

Perpignan: Inauguration of the largest building integrated photovoltaic power plant in the world

Project description

On October 13th, the world's largest building integrated photovoltaic plant with a total power of 8.8 MW and an annual production of 9 700 000 kWh will be inaugurated at Saint Charles International, the European's largest fruits and vegetables distribution centre.

After two years of rehabilitation, the roofs of the Saint Charles International site have been renovated and the 68 000m² of corrugated fibrous cement plates (with asbestos) have been replaced by 97 000 photovoltaic tiles, a genuine building material, making this project not only an environmentally friendly adventure but also an innovating and resolutely promising one.

The plant will be inaugurated by Nathalie Kosciusko-Morizet, Minister for ecology, sustainable development, transport and housing.

The photovoltaic plant construction has been directed by the Saint Charles Solaire Company, the end operator, along with a temporary partnership of local companies also promoting business in and around Perpignan. This solar power plant - unparalleled in the world - is deeply rooted in our commitment to sustainable development. It also proves the feasibility of large scale photovoltaic solar power production within our built environment.



The power plant site: Saint Charles International Market

Saint Charles International is the largest transportation, logistics and commercialization hub of fruits and vegetables in Europe. It represents 72 owners, 200 companies, 2500 employees and generates a turnover of 1.6 billion Euros.

The site itself is made of 11 buildings with a total roof surface of 68 000m². The corrugated fibrous cement plates (with asbestos) have been replaced by the photovoltaic tile roofing system Solaire France SUNSTYLE®. Even the roofs less exposed to sunlight (North orientation) have been replaced and are fully incorporated into the photovoltaic power plant.



Figure 1: Saint Charles International site in Perpignan



Figure 2: Replacement and renovation of the former roof

Technical aspects of the plant

The Saint Charles Solaire power plant was realized in 9 independent project stages. This division has allowed an easier electric installation, has reduced the technical, financial and organizational risks and has permitted for the production of electricity to be operational already a few months after the works started.

Main characteristics of the installation				
Stages	Building	# Tiles	Peak power	Annual production
Stage 1	Building E	9'732	837 kWc	921 MWh
Stage 2	Building D	17'126	1'516 kWc	1'683 MWh
Stage 3	Building C and M	16'736	1'510 kWc	1'676 MWh
Stage 4	Building B	14'729	1'372 kWc	1'523 MWh
Stage 5	Building A	12'768	1'167 kWc	1'284 MWh
Stage 6	Building P and Q	10'137	951 kWc	1'046 MWh
Stage 7	Building K	2'476	232 kWc	255 MWh
Stage 8	Building H	7'428	691 kWc	760 MWh
Stage 9	Building F	5'643	531 kWc	558 MWh
TOTAL		96'775	8'807 kWc	9'706 MWh

Saint Charles solar power plant

Figure 3: The 9 different stages at Saint Charles Solaire plant with the grid injection points indicated

The SUNSTYLE® tiles comprise system the necessary wiring making it possible for the roofer to connect the tiles to each other upon assembly. The wiring is then connected to a junction box. The cables from the junction box are then connected to the shelters that include inverters, transformers and 20000v injection equipment. The delivery stations are connected to ERDF (French Grid Operator) network (by underground cables).

The figure below shows a simplified electric diagram of a shelter (junction box, transformer and Middle voltage switchgear).

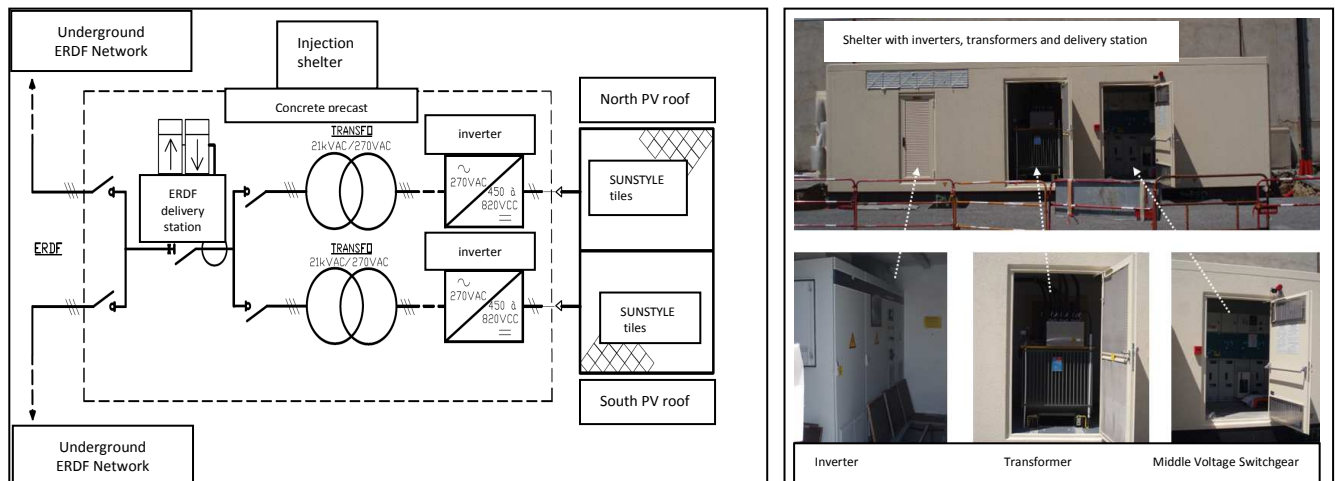


Figure 4: Simplified electrical diagram of the Saint Charles Solaire power plant

The SOLAIRE FRANCE SUNSTYLE® roofing system: a genuine building material

The SUNSTYLE® photovoltaic tile roofing system has been developed by Solaire France. It replaces traditional building materials while at the same time generating electricity. It is used for new roofs and to replace existing roofs of individual homes as well as commercial and industrial buildings.

The SUNSTYLE® system differentiates itself from other photovoltaic systems through aesthetics and unique design of tiles, high level of integration into buildings, flexibility, and its ease of installation and low maintenance. It is nothing less than a multifunctional building material that will ensure all the functionalities of a traditional roof in the long term. Tiles without solar cells can be used to complete all the sections of the roof where no solar power generation is foreseen.

SUNSTYLE: a truly integrated building material



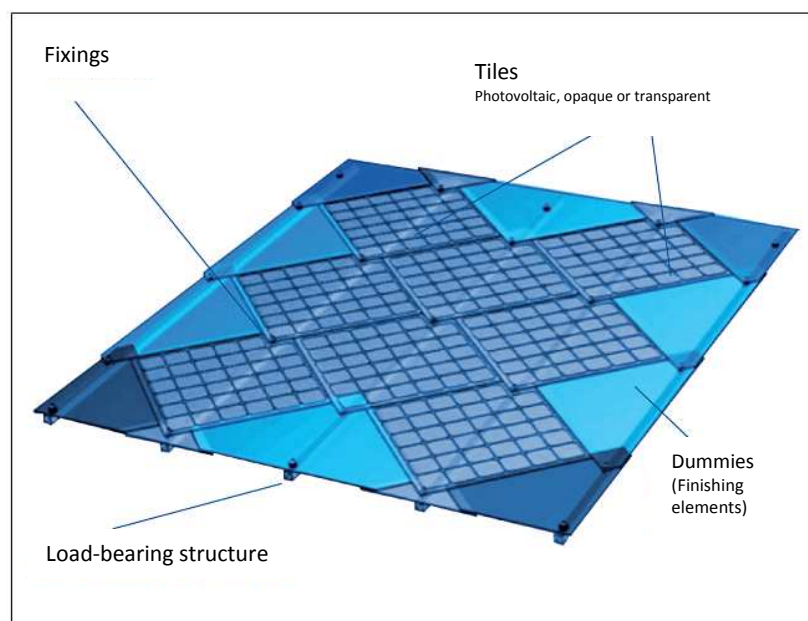


Illustration 6: SUNSTYLE® photovoltaic tile system

Produced in Europe, certified and guaranteed, the SUNSTYLE® system guarantees absolute water-tightness, shock resistance, durability and high wind resistance (6mm glass panes). It is therefore perfectly suitable for the weather conditions to which Saint Charles International is exposed. The tiles of the SUNSTYLE® system were manufactured by Saint Gobain Solar.

The complete SUNSTYLE® roofing system has been successfully tested for its building integration by the CSTB. (French Scientific and Technical Centre for Building)

Description of the photovoltaic tiles

The diamond shaped tiles have diagonally arranged fixing holes allowing for both the placement and the fixing of the tiles onto the load-bearing structure. The tiles are placed one after the other from the bottom to the top which each tile overlapping the previous one thus facilitating the water flow and ensuring the water-tightness of the system along with additional waterproofing elements between the tiles and within the fixing elements.

The single-crystal silicon photovoltaic cells provide electricity with optimum efficiency. Each tile is composed of 24 photovoltaic cells. Transparent tiles can be inserted where desired to ensure natural light within the building.

Illustration of the various phases of the project

The pictures below illustrate the installation of the roof and of the electric components of the photovoltaic power plant. The photovoltaic roofs have been replaced on the buildings without interfering with the activities inside the buildings (co-activity).

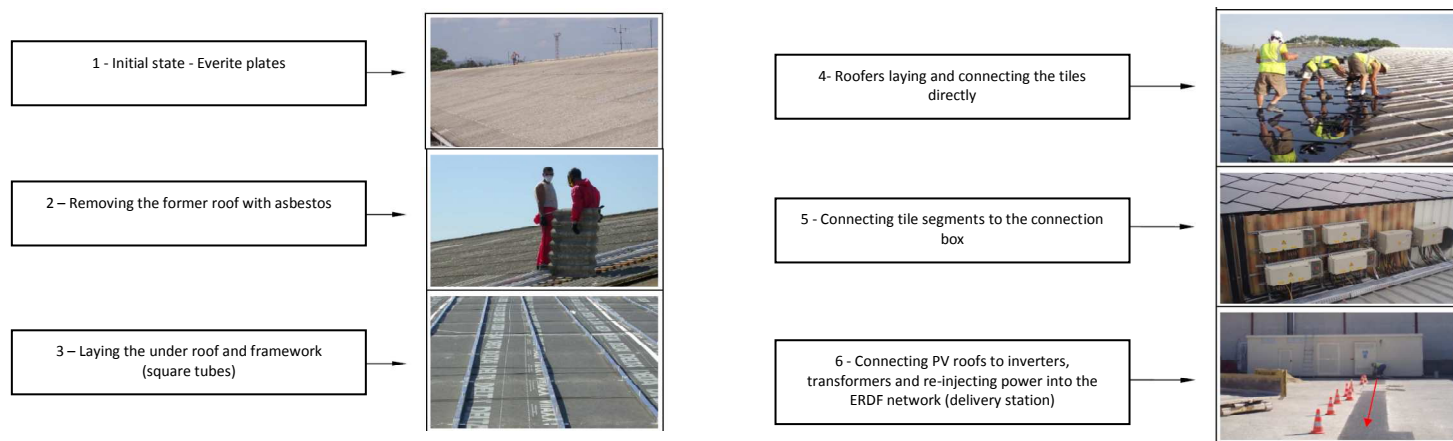


Figure 8: Illustrations of various interventions on the site

Participants to the project

The photovoltaic power plant has been constructed by Saint Charles Solaire, the owner of the power plant, along with a temporary partnership of local companies also promoting business in and around Perpignan.

The construction of Saint Charles Solaire photovoltaic plant

Work duration: 2009-2011
Photovoltaic Power: 8.8 MW
Surface: 68.000m²
Annual production: 9.7 MWh
Number of tiles: 97 000



SAINT-CHARLES SOLAIRE SAS
 Owner of the plant
TECSOL SA
 Project Manager
BUREAU FREJAFON SA
 Medium Voltage Engineering
SOLAIRE FRANCE SARL
 Project Development and PV roofing supplier
VILMOR ENR SARL
 Removing and Installation of the roof
SOTRAVENIR SOTRAGROUPE
 Electrical works
CEGELEC SUD OUEST SA
 Electrical Equipment Supply and Engineering
SOCOTEC SA
 Safety and Control Office
COORDINATION CATALANE
 Project Coordinator

Conclusion

Thanks to the SUNSTYLE® photovoltaic roof system, the Saint Charles Solaire power plant provides aesthetical and architectural integration in the urban and industrial environment.

The photovoltaic tile roofing, a genuine building material, guarantees all the functionalities of a traditional roof in the long term.

The actual size and importance of the project will remain a landmark in the area of building integrated solar power plants.

The old roofs have been replaced by a new and roof, aesthetic and designed for the long term, all of which add to the value of the present buildings.

The electricity production of the power plant is superior to what was initially expected.

This solar power plant - unparalleled in the world - is deeply rooted in our commitment to sustainable development. It also proves the feasibility of large scale photovoltaic solar power production within our built environment.