

Example name: Case Study 1 – Integrated on a pitched roof

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For installations

BISTS Location:
Lisbon (38.7138° N, 9.1394° W)

Climate Type: CSA

Building Use: Commercial – Bank headquarters

Level of BISTS integration:
Reijenga classification: Applied invisibly

- ☐ New Build
- ☒ Refurbishment
- ☐ Other:



Fig.2: Integration of STC in a pitched roof (Caixa Geral de Depósitos, bank headquarters, Lisboa)

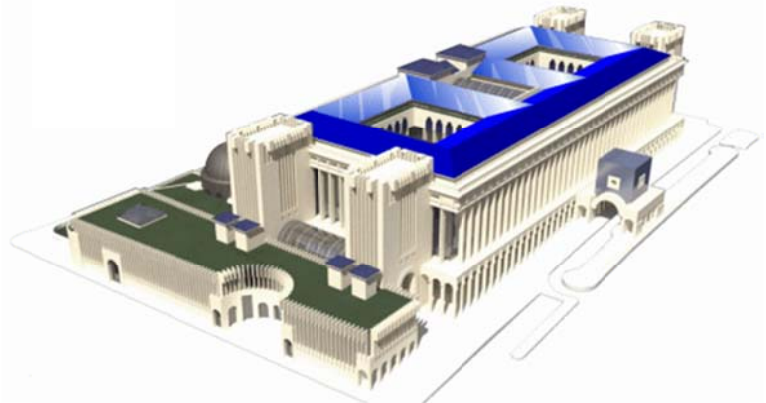


Fig.3: 3D model of the building

Type of BISTS:

Active

Function(s):

- ☒ Air heating and cooling
- ☒ Water heating
- ☐ Combi-system
- ☐ Cooling/ventilation/shading
- ☐ PV/T
- ☐ linked to another system (e.g., heat pump)
- ☐ Other:

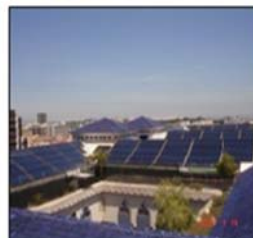
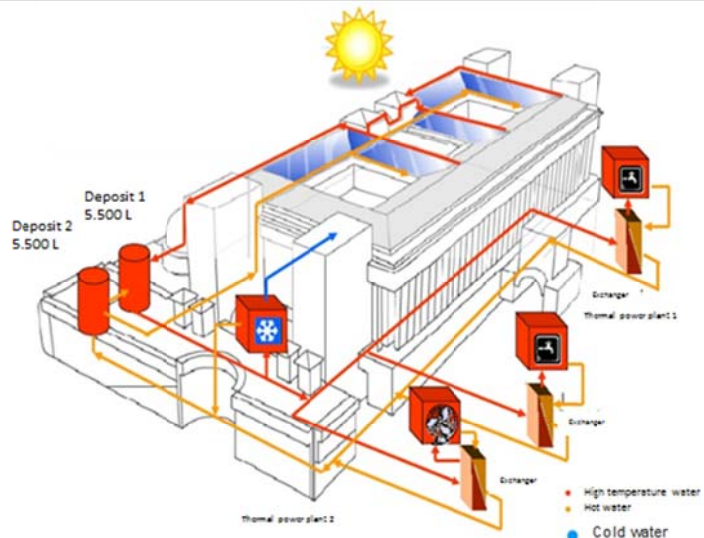


Fig.4: Installation of the STC in the roof

Building element:

- ☐ Facade
- ☒ Roof
- ☐ Other:

**Fig.5: Scheme of the air heating and cooling system****BISTS characteristics:**

The solar thermal system used in the CGD central headquarters consists in 158 solar collectors with a total area of 1600 m². The panels were manufactured off-site and subsequently placed on the roof of the building over a wooden structure. The roof on the south side would be a prime location, but CGD opted not to use it due to concerns about visual impact. In total, there are energy savings of more than 1 GWh/year, corresponding to 5% of the global building consumption.

Stage of Development: Installed**Responsible:** Jayme da Costa
Mecânica e Eletricidade, S.A.

- ☐ Idea/Patent
- ☐ Prototype
- ☐ Demonstration
- ☒ Integral building element
- ☒ Commercially available

BISTS description and context

The building has a total floor area of 173,600 m² with a rectangular shape and consists of 15 floors. This is a building for services, including bank headquarters.

System viability

CGD invested in this project about 1 million Euros, and foresees to recover the investment in 8 - 10 years through the savings made on the electricity bill. With the solar thermal plant, the building annually saves more than 1 GWh of electricity, equivalent to avoiding each minute of operation the emission into the atmosphere of about 1 kg of CO₂.

Modelling and simulation tools developed/used

The building has a system to do a detailed monitoring of the energy produced, that allows a real-time analysis of the performance. This data allows the CGD direction to evaluate the further expansion of this type of system in other CGD buildings. The SolTerm software was used in the modelling and simulation phases.

BISTS Performance data

Based on:

- Estimation
- Detailed simulation
- Measurement/testing
- Long-term monitoring

Performance parameters

For integrated systems:
key performance indicators -

Solar savings fraction: 99,8%
Esolar: 37007 KWh
leaning radiation: 1363 KWh/m²
horizontal radiation:
1649 KWh/m²

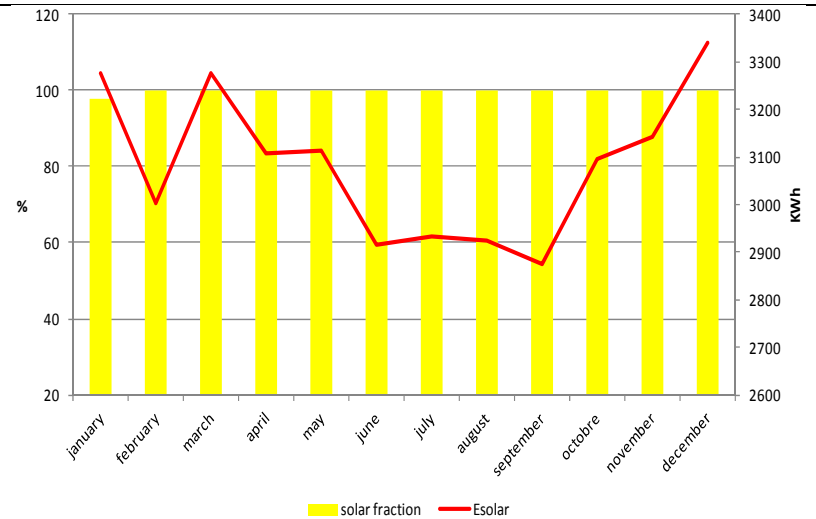


Fig.6: Estimation of the STC performance during the whole year

Additional information:

Sources and references:

<https://www.cgd.pt/Institucional/Caixa-Carbono-Zero/Projectos/Pages/Central-Solar.aspx>