



SOLARCHITECTURE
building solutions



St. Francis Church Refurbishment



Address

Bachtelstr. 13, 8123 Ebmatingen, Switzerland



Location

47°21'16" N | 8°38'08" E



Altitude

626 MAMSL

With the support of



SWISSOLAR 

SUPSI

ETH zürich



PV and PVT combined

St. Franziskus Church has been transformed into a PEB building with a 221% energy efficiency and may be run CO²-neutral. Erected in 1989 and extended in 2008, the partial refurbishment including roof, facades and a new heating system with heat pumps was limited to the original building. Nevertheless architectural unity is achieved: South-west oriented prefabricated PVT-roof-elements incorporate absorbers and hydraulic tubes as well as additional insulation improving the existing roof structure after just one day's mounting procedure. A PV-roof oriented to north-east is made with the same PV-modules and architectural detailing as the PVT-roof. The new heating system's COP is 6.8.



South-east view with PVT roof.



Plan of the ground floor.

Energy

Active solar surface	543 m ²	n/a
Active solar surface ratio	100 %	n/a
Peak power	89.93 kWp	n/a
Building skin application	Solar tiles	n/a
Storage	n/a	n/a

Energy production

123,961

kWh

Self-consumption

0%



Building characteristics

Building typology

Church

Construction type

Retrofit

Year of construction

1989 (original building) 2018 (retrofit)

Energy reference surface

1,072 m²

Energy index

51.2 kWh/m²a (heat., electricity & cooling)

Energy labelling

–



PVT-roof under construction.

BIPV module

Product

Eternit Integral II

Manufacturer

Eternit AG / SI Module GmbH

Cell technology

Mono-crystalline

Front glass type/customization

Glass/glass BIPV modules

Cell colour

Black

Dimensions

1,300x880x12mm

Power

190 Wp

Specific power

166 Wp/m²

Specific weight

9.62 kg/m²

Weight

11 kg



Building skin

Roof

Application

Solar tiles integrated in a pitched roof.

Description

Sloped timber roof insulated with 24 cm of mineral wool.

U value

0.16 W/m²K

Fastening system

Eternit integral II punctual fixing system (timber tracks)

Other

PVT and PV using identical modules

Facade

Application

None

Description

None

U value

None

Fastening system

None

Glass surface

Application

Windows and skylights

Description

Triple glazing with wooden frame

U value

0.70 W/m²K

g value

0.47

Other

Refurbishment, just glazing was changed while still using existing framing



PV-roof (left) and PVT-roof (right) under construction.



Costs

Costs of the building

Refurbishment: 1,200,000 CHF

Price per m³

n/a.

Parties involved

Owner

Röm -kath. Kirchgemein-
de Egg

Architect

Daniel Studer, Arch. ETH
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Hüttenmattweg 19, 5213
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rarchitekt.ch

Research partner

BS2 AG, Brandstr. 33, 8952
Schlieren – W+P Engine-
ering AG, Zweierstr. 129,
8003 Zürich

Photovoltaic installer

Winsun AG, Beeschi Mat-
tenstr. 2, 3940 Steg VS

Photo

Daniel Studer – Bildschir-
mfoto

Awards & recognitions

Awards

Schweizer Solarpreis 2019
– Plus Energy Buildings

European Solar prize 2019
– Owners and operators of
renewable energy installa-
tions

Publications

Erneuerbare-Ener-
gien-2019-1 S. 14ff;

Solaris #03 2019 S. 31;

Zürich Oberländer/Anzeio-
ger von Uster 22.3.2019 S. 9



The original edge of the roof had to be redesigned due to the insulation-related increase of the roof area.

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