

Architecturally appealing solar thermal systems – a great marketing tool in order to attract new customers and market segments

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Abstract

Architectural integration is a major issue in the development and spreading of solar thermal technology. Unfortunately, the architectural quality of integrated solar thermal systems in many existing buildings is poor, which often discourages new potential users [1].

Henning studied the attitude among people towards solar collectors and systems from a social anthropological point of view in 2000 [2]. Evidence showed that strengthened legitimacy and increased branch status is needed in order to attract new customers and market segments.

As a contribution from IEA-SHC Task 39 [5] to the challenge of making solar thermal systems more desirable, a database consisting of showcases where solar collectors have been successfully integrated into the architecture have been established. The idea is to make solar thermal more desirable by showing examples of visually appealing solar systems – something people really would want to put on their houses and something architects would want to implement in their design of new buildings.

Keywords: architectural integration, solar thermal systems, marketing

1. Introduction

Although mature technologies at competitive prices are largely available, solar thermal is not yet playing the important role it deserves in the reduction of buildings fossil energy consumption. There has been a rapid market growth over the last few years, but the spread of solar thermal installations is still very modest taking into account the fact that the technology is highly efficient and proven with a payback time much shorter than lifetime and a cost per kWh of 6 to 10 times cheaper than photovoltaic [3]

The cost effectiveness and simplicity of solar thermal systems indicate that this is not the sole reason for the general lack of interest for these technologies by both end users and building professionals.

The general impression of solar thermal systems today, is that these are suffering from a low-tech/low status image (technically complicated but low-tech), especially when compared to photovoltaic systems. Contributing to this view, are all the published photos and illustrations of solar collectors randomly put up on roofs (fig.1).

Fig. 1 Solar collectors randomly mounted on roofs.



More effort should be put into presenting products, systems and projects in an appealing way.

2. Architectural integration as a marketing tool

2.1. Motivation and background

The architectural quality of integrated solar thermal systems in many existing buildings is poor and is pinpointed by many experts as one major reason for the lack of popularity of the technology. Because the solar systems are relatively large in relation to the building envelope, the architectural quality of their integration has a major impact on the visual quality of the building [1]. This should, together with the fact that public acceptance of solar energy to a high extent depends on the quality of the architectural integration, stimulate and motivate a much stronger focus on making solar systems visually appealing— something people really would want to put on their houses and something architects would want to implement in their design of new buildings.

Fig. 2 Solar collectors integrated into the architecture.



In the most developed solar thermal markets, combined systems for both domestic hot water preparation and space heating/cooling are increasing their market share. Such systems cover a bigger part of the total energy demand in the building, but require larger areas for collector installation. In this perspective, the implementation of solar thermal collectors into façades becomes very interesting. Here large areas can be found. However façade integrated collectors are visually exposed to a much higher extent than roof integrated collectors;

- Façade integrations are much more delicate than their roof counterpart because of the high visibility of the collectors. As the façade is the public face of the architecture, the collectors cannot simply be used as added technical elements; their architectural integration need to be satisfactory and the design controlled [1]

2.2. Architectural integration – finally a hot topic

Evaluation of architectural quality is a complex debate and a very hot topic in architectural sciences nowadays. The topical importance has resulted in a new Task - "Solar Energy and Architecture" - dedicated to the architectural aspects of solar technologies and applications. This is the first

time that the word 'Architecture' appears in a Task title, after 30 years of IEA researches and 40 Tasks mainly focusing on solar technologies for building application. One of the main objectives of Task41 is to define general architectural quality criteria and extract recommendations for solar components and systems, to support manufacturers in developing existing products as well as new products [4].

This increased interest from architects in solar energy as a solution for heating is considered to be of great importance, both when it comes to product development (collectors, jointing, framing etc.) and of course the general quality of solar thermal installations.

2.3. Architectural integration from a marketing perspective

Our (the SHC/Task39 group) approach to the topic is to look at successful architectural integration as a marketing tool, simply because we believe that people are inspired by visual impressions. The appearance of a product certainly counts in making a first impression on a customer and often plays a decisive role in the final decision to buy or not. Effective use of design and high visual quality adds value to the product and builds trust and confidence. Attractive design also helps in differentiating between competing products.

When it comes to solar thermal systems, the collector design is only one part of the final product. Placement of the collector field and good architectural integration is more important for the final result that will be judged by the public. To focus on showing really good examples of harmonic and well designed solar thermal systems can be an important parameter for market development and help to re-define solar thermal to the public as something high-tech, good looking and sustainable.

3. Web-Database

3.1. Visually appealing solar thermal installations as a source of inspiration

As a contribution from IEA-SHC Task39 [5] to the challenge of making solar thermal systems more desirable a database consisting of showcases where solar thermal energy systems have been successfully integrated into the architecture has been established. The idea is to make solar thermal more desirable by showing visually appealing solar systems – something people really would want to put on their houses and something architects would want to implement in their design of new buildings. It presents a range of buildings where not only function, but also aesthetics and architectural integration, have been in focus when designing and installing solar thermal systems.

The technical and economical key data are only briefly listed in the database while photos and illustrations are emphasized.

3.2. Collecting showcases for presentation

Information about the database was sent out to over 30 collector producers, distributors of solar thermal systems and architects together with a call for projects proposals. We asked for good photos and used a short and simple questionnaire to collect relevant project information like;

- general project data (type and size of building, location etc.)
- type of solar heating system (domestic hot water system, combi-system etc.)
- collector area
- auxiliary heating
- type and size of heat store
- collector description and economic figures

3.3. Evaluation of project proposals

We received 21 project proposals as a result of the first call. The proposals have been evaluated by a group of experts, considering both technical and architectural aspects.

Architectural evaluation is done by **Susanne Gosztonyi**, architect, AIT (Austrian Institute of technology) and **Bjorn Larsen**, architect, chairman of the board, Norwegian Solar Energy Society.

Technical evaluation is done by **Karl-Anders Weiss**, Dipl. Phys.- oec., Head of Team Analytics at Fraunhofer ISE and **John Rekstad**, Professor, Department of Physics, University of Oslo.

The following formal aspects were considered;

- innovative system design
- dimension and orientation compared to the type of application
- multifunctionality
- formal architectural appearance
- colour adjustment with envelope
- frame/jointing quality and integration design
- proportions of envelope/collector position & field
- collector field position & combination

3.4. Examples – showcases

Fig. 3 I-Box concept, Storelva/Tromsøe Norway (collector producer: Viessmann).

I-Box concept, Storelva/Tromsøe, Norway
 7 dwellings in a row house, with solar collectors integrated in the façade

PROJECT
 Multi-family house with passive house standard and solar heated tap water. The project is designed according to the I-Box concept from Steingrims Architects. The 7 dwellings at Storelva was completed in 2008.

I-Box was the first passive house concept in Norway, and was awarded with the "Steingrims Arkitektpris" in 2007. The dwellings are constructed in massive wood elements and have no conventional heating systems; the entire space heating load is covered by the ventilation system, which is coupled to an earth to air tube collector buried beneath the basement and a compact heat pump unit with heat recovery. The solar system produces most of the warm water during the spring, summer and autumn seasons.




Photo: Oddvar Ole Skjelstad

Architectural Integration of solar thermal energy systems



NAVIGATION

- Start
- Project description
- Technical description
- Project management
- Energy performance
- Energy
- Cost
- Conclusion
- Thank you

SOLAR COLLECTOR

Parameter	Value
Collector area	10.0 m²
Collector efficiency	0.50
Collector temperature	40 °C
Collector inlet temperature	10 °C
Collector outlet temperature	50 °C
Collector flow rate	0.5 m³/h
Collector pressure drop	0.5 bar
Collector cost	1000 €

Photo: Oddvar Ole Skjelstad

Fig. 4 Penthouse Vienna, Austria (collector producer: Viessmann)

Penthouse Wien, Vienna, Austria
Penthouse WEG with solar collectors used as sun shades

PROJECT

Penthouse WEG is a modern 2 flat penthouse, located in Vienna. Solar collectors are installed at the roof terrace providing domestic hot water for both flats.

The design of the vacuum tube collector fits very well to the modern roof landscape. Besides being energy deliverers, the collectors serve as sunshades.



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Photo: Cassapan

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Fig. 5 “Home for life” concept house, Aarhus/Denmark (collector producer: Velux)

“Home for life” concept house, Aarhus, Denmark
Single-family house with roof integrated solar collectors

PROJECT

The principal architectural idea in Home for Life is to unite single-family house requirements to experience, functionality and energy consumption in an integrated design.

VKR Holding, which is the mother company for VELUX and VELFAC, has initiated the construction of eight demonstration houses in a number of European countries following the active house principle. The houses produce energy themselves and are built as examples of intelligent buildings with low energy use, a good indoor climate and an exciting architecture. Home-for-life was built in Aarhus/Denmark in 2008 as the first active house in the world.



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Picture source: VKR Holding A/S

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Fig. 6 Bjoernveien 119, Oslo/Norway (collector producer: Aventa AS)

Bjoernveien 119, Oslo, Norway
Multi-family house with solar collectors integrated in the façade

PROJECT

Multi-family house, 8 flats (130-170 m²) in two and three stories - total area 1868 m². Solar collectors integrated in the façade

In the housings at Bjoernveien 119 in Oslo the use of sun energy has been an important issue of the design. On the southern façade, 100 square meter solar collectors have been incorporated. In this project the produced energy will be stored and used for heating water, added into the water based floor heating system.

The dark, reflecting surfaces are attractive building elements, producing energy and acting as a sound barrier for road traffic.



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Picture source: Odele/Datle/Enkeltstair AS

Architectural integration of solar thermal energy systems

Fig. 7 Hotel Jezerka, Czech Republic (collector producer: Thermosolar Ziar)

Hotel Jezerka, Czech Republic
Hotel located in the marvellous ambience of the Iron Mountains Natural Preserve with solar collectors on the balconies

PROJECT

Hotel Jezerka is a modern accommodation facility with the capacity of 150 beds, 3 swimming pools and a large sports centre. 236 m² solar collectors are integrated in the south facing balconies, heating tap water and swimming pools.

The hotel was built in 1988, but has been regularly upgraded. The solar system was installed in 2007.



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Photo: Thermosolar

Architectural integration of solar thermal energy systems

4. Summary

As a contribution from IEA-SHC Task39 [5] to the challenge of making solar thermal systems more desirable a database consisting of showcases where solar thermal energy systems have been successfully integrated into the architecture have been established. The objective is to show projects where not only function, but also aesthetics and architectural integration have been in focus when designing and installing solar thermal systems. A group of experts (architects and solar thermal engineers) evaluate the incoming projects and select the best examples. The database will be hosted by the website of IEA-SHC (www.iea-shc.org), with a direct link from its homepage since this topic is seen as a major issue for the growth of solar thermal technology.

Our intention is that the database will be extended with more showcases over time, that new excellent project presentations will be regularly added to the collection and help to spread the use of these technologies by making them appealing to both users and building designers.

5. References

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