T@W Good Practice Form

Setting

Title:	SOLAR XXI building
Country:	Portugal
Location:	Lisbon
Start date:	2004
End date:	2006
Technology keyword(s):	Solar energy
Host sector:	Service building

General description

Summary:

SOLAR XXI is the building of the Department of Renewable Energy of INETI, the National Institute of Engineering, Technology and Innovation. The building was built based in the best use of solar energy, using solar passive and active technologies.

This project is the result of the cooperation between architects and engineers, where the solutions to improve the energetic efficiency and to use renewable energy resources are integrated in the building architecture.

The building has 1, 500 m^2, mainly offices, meeting rooms and laboratories. The internal space distribution was made based in the solar direct gains. The spaces more occupied during the day (offices) are located in the South of the building and the spaces that have a lower occupation are located in the North (meeting rooms and laboratories). All the building have natural light during the day, due to a skylight situated in the centre of the building. The rooms have openings in the doors that allow transferring heat, by natural convection, between South and North spaces.

Photovoltaic panels were integrated in the south facade, covering an area of 96 m^2 with perfect agreement with glazing areas. These panels have a total installed capacity of 12 kWp. To increase the electricity production capacity, photovoltaic panels, with a total installed capacity of about 6 kWp, were integrated in the shading structure of the car parking.

SolarXXI building, showing a 100 m² PV facade

Aims:

The building aims to be a good example of integration of renewable energies in buildings, mainly the integration of passive and active solar systems.

With this building, the project developers' also aim to give a good example of energy efficiency and low energy consumption in a service building.

To reach these objectives they used some strategies, namely:

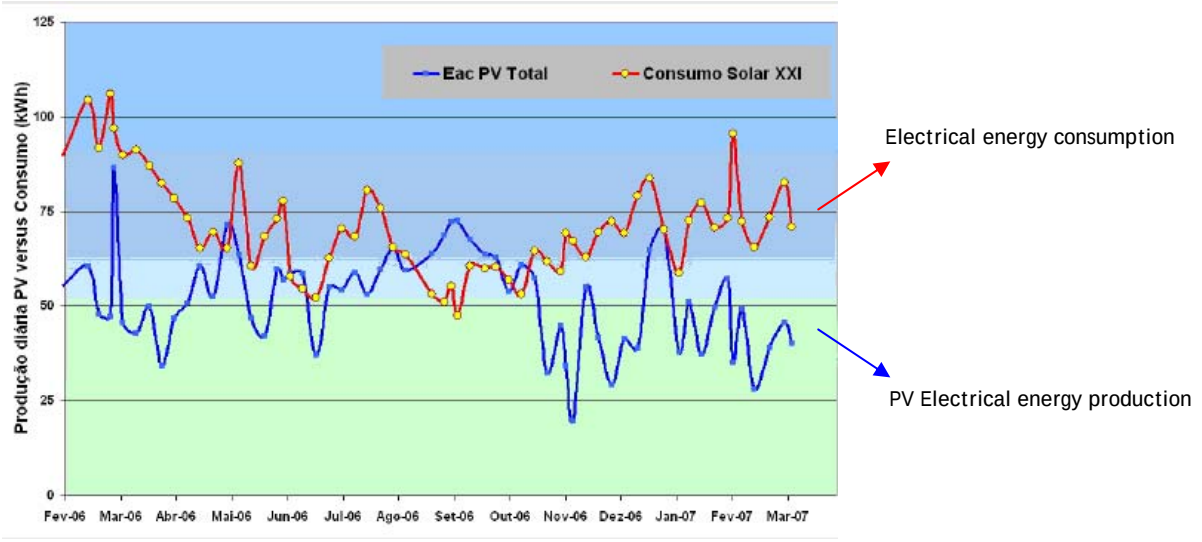
- Building envelope optimization
- Solar facade oriented at South, as a "direct gain" system for heating
- Photovoltaic panels integrated in the south facade
- Take thermal advantage of the photovoltaic panels by natural convection
- Earth cooling passive system
- Natural lighting and ventilation system
- Solar active thermal system (installation of solar thermal collectors in the roof) – to cover the remaining heating energy needs the building has a natural gas boiler.

View of the SolarXXI building

Note: From now, due to the various solar energy systems used in the building, either at passive level, either at active level, to simplify the study, we decided to present only the results for the photovoltaic systems installed.

Summary of Results:

Between February 2006 and March 2007, the photovoltaic panels integrated in the building and in the shading structure of the car parking produced about 75% of the electrical energy consumed in the building.



The Solar XXI building has an average daily electrical energy consumption of 70.8 kWh/day. The PV incorporated in the building produces about 29.7 kWh/day and the PV of the car parking produces around 22.4 kWh/day.

Planning Time: Conception to end of building in years (not mandatory)
Planning issues: (not mandatory)
Operation Time: (not mandatory)
Feasibility Study: (not mandatory)

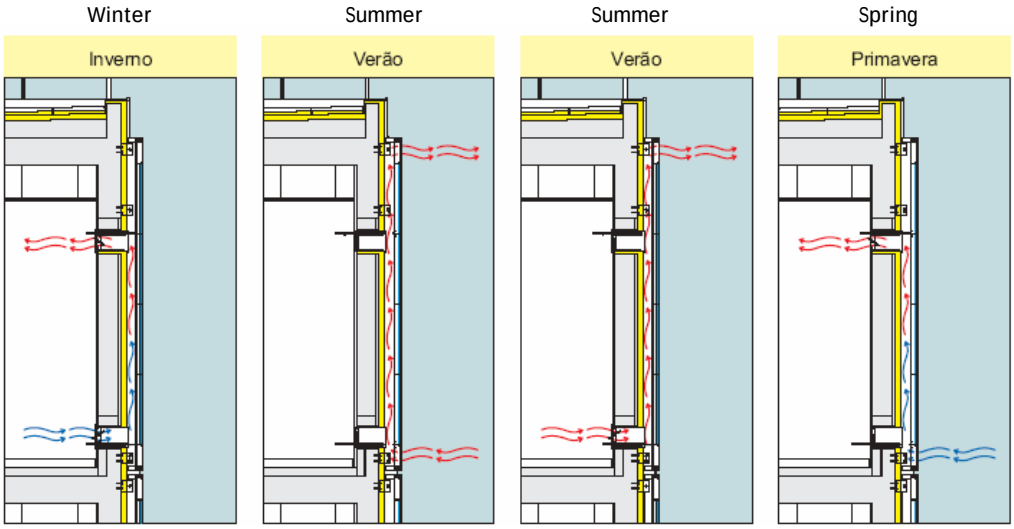
Technical details

Technical details:

The photovoltaic system integrated in the south facade of the building is grouped in modules of polycrystalline silicon in the vertical position. These panels have a total installed capacity of 12 kWp, and will generate about 12, 000 kWh of electricity per year.

The innovation of the system, however, is the use of the heat generated in the back of the PV panels to heat the offices by natural convection.

The following figure presents the natural ventilation strategy that is going to be used in the building. In summer, the space behind the panels can be used to cool down the PV panels and, in this way, increase the efficiency of photovoltaic conversion.



Energy data

Energy data:

The two PV systems produce about 52.1 kWh/day, which covers 75% of the electrical energy needs of the building.

This building is a good example of integration of PV in buildings and can be the starting point to develop a market of BIPV in Portugal.

Regarding the PV sector, Portugal has goals to reach until 2020 – 1, 000 MWp. The integration of PV in buildings can help the country to achieve this objective. On the

other hand, the production of electricity using solar energy diminishes the consumption of fossil fuels, helping to decrease the energy invoice of the country.

Energy saved/generated:	In common units, GJ/y (not mandatory)
Monitoring:	Methodology used (who did it)

Environmental data

Environmental data:

The photovoltaic panels allow the production of electricity without emitting any greenhouse gases. With the "in house" energy production, the energy losses related with transportation and distribution are null, turning the system more efficient.

Project GHG-emissions:	In common units, tonnes CO_2equivalent/year
GHG-emission reductions:	In common units, tonnes CO_2equivalent/year
"EAU, CER, ERU, AAU":	Number of units…
Methodology:	(if applicable) approved baseline methodology or study done – reference to this
Baseline	Text description
Monitoring:	Methodology used (who did it)

Contribution to Sustainable Development:
The construction of a building based in the energy efficiency, in the reduction of external loads and in the use of passive and active solar technologies is a good example of sustainable development, since it shows a form to have economical development associated to an environmental protection.

Economic data:

Economic data:

As the PV is used for energy production, but also as a material construction, the costs are lower that if we put a PV system in a building after its construction.
The "in house" energy production allows the diminishing of energy invoice of the building and the costs related with transportation and distribution of energy.

Financing:	PRIME
Capital cost:	Select a currency (not mandatory)
Operational Costs:	Select a currency (not mandatory)
Payback:	In years (not mandatory)
Energy Production costs:	Select a currency (not mandatory)
Other savings:	Select a currency (not mandatory)

Additional Information

Type of Organisation:

(e.g. technology supplier, service provider, host company, financing body, project management)

Technology keyword(s) specific to this organisation:

Organisation / Agency:	INETI - Instituto Nacional de Engenharia, Tecnologia e Inovação
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Description of the Organisation for inclusion in the database of Technology and Service Providers:

Other contacts:

#please only give full contact details (name, address, email, telephone) if you have confirmed that they are willing to respond to enquiries and want to be included in the database of Technology and Service Providers. These could for example be: host organisation, equipment manufacturers, financial organisations, etc.#