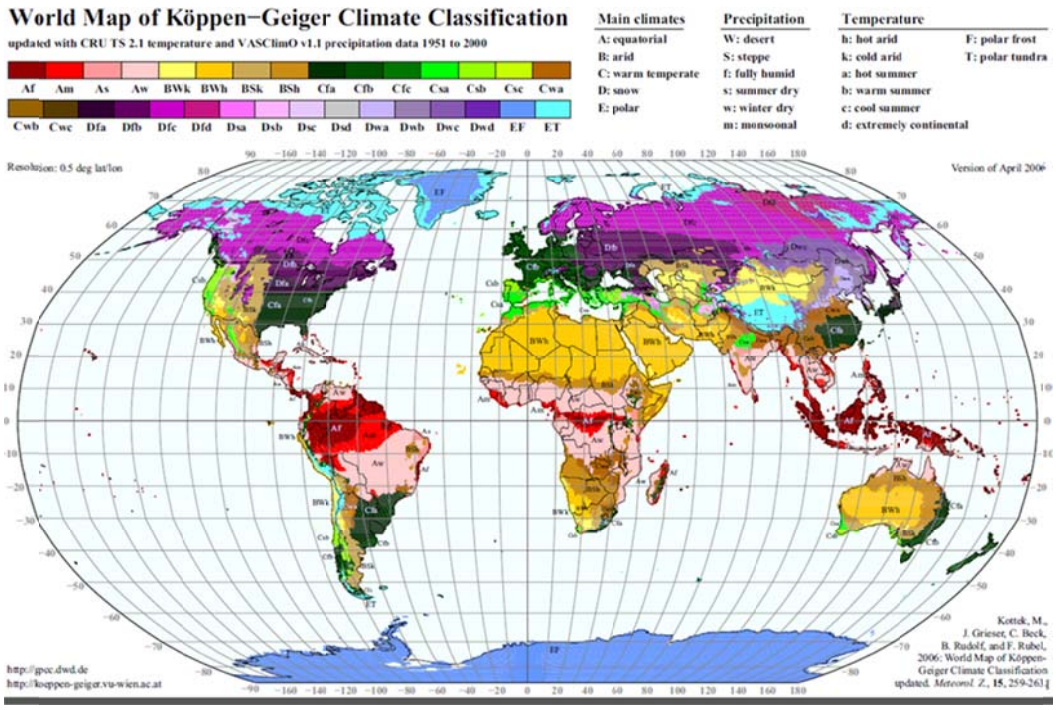
Text in red is suggested guidance. Insert information in provided space, removing red text as appropriate

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 Classification updated. 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’