

## INFORMATION

### Mont Louis solar furnace

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### Odeillo large solar furnace

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### Information about the exhibitions at Thémis solar plant (summer only)

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### Sources and Bibliography

Guide to renewable energy  
of Pyrénées-Orientales, Ed. 2005 ;  
L'Accent Catalan n° 20, october 2004 ;  
Brochure Air Soleil en Pays Catalan,  
Environmental division,  
General Council of Pyrénées-Orientales

### Internet links

www.cg66.fr  
www.tourisme-pyreneesorientales.com

### Reference to other information sheets

The Yellow Train, Mountains in summertime,  
Mountains in wintertime, Crafts and handiwork,  
Port-Vendres and Fisheries, The Iron Route

## Solar energy



With 3,000 hours of sunshine per year and the purity of its air, the Cerdagne plateau in Pyrénées-Orientales is a perfect place for solar energy research and implementation. From 1900, in Coll del Buc, near Sorède, Manuel Antonio Gomes (1868-1933), nicknamed "Padre Himalaya" (due to his height) conducted his first experiments and built alone a 7-m-diameter solar furnace presented in 1904 at the Universal Exhibition in St. Louis (USA) and for which he received the First Prize. He had paved the way for future research...

### Mont-Louis solar furnace

This is the world's first dual reflection solar furnace. It was built in Mont-Louis in 1949 by Professor Felix Trombe, who initiated scientific research and industrial applications in the field of high temperatures (between 1,000 and 3,000 C°). The furnace served as a prototype for the construction of the large solar furnace at Odeillo and is a reference for all solar furnaces (a dozen) built since then throughout the world.

Since 1993, it is run by Four Solaire Développement, a self-funding company operating in four complementary activities:

- 1/ Organisation of exciting scientific events, such as demonstrations and live scientific experiments at high temperatures (over 3,000 C°),
- 2/ Production of ceramics and fusion of bronze products,
- 3/ Applied research, with the development of specific receptors and non-polluting processes,
- 4/ Sale and installation of solar oven kits in countries with high levels of sunlight, in order to prevent deforestation and pollution.

### Specifications:

- Parabolic concentrator of 100 m<sup>2</sup>, 10 metres high and 12 m wide
- Heliostat of 141 m<sup>2</sup> with elevation and azimuth-rotation, 10.70 m high and 14 m wide
- Thermal power 50 KW
- Furnace temperature of over 3000 C°
- Focal spot of 18 cm diameter
- Receiver for ceramic firing of 500 l capacity
- Firing temperature of 1,000 C° in two and a half hours, and 1,300 C° in three hours
- Firing capacity, 1 to 3 m<sup>3</sup> of ceramics per day
- Firing capacity for aluminium or bronze: 200 to 500 kg per day.

## PRESS SERVICE

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## The Large Furnace at Odeillo



Labelled as "Great European Science Infrastructure", the Large Solar Furnace at Odeillo with a thermal power of 1000 kW, is one of the world's two largest solar furnaces. Put into operation in 1970, it can reach temperatures above 3,400 C°, without the input of polluting substances. The sunlight is

concentrated on the furnace with a large fixed parabolic reflector consisting of 9,130 mirrors. The sunlight is then reflected onto the big mirror by 63 heliostats which are oriented to follow the apparent movement of the sun with the help of a computerised system.

### A visit to Héliodyssée, "the solar energy adventure"

With its scientific leaders, its exhibition room, its film in four languages, its presentations, its educational service, Héliodyssée is an information and education centre accessible to all, from an early age. The topics covered are: solar energy, the different forms of energy, renewable energy and its applications in various environments. It also enables to discover in a fun and interactive way the CNRS research laboratory that helps provide solutions to energy and environment problems, participates in the development of materials for aerospace engineering, the industry and materials of the future.

## Thémis solar power plant

Following the oil shocks of 1973-1974 and 1979, solar energy emerged as an alternative energy solution that could lead to a greater independence of France and its economy from oil imports. It is in this context that the construction of Thémis electro-solar plant began in 1981 under the auspices of EDF, the French utility company. The plant operated from 1983 to 1986. It then became a real international reference for converting solar energy into electricity. Unfortunately, after three years of operation, EDF decided to end its experimental research programme with Thémis, arguing the cost per kWh produced was too high. Thémis therefore closed in 1986 and the General Council, owner of the site, had to seek solutions to rehabilitate the facilities of this electro-solar plant. From 1987 to 2004, the site of Thémis is made available to the CNRS IN2P3 laboratory in order to conduct research on particle astrophysics.

### • Operation Thémis-pv

Part of the heliostat field will be equipped with solar cells to create the most powerful photovoltaic solar power plant in continental France with a power of 1MWc that will annually produce more than 1600 MWh, representing the annual consumption of more than 600 families.

### • Operation PEGASE

Another part of the heliostat field and the tower will be reserved to the CNRS PROMES laboratory (PROcesses Materials and Solar Energy), in order to develop on-site research programmes on solar concentrated solar energy.

To consolidate the "solar ambition" of this site, two other operations will be implemented

### • Operation THEMISH

The installation of Stirling-system dishes has for objective to test decentralised systems for the production of solar electricity (project supported by CNRS PROMES).

### • Installation of a prototype multifunction solar furnace

Dedicated to crafts and the small industry, this operation is proposed by Four Solaire Développement (Solar Furnace Development), the company that currently manages the solar furnace at Mont Louis.

### • Summer tourist animations

In addition to these operations, and in order to develop an industrial and technological tourism, the department of Pyrénées-Orientales, for two years now, opens the site to the public during the summer months and offers free tourist animations such as exhibitions on energy and the presentation of the plant, its history and its conversion programme.

In this context, a partnership was initiated in 2006 with the City of Science and Industry of La Villette, France. Eventually, a real museum will be created in the factory building to house various exhibitions. Moreover, it is envisaged to create an on-site business centre that would work together with the department's business incubator 'Plein Sud' located in Rivesaltes, in the plain near Perpignan. This business incubator is dedicated to renewable energy, tourism and high-technology.

## Other sites using solar energy are also present in the Roussillon plain or on the coast.

### • Solar cooling of wine cellars in Banyuls

The winery of Cellier des Templiers in Banyuls-sur-Mer are naturally cooled by a solar air cooling system. This facility is the first such experiment operating in France since 1991. With a solar sensor surface of 131 m<sup>2</sup> covering the building, it can produce hot water that is then mixed with a chemical reaction absorbing heat and thus producing refrigeration. To obtain the optimum conditions for ageing their best wines, the winemakers of GICB (Banyuls Wine Producers Grouping) have identified a technical challenge: produce cold and controlling its use by directly harnessing the sun's energy. With this renewable and eco-friendly energy, the sun's role is extended from grape maturation to wine ageing.

### • Fruit terminal of Port-Vendres

The commercial port of Port-Vendres now features a new building that will improve the quality of service and particularly guarantee an unbroken cold chain. On this new building, a photovoltaic generator of 720 m<sup>2</sup> has just been installed, making it currently the 4<sup>th</sup> largest such facility in mainland France. With an installed capacity of 87 kWp, it will produce approximately 110,000 kWh of electricity to be injected into the grid.