PHOTOVOLTAICS IS MODERN ARCHITECTURE

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Summary

PV is all too often mounted in a not optimal way. PV has it's specific own technical demand which correspond with the best architectural aperence.

Keywords: PV, Solar Architecture, Daylight quality, Active Solar Use

1 What makes the difference between Passive Solar, Thermal Active Solar and PV?

Those different solar-strategies have a very different impact on architecture. Passive Solar Use transforms the building itself to a collector and orients the house towards the south. Thermal Active Collectors like it warm to operate in its best way and they are not transparent: they have to be integrated into the house and they close the house towards the south.

Very different to those strategies the Photovoltaic panel operates best when it is good ventilated. Therefore PV should not be integrated into the building.

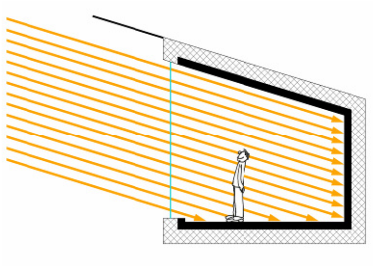

Fig. 1 Passive Solar Use

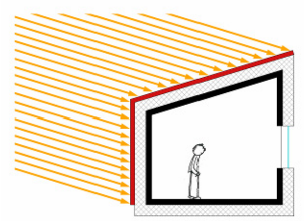

Fig. 2 Thermal Active Solar

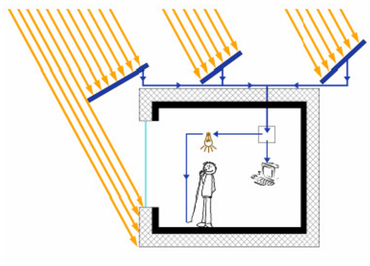

Fig. 3 Photovoltaic

2 Five architectural Theses concerning PV in Modern Architecture

PV-Collectors are not allowed to be integrated into the building: they are the "flying" part of Architecture. They have to be held as cool as possible because – with the usual technologies – the performance falls with rising temperature. Therefore the PV – Collectors are not to be integrated into the building but should be attached well ventilated.

2.1 PV-Collectors are not visible from above but from the bottom

Well ventilated, free from shadow and advantageously used for shadowing the building in summer, PV-elements are only visible from the bottom and only in special cases also from above. Therefore the appearance of the bottom view is relevant and not that from above.

2.2 PV-Collectors are too expensive to gear them suboptimal

Compared with power-production with wind-power-plants or biomass the energy that is produced with PV – elements is financially as well as ecologically relatively expensive. For that reason they should always be in an ideal position to the sun and deliver throughout the year the highest possible output orientation (approx. 30° to the horizontal and as much to the south as possible). Any shadowing should be eliminated since the smallest amount of shadow lets even larger surfaces become unproductive.

2.3 PV-Collectors become economical when they are adjusted multi-functional (do more than just produce power)

As an architectural element PV – panels can take over secondary functions such as operating as summer shade. With this additional function the cost of the produced energy can be cut down.

2.4 PV-Collectors are the most beautiful when they are equipped in a way to produce the most power

Appropriate for the material involved and ecologically optimized material usage are the basic fundamentals of modern Solar Architecture. This standard should be valid also for PV panels.

3 Photovoltaics in Modern Architecture: Examples from Arch. Reinberg

Fig. 4 St. Veit / Glan, 20-40 m² PV

Fig. 5 Gleisdorf, 17 m² PV, 17 m² PV

Fig. 6 Aspern an der Sonne, Vienna, 90m² PV

Fig. 7 St. Veit / Glan, 192 m² PV

Fig. 8 Amstetten, 60m² PV

Fig. 9 Vienna, 61m² PV

Fig. 10 Deutsch Wagram, 110 m² PV

Fig. 11 Schellenseegasse, 100 m² PV

Fig. 12 Eisenstadt, 200 m² PV

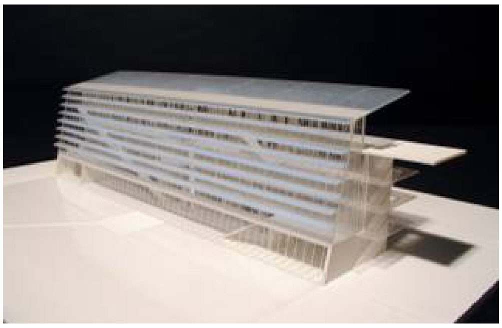

Fig. 13 St. Veit / Glan, 2369 m² PV

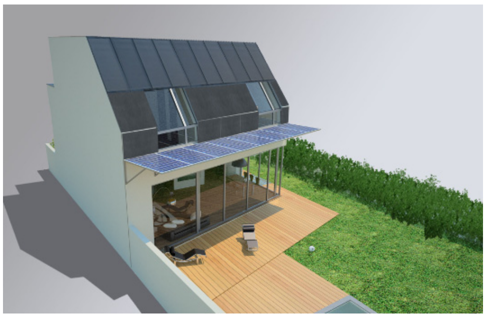

Fig. 14 Vienna, 20m² PV

Fig. 15 Vienna, Sagedergasse, 56 m² PV

Fig. 16 Valva Zypern, 723 m² PV

Fig. 17 Italy, San Possitonio, 314 m² P

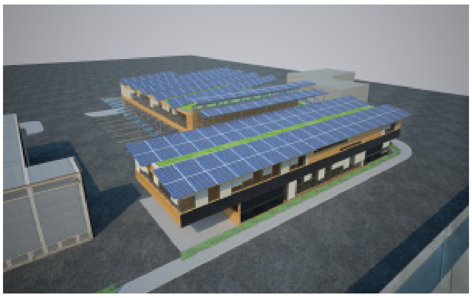

Fig. 18 Vienna, 540 m² PV

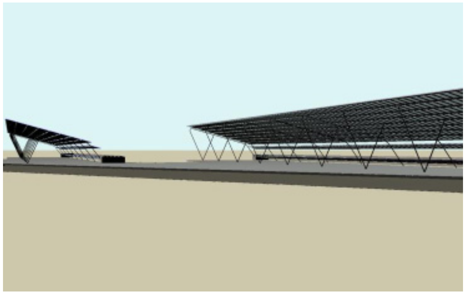

Fig. 19 Zypern, 7500 m²

Fig. 20 Otvice, 8000 m² PV

Fig. 21 Modena, 92 m² PV

References

[1] Georg W. Reinberg / Matthias Boeckl (Hg.): „Ökologische Architektur – Entwurf, Planung, Ausführung“, Springer Verlag, 2008, 348 S., ISBN: 978-3-211-32770-8