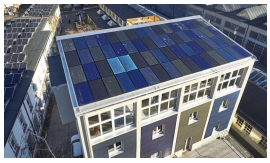


Solar silo in Gundeldinger Feld - Basel

Author: Cristina Polo (SUPSI)

Coloured photovoltaic modules roof and wall integrated

Solar

What is the solution?

Innovative coloured customized photovoltaic modules are used creating a particular visual design integrated in the ventilated roof and façade envelope of an industrial refurbished historic building in Basel, Switzerland. Green, gold, orange, blue and gray PV modules with monocrystalline solar cells and some standard modules in black were used on the roof as well as on the south and north façades. The 159 m2 BIPV plant (23 kWp) installed in the Solar Silo Building is integrated over the entire area and generates 16,400 kWh of solar power annually. It covers around 37% of the building's total energy consumption of 44,400 kWh/year and the building is connected to a district heating supply. The project has finished in 2015 and won the Swiss Solar Prize 2015 in the Category B: Building renovations.

Why does the solution work in terms of compatibility with conservation and technical aspects?

The aesthetical appearance of the BIPV façades and the BIPV roof arises from the use of innovative coloured PV modules that have been combined with attention to the geometrical aspects and existing constrains of the roof and the façades. The modules technology is characterized by a colour coating on the outer surface of the module's glass that makes the modules a matte panels and the PV cells are hardly recognizable. Besides the technological specific features of the modules, the roof modules have standard dimensions and they have been used as mosaic tiles whereas the façade modules have been customized for keeping the modularity of the existing surface with the smaller number of custom-sized panels. BIPV modules have been installed as cladding elements of the ventilated roof and façades – both southern and northern – although if facing north BIPV produce less amount of electricity, the aim of designers were to have a homogeneous architectural language in the whole building design. To increase the self-consumption of the electricity that is generated on-site and to relieve the public grid, previously used lithium-ion batteries from electric vehicles are used as second life battery energy storage. The PV system and battery storage are being investigated and monitored in detail in a joint research project by the Office for the Environment and Energy of the Canton of Basel-Stadt and the Federal Office of Energy together with the University of Applied Sciences North-western Switzerland (FHNW).

Description of the context:

The former building of the heating center and the coal silo of Maschinenfabrik Sulzer and Burckhardt in Basel over the past 15 years, has been completely converted into a multipurpose building making way for a cultural district. The Solar Silo is the result of the refurbishment of an old coal silo tower, where coal was stored to produce heat for an ex-industrial field “Gundeldinger Field”, established in 1844. In the last 15 years, the foundation Kantensprung AG has bought the industrial area to return this site to the local population. The main criteria for site transformation are: neighborhood, ecology and integration. Therefore, this transformation has been carried out adopting a holistic sustainable approach: re-use of existing materials, rainwater collection, green roofs, photovoltaic systems and space reconversion for social/work/commercial activities. With regard to the photovoltaics, it has been integrated into the building envelope to provide a visible sign of the shift from the use of fossil fuels for an old manufacturing site to the use of renewable energies for a new cultural and commercial site. The project is part of the "2000-watt society - pilot region Basel". Various types of photovoltaic modules were installed in the Gundeldingen Feld complex. A photovoltaic system with an output of 50 kWp was also installed on the shed roofs of halls 4 and 5. The electricity produced is fed into the IWB (Industrielle Werke Basel) network. In addition to the PV, a Second Life battery energy storage system (2nd-Life BES) is installed. This maximizes the amount of energy that can be used on site. Especially on summer days and on weekends, the production of the PV system exceeds the local power consumption. This surplus can be stored in the BES and can be consumed at a later point in time.

Pros and cons of the solution:

Some pros of so-far-known aspects of this solution: Protection & reversibility, Aesthetics, Energy efficiency, Maintenance, Synergies for user compared to heaving no renewable energy system, Scalability of the solution, Innovative solution, Customized and tailor-made product to improve the integrability of the architectural solution in the existing building, Research project to monitor energy performances and to demonstrate innovative BIPV concept, Socio-cultural revitalization and construction refurbishment of an entire urban area, ex-industrial zone of the city, by adopting renewables energies and a sustainable approach.

Type of data available (level of information, simulation):

Data monitoring system: <https://www.irix.ch/en/references/case-studies/kantensprung-analysis-solar-data-coal-tower> The climatic zone is Cfb (Warm temperature, fully humid, warm summer)

Additional information about the solution:

The refurbishment project of Solar Silo building was awarded with the Swiss Solar Prize in 2010. Link: https://www.solaragentur.ch/sites/default/files/g-15-09-02_mehrzweckgebaude_kohlesilo_basel.pdf Article in Haustech 12/2015. Link: https://www.hiberatlas.com/smartedit/projects/51/1_Beleg_2nd-life-Batteriespeicher_Haustech.pdf Article in TEC21 24/2015: https://www.hiberatlas.com/smartedit/projects/51/tec%2021%2024_2015.pdf Book: Gundeldinger Feld - A machine factory in transition, Kantensprung AG (ed.), editions denkstatt Basel, ISBN 978-3-9524556-0-9. [Internet]. 2020; Available from: https://www.denkstatt-

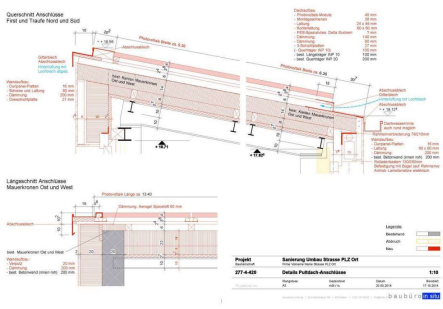
sarl.ch/app/download/10804542174/Buch_GundeldingerFeld_SCREEN.pdf?t=1586173367

Are there any related publications or pictures of the solution?

Roof, © Martin Zeller

Roof, © Martin Zeller

Airview, © Martin Zeller



Cross-section detail © baubüro in situ ag

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Information for selection of solutions