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EnBau, Energie und Baudenkmal. Energy Conservation Practices on the Historic Heritage Buildings

Abstract and main outcomes of the EnBau Project

The EnBau project focuses on energy retrofitting of historic heritage buildings with high architectural values to be preserved. Historically significant buildings are listed on local, national or international register providing certain degree of protection. Any physical alteration, including repairs, additions, refurbishment, energetic renovation, etc. to these important properties requires review and approval by the corresponding official body. Furthermore, energy efficiency improvement measures by renovation/restoration or rehabilitation of these older buildings that have been studied, are aimed at maintaining and protecting the original architectural features reinforcing the historic character, increasing property values avoiding degradation.

Technical solutions are presented through the analysis of three Swiss case studies. A multi-criteria analysis was implemented for the comparison of alternative approaches relating to energy efficiency, considering the current status of construction conditions and the historical building significance. Depending on the property issues and preservation and conservation needs, the proposed methodology takes into account different priority and feasibility degrees of measures. Furthermore alternative construction and technological systems solutions, as well as, the proper integration of solar components such as Photovoltaics and Solar Thermal collector, to increase the energy efficiency, are also indicated.

Main outcomes of the project is a suitable methodology (which can be summarized in guidelines) useful when preparing a refurbishment project of historical protected buildings. The whole stakeholders are involved (developers, architects, engineers, building constructor, private and community partners, owners and curators of historical monuments) and collaborate to create common general conditions for the effective project development.

The procedures developed within this project offers an objective comparison of different retrofitting interventions and measures across the current state of the building. The document can be also used as decision making tool for a quick and immediate evaluation of the possible building's measures. The system certainly do not replace the necessary and specific studies conducted to carry out any action on a historic building, but it is intended to help in forecasts building owners or municipalities the degree of intervention and the possibilities. Furthermore can be also used after the renovation has been done in order to monitor the building and to plan correctly the maintenance.

The project activities were organized as follows:

- First step: Data acquisition and critical aspects analysis - Current building status diagnosis and first energy balance analysis;
- Second step: Project proposal development, energy efficiency measures based on the information acquired in the first phase - Energy retrofitting solutions and tools to assess measures and resources to enhance and improve the present situation;
- Third step: Assessment of retrofit measures, management, planning and maintenance.

At the end of the project an exhaustive analysis and description of the possibilities to integrate solar energy system, such as Photovoltaics (Building integrated Photovoltaic, BIPV), is also presented with some example and best practice.

Client: Stiftung zur Förderung der Denkmalpflege

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Publications

- [1] Cristina S. Polo López, Francesco Frontini, Morena Ferrazzo. *Project: ENBAU, Energie und Baudenkmal. Energy Conservation Practices on the Historic Heritage Buildings*. Proceedings of the BRENET Status-Seminar «Forschen für den Bau im Kontext von Energie und Umwelt», September 2012 – ETH-Zürich.
- [2] Cristina S. Polo López, Francesco Frontini. *Sustainable Renovation of Historical Buildings: Concepts For Solar Integration*. Proceedings: Fotovoltaico e Preesistente Congress, Energy Med (Napoli), 2012.
- [3] I. Zanetti, F. Frontini. *Project: Energie Und Baudenkmal (Enbau) Optimization of Energy Interventions in Buildings of Historical-Architectonical Value*. Proceedings of the “CISBAT - CleanTech for Sustainable Buildings - From Nano to Urban Scale”. September 2011, Losanna, Svizzera.
- [4] A. Scognamiglio¹, A. Berni², F. Frontini³, C. Polo Lopez³, L. Maturi⁴. *The Complex Dialogue Between Photovoltaics and Pre-Existing: Starting Point for a Discussion*. Proceedings of the 27th European Photovoltaic Solar Energy Conference and Exhibition, Frankfurt (2012).
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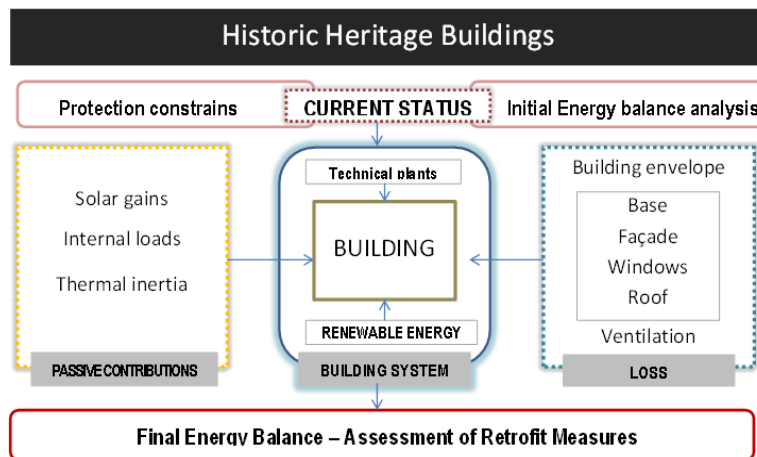
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Case Studies

Preserved and only slightly modified during the time	Partially preserved and modifies in present day	Not preserved and with many transformations
<p>Casa Manetti</p> 	<p>Hotel La Sage</p> 	<p>Villa Anatta</p> 

Building integrated Photovoltaic

