

Solar Silo





Aesthetic integration

The dimensions of the façade BIPV modules was designed taking into account the existing modularity and the geometrical aspects and constraints of the façade. On the other hand, the BIPV roof has been constructed using standard module dimensions but the resulting effect is similar to a mosaic, thanks to the combination of different colours.

Energy integration

The BIPV modules have been installed to produce electricity to be used directly for reducing the electricity demand from the grid. In fact, the BIPV system is able to cover about 37% of the total energy demand of the building estimated as 44,400 kWh/year. Moreover, as an R&D project, each BIPV module of the roof is monitored and the whole PV system is combined with a second-life battery energy storage system for studying how to better optimize self-consumption of electricity in the area.

Technology integration

The BIPV modules (Kromatix®) have been used as building materials for both the building's façades and the roof. Indeed, they represent the cladding elements of the ventilated façades that have been constructed to improve the thermal energy behaviour of the existing envelope that was made of concrete. The façade modules have been mounted by means of metal mounting backrails and fixed by small clamps on the long edges of the modules. Similarly to the façades, the roof's modules are used as large slates creating a water-bearing layer of the ventilated roof that has been created with a wooden substructure on the thermal insulation layer. In both cases, the air cavities behind the BIPV modules represent an advantage for the thermal-hygrometric behaviour of the envelope and for the energy performances of the modules. The modules, with standard dimensions on the roof and few customized sizes on the façade, are characterized by a coloured coating on the inner surface of the outer glass that slightly decreases the system efficiency.

Decision making

Every year, Kantensprung AG invests more than 200.000 CHF in energy economy measures to renovate buildings gradually. Within the process of redevelopment of the former industrial site "Gundeldinger Feld", the BIPV technology was integrated into the envelope of the Solar Silo both to provide a visible sign of the shift from fossil fuels to renewable energy and to pursue the objectives of the 2000 Watts Society thanks to renewable energy production.

Lesson learnt

The original purpose of a silo was to stock coal needed for heating the entire area. Therefore, the building became a symbol for the transition from fossil fuels to renewables for the whole area, thanks to BIPV that can be seen by visitors to the site. In the past, architects had to convince people to choose BIPV, but today this is changing. Some good examples of integrated BIPV in façades are needed to create a picture of the possibilities in people's heads. In this building, the glass of the coloured BIPV modules was designed not to reflect solar light so that there would be no glare effects. The design team received positive feedback regarding the aesthetics of the building and the modules. Some people wondered what kind of material were used on the façades, they don't recognize it as PV! (Arch. Kerstin Müller, Baubüro in situ AG)

Solar Silo has a long history, related to Gundeldinger Feld. Indeed, the whole area has been renovated and transformed into a multipurpose district adopting the sustainability concept in a wide and holistic perspective, ranging from energy to cultural aspects. It is worth considering that re-building the whole area would have meant a lot of embodied energy, so they tried to find a balance, including economically, for the entire area. Therefore, step by step, the entire site has been renovated, using thermal insulation, good energy-performance glazing, while also considering water recycling. (Mr Thierry Bosshart, iRIX Software Engineering AG)

For instance, we decided to reuse some existing materials (e.g. cladding for the external elevator and the kitchen) and to integrate solar energy into the existing building envelope (Arch. Kerstin Müller, Baubüro in situ AG).

As an R&D project, this pilot BIPV building is offering the opportunity to continuously learn from the interplay of electricity production, consumption and storage. The installation of BIPV modules on the Solar Silo, indeed, has been equipped with many sensors, aimed at evaluating the real power output of each single module. This is allowing to record the performances of the differently coloured modules over time and compare their real electrical behaviour with the declared values.

For this R&D project there was not a predefined business case. Instead all implemented renovation measures have been adopted step by step, considering also the economic aspect of sustainability. For instance, existing building materials have been reused to reduce both investment costs and environmental impact. This building project is promoted as a pilot project by the Office of Environment and Energy of the Canton of Basel City and the Federal Office for Energy and, specifically, the former supported this pilot project with a funding for coloured BIPV modules. This project was awarded with the Swiss Solar Prize 2015 in the "Renovation" category.

PROJECT DATA

Project type	Retrofit
Building function	Office
Integration system	Opaque tilted roof
Location	Dornacherstrasse 192, 4053 Basel, Switzerland

BIPV SYSTEM DATA

Module type	Custom made modules
Solar technology	Monocrystalline silicon
Nominal power [kWp]	24
System size [m²]	159
Module size [mm]	Several
Orientation	North (façade), South (façade and roof)
Tilt [°]	90 (façade), 11 (roof)

BIPV SYSTEM COSTS

Total cost [€]	-
€/m²	-
€/kWp	-

PRODUCER DATA

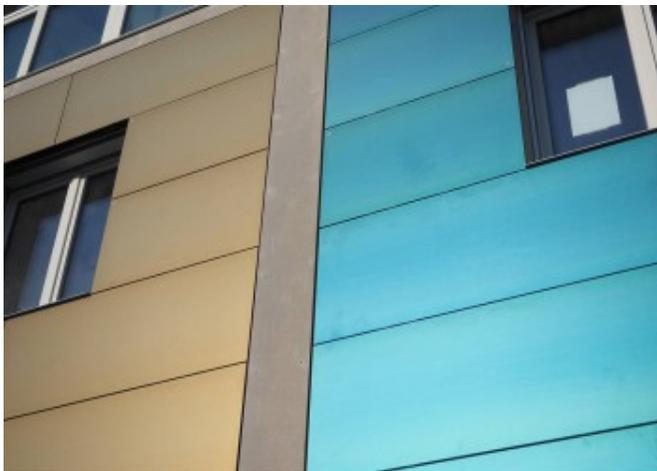
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Address	Dubai Investment Park 1, Dubai, United Arab Emirates
Contact	info@emirates-insolaire.com 04-8122726
Web	http://emirates-insolaire.com/



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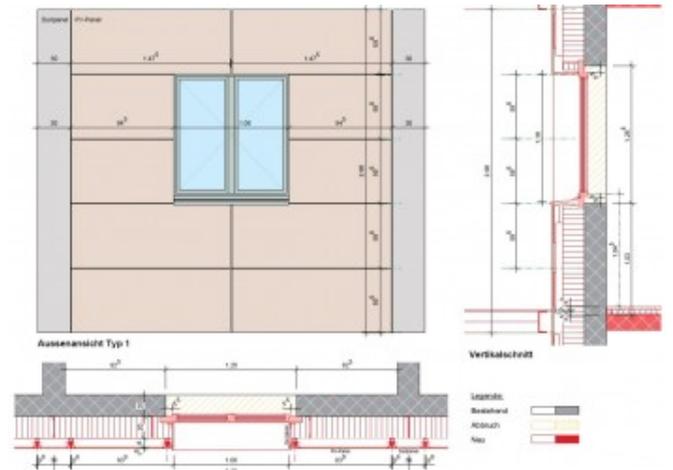
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1. Solar Silo © Baubüro in situ AG
2. Historical picture of the Gundeldinger Field © Baubüro in situ AG
3. BIPV South façade © Martin Zeller
4. Different colours of BIPV façade © Martin Zeller
5. Detail of blue BIPV modules © Martin Zeller
6. Detail of gold BIPV modules © Baubüro in situ AG
7. Technical drawings of the BIPV façade © Baubüro in situ AG