

INFORMATIONS

Mont-Louis Solar Furnace

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Odeillo Solar Furnace

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Sources et bibliography

Guide des énergies renouvelables des Pyrénées-Orientales, Ed.2005 ;
 L'Accent Catalan n° 20, octobre 2004 ;
 Plaquette Air Soleil en Pays Catalan,
 Service Environnement, Conseil
 Départemental des Pyrénées-
 Orientales

Links

www.ledepartement66.fr
www.tourismepyreneesorientales.com

With 3,000 hours of sunshine per year and the pure mountain air, the Cerdanya in the Pyrénées-Orientales is the perfect place to carry out research on solar energy and its use. In the 1900s, near Sorède, at the Coll del Buc, Manuel Antonio Gomes (1868-1933) known as "Padre Himalaya" (because he was so tall) worked on his very first creations and built the first solar furnace himself, with a diameter of 7 m. He presented it in 1904 at the Louisiana Purchase Exposition (USA) and won first prize. This was the beginning of something...



Mont-Louis Solar Furnace



The first solar furnace in the world with double refractory materials was built at Mont-Louis from 1947 by Professor Felix Trombe. This led to scientific research and industrial applications at very high temperatures, between 1,000 and 3,000°C. It was a precursor of Odeillo Solar Furnace and was used as the reference for all solar furnaces (a dozen) built from then on all over the world.

From 1993, it was used by the company Four Solaire Développement, which was a self-funded company, working in four complementary sectors:

- 1/ captivating scientific activities, with live demonstrations and experiences at over 3,000°C,
- 2/ the production of ceramics and smelting bronze objects,
- 3/ applied research, with the development of specific receivers and the development of non-polluting processes,
- 4/ selling and installing solar furnaces as a kit to countries with high levels of sun exposure, to avoid deforestation and pollution.

Technical characteristics:

- ✓ Parabolic concentrator, 100 m², 10 m high and 12 m wide.
- ✓ Heliostat, 141 m² that can swivel on two axis, site and azimuth 10.70 m high and 14 m wide.
- ✓ Thermal power 50 kW
- ✓ Internal temperature over 3,000°C.
- ✓ Focal spot 18 cm in diameter.
- ✓ Receiver for firing ceramics 500 L useful capacity.
- ✓ Firing at 1,000°C in two and a half hours, and at 1,300°C in three hours.
- ✓ Firing capacity, 1 to 3 m³ of ceramics per day.
- ✓ Capacity for aluminium or bronze smelting: 200 to 500 kg per day.

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Odeillo Solar Furnace



Odeillo Solar Furnace bears the “Large European Scientific Infrastructure” label and is the biggest solar furnace in the world, with a thermal power of 1,000 kW. It started operating in 1969 and the temperature of the furnace can exceed 3,000°C in a controlled environment. Sunlight is reflected by 63 flat mirrors, heliostats on 8 levels, that rotate to follow the movement of the sun thanks to a computerised system, the light is then concentrated into the furnace via a large fixed parabola with a surface area of 1,830 m², made from around 9,000 mirrors. The solar furnace houses the research laboratory “Procédés, Matériaux et Energie Solaire” (PROMES-CNRS) that works on concentrated solar energy and high temperature materials, and that also makes use of 11 other solar furnaces, with a slightly lower power than this one.

Not-to-be-missed, “Héliodyssée” - the adventure of solar energy

Héliodyssée is an information centre that is suitable for everyone, even very young children. The guides are scientists, there is an exhibition room, a film available in four languages, demonstrations and an Educational Department. Various topics are addressed: solar energy, the different energy forms, renewable energy and its uses in the home. Visitors can also learn about the research carried out at the CNRS laboratory, in a fun and interactive way. This research contributes to providing solutions to issues regarding energy, the environment, developing materials for space, industry and studying materials of the future.

Thémis Solar Power Tower



Following the oil crises of 1973-1974 and 1979, solar energy emerged as being one of the alternative energy solutions that could help France and its economy to become less dependent on petrol imports. For this reason, construction work began in 1981 to build Thémis solar power tower, led by EDF. This tower was in operation from 1983 to 1986. It became an international reference for converting solar energy into electricity. Unfortunately, after three years of operation, EDF decided to put an end to their experimental research programme at Thémis, because the cost price to produce a kWh was too high. Therefore Thémis closed its doors in 1986 and the owner of the site, the Conseil Général, had to look for ways to utilise the installations inside the solar power tower. From 1987 to 2004, Thémis tower was made available to the CNRS - IN2P3 laboratory to carry out research on particle astrophysics.

✓ **Thémis-photovoltaic operation**

A part of the heliostats field was equipped with solar panels to be able to create the most powerful photovoltaic plant in France, that would develop an overall power of 1MWc and could produce more than 1,600 Mwh per year, representing the annual consumption of more than 600 families.

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SOLAR ENERGY

To consolidate this solar function for the site, two other operations were also implemented :

✓ **THEMDISH operation**

Parabolas with Stirling engines were installed to test decentralised systems of electricity production from solar energy (project led by the CNRS PROMES laboratory).

✓ **Installation of a multi-functional solar furnace prototype**

This operation was entrusted to local craftspeople and small companies by the firm Four Solaire Développement who currently manage Mont-Louis Solar Furnace.

✓ **Tourist activities in the summer**

In addition to these operations, the Department decided to try and develop an industrial and technical tourist offering here, and so for the past two years during the summer season, the site has been open to the public for free tourist activities, in the form of exhibitions based on energy and a presentation of the site, its history and reconversion project.

For this, the site entered into a partnership in 2006 with the Cité des Sciences et de l'Industrie de La Villette. Eventually, there will be a museographic space in this building so a significant number of exhibitions can be held here. A business centre will also be created, working with the departmental business centre Plein Sud in Rivesaltes, near Perpignan. This business centre will be devoted to the renewable energy, tourism and high-tech sectors.

There are also other establishments working on solar energy in the Roussillon plain and along the coast.

✓ **Solar air-conditioning in Banyuls cellars**

The cellars at the Cellier des Templiers in Banyuls-sur-Mer have a natural approach to air-conditioning, with a solar air-conditioning system. This installation was the very first in France and it has been operating since 1991. With an area of 131 m² covered in sensors on the building, hot water can be produced, and then used for a chemical reaction whereby the heat is absorbed to produce frigidities. To obtain the optimal conditions for ageing their very best vintages, the winegrowers from the G.I.C.B. (Groupement inter-producteurs du cru Banyuls) set themselves a technical challenge: to produce their own cooling system and control how it is used, by capturing the energy from the sun directly. Thanks to this eco-friendly renewable energy source, the sun's role in ripening the grapes is extended to the ageing process of these local wines.

✓ **Port-Vendres fruit terminal**

Port-Vendres commercial port now has a new building that will help to improve the quality of the services provided and will guarantee the cold chain. A 720 m² photovoltaic generator has recently been installed on this new building, which is currently the 4th biggest installation of its kind in France. With a power of 87 kWc, this installation will produce around 110,000 kWh of electricity, that will then be reinjected into the network.

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