

Solar systems in public open-air pools

An increasing demand for solar heating systems in public open-air pools leads to increasing efficiency of the modules and innovation in control units



Adding value – buying green

Abstract

Due to the high energy costs for water heating in public open-air swimming pools in Germany, many municipalities have searched for innovative ways to reduce energy costs since 1980 as a way to disburden the municipal budget.

The energy costs represent with about 30% one of the mayor shares of follow-up costs of swimming pools. In 1983 the European Commission and the German Ministry of Research and Technology have initiated a model project to substitute conventional pool water heating by solar heating (absorber technology), with eminently positive results.

Since the late 80^s an increasing number of the 6000 German public swimming pools have installed solar systems for heating the pool water. About 9% of public swimming pools (225.000 m²) are heated be solar energy now and there is an increase of about 30.000 m² yearly.

As there was an increasing demand for absorber processors, their efficiency increased. The system prices per square meter decreased significantly. Furthermore, the energy costs per kilowatt hour of solar systems is now significantly lower than for conventional heating.

Objectives

A majority of public swimming pools are heated in order to make visitors feel more comfortable. As a large surface of water is in direct energy exchange with the environment, energy costs for heating are naturally very high. They amount to about 30% of the follow-up costs of an open-air pool. This of course puts a high burden on the municipal budget, especially delicate in times of budget restrictions. In order to avoid the closing of many open air pools, innovative ways of cost reduction were searched for.

In reaction to this situation, a demonstration project was initiated by both the European Commission and the German Ministry for Research and Technology in 1983/84. This project aimed at converting the pool water heating of six public open-air pools to solar heating systems.

State of the activities

The demonstration project of the European Commission and the German Ministry of Research and Technology is completed. However, the use solar heating modules for swimming pools is permanently increasing. Every year, the surface heated in this way is growing about 30.000 m².

Furthermore, the efficiency of solar collector and absorber systems is permanently improved (see results and impacts).



Background Information and Implementation

At the very beginning of the demonstration project, many elements of a solar heating system were available as prototypes only and correlatively expensive. In the last years, the prices of solar collectors and absorbers have dropped significantly through increasing demand. Nowadays large solar systems are available for a square meter price of EURO 75 – 125. Besides the costs for the collector or absorber panels, the costs for control units and the connection to the filter circulation are essential. As a rule, these are about 20 - 30% of the overall costs.

The control unit of a solar heating system is of special importance. Precision of the control units is very essential, because otherwise precious energy would give away. To save costs on the electronic devices of solar systems would therefore be the wrong way.

On the other hand through lowering the water temperature a lot of energy and costs can be saved. With increasing water temperature the heat loss increases disproportionately, e.g. a pool with a constant temperature of 28 C would need three time more energy as a pool of the same size but with a temperature of only 22 C.

As the use of solar heating modules only make sense if the water temperature is considerably low (around 23 C), this means that for an open-air pool with a water surface of 2000 square meter and a base water temperature of 23 degrees C, a solar heating system can substitute a conventional fossil heating system completely. An additional heating system would not be necessary, which would save about 75.000l oil or 150t CO₂ per season.

• Partners

The project was initiated by the European Commission and the German Ministry for Research and Technology. Further involved were the participating local authorities as well as the corresponding local suppliers of solar heating modules.

• Financing and resources used

The project was financed by the European Commission and the German Ministry for Research and Technology together.

Results and Impacts

In 1988 the installations realised under the project were evaluated by a follow-up project. Thereby, it turned out that the conversion of the pools had effected considerably savings of energy and energy costs. During the time the demonstration project was running, the demand for solar systems by other communities was increasing. Up to now about 9% of all public open-air pools are heated by solar energy systems, which means more that 225.000 m² water surface.

Without doubt the solar technology for swimming pools was influenced very positively by the increased municipal demand for solar systems. The efficiency of the recent inexpensive absorber systems is substantially higher than the more expensive systems of the first generation in the 1980^s, thanks to mass production and an increasing amount of suppliers of such systems.

With energy costs of 2,5-5 Cent/kWh recent solar systems are competitive with conventional fuels. However, the best efficiency would be achieved if the carrier of a pool would abstain from an additional fossil fuel heating. Additional heating for summer open air pool is not self-justifying, because the number of visitor are correlating with the weather situation and the amount of sunshine hours.



This means that most visitors would not go to a public pool when the weather is cold and cloudy, anyway. Which makes additional heating useless, beside the solar heating. An exception are fun- and spare-time pools.

- *Transferability*

A price increase of technological equipment going hand in hand with technical improvement through a higher demand is generally well transferable to other situations, countries or actors. As for solar heating modules, this is a product which local authorities have a particular interest in. Therefore, the case is especially transferable to local authorities also in other countries. A precondition for this is of course that energy prices would provide incentives to look for new and cost saving solutions.

- *Lessons learned*

The implementation of a solar heating system for public pools should be self-evident for municipalities, both from the environmental and from the economical perspective. This at least if the old heating system has to be changed.

Planing, financing and also implementation of a solar system need a certain time within the public administration, which will influence the overall costs. Therefore it is recommendable to plan the implementation of solar system in advance, taking into consideration the time factor.

Additional information

BINE Informationsdienst
Fachinformationszentrum Karlsruhe GmbH
Büro Bonn
Meckenstraße 57
D-53129 Bonn

Phone: +49 (0)228-923790
Fax: +49 (0)228-9237929
Email: bine@fiz-karlsruhe.de

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