Exploitation aspects of Solablock collector as a means of using renewable energy sources in the context of a possible development in the sector of tourism

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Abstract
Renewable energy sources in the understanding of interest of faculty of BERG represent a specific area of aquisition and processing the earth's resources, and are closely linked to the natural phenomena of their origin, nature, potential, identification, technical methods and methods for their exploitation and use. This interest goes beyond the dimension of understanding RES only in strictly energy or technological context. OZE therefore applies not only in the industrial sphere, but also in communal sphere, like geotourism. We will present some ideas of connecting OZE, geotourism and our solablock invention, in it is experimental phase. Finally, we will summarize the practical application and utilization of our solablok collector in terms of economic recovery or efficiency and competitiveness with conventional flat solar collectors.

Key words: RES, Solablock, geotourism, absorber, glazing frame,

INTRODUCTION

In many towns and cities around the world a renewable energy revolution is underway. For many, the aim is a 100% renewable energy supply from within the city region (Girardet & Mendonca, 2009; Koroneos et al., 2003).

Due to growth of geotourism in many areas there are now a lot of overpopulated cities. Vast number of them still uses fossil-fuel technologies but there are some, which are heading to the different dirrection. They want to use Renewable energy sources (later RES) and with RES we also want to attract many tourists. We think, many green thinking tourist, would prefer to visit region with high amount of RES, so we would like to present some ways how to make this world more GREEN using espacialy Solar power. It's because Solar power is our main interest. Many urban structures depends on a continuous supply of energy for powering big city-centres, relax centres, suburbs, centres of production, consumption, services, transportation and communication (Girardet & Mendonca, 2009). In an effort to support supply of energy, we are experimenting with the renewable energy source based on Solar power technology (Rybár, 2010). We call it SOLABLOCK and we will discuss more about this sollar non-metal collector and it's usability in the 3rd chapter.

RENEWABLE ENERGY IN GEOTOURISM

Benefits of renewable energy in Geotourism:

- Social and economic development -

Production and use of RES such as Solar power can provide economic development and growth, in rural regions also employment activities. Solar power and other RES can thus help reduce poverty and also urban migration. On the other side, it provides better opportunities for tourism activities (Johansson & Burnham, 1993).

- Land restoration - Energy from RES can provide financing needed to restore unused and momentarily useless lands. Recovery and recultivation of these lands would support not only possibilities for geotourism and/or mining tourism as discussed by many authors (e. g. Compoľová & Rybár, 2011; Schejbal, 2011; Hvizdák et al., 2012; Rybár P. et al., 2012), but also it would prevent erosion and provide a better habitat for wildlife (Johansson & Burnham, 1993).
- Reducing air polution - Without the need for costly additional controls, RES produce virtually none emissions, polution or deposition. Resulted green cities or areas will be much more pleasurable for tourism activities than poluted areas (Johansson & Burnham, 1993).

City administrations across the world are becoming increasingly aware that the cities in their charge are more contributors than a reducers of unwanted global climate change, air poluted unhealthy cities, not very attractive for tourism. Therefore in an urbanizing world, we must fundamentally change our energy supply systems. Such "green or let's say SolarCity", powered mostly by renewable energy, must be on the top of the list in this age. Understanding cities as dynamic and everevolving ecotechnical systems can help us formulate strategies and technologies for a sustainable urban future, greetingly welcomed by the comunity of Geotourism (Girardet & Mendonca, 2009).

SOLABLOK IN IT'S EXPERIMENTAL PHASE

The intention is to design solar collector, in which construction there won't be any metallic elements, especially absorber.

This solution is for wide field of users and area of use having following properties (Rybár R. at al., 2012):

- simple construction
- low price, compared to conventional collectors
- high durability
- efficiency level equal with the middle class conventional collectors

Basic contruction parts of the conventional collectors

- glazing frame
- transparent cover
- absorber with fluid pipe
- heat insulation
- bath collector

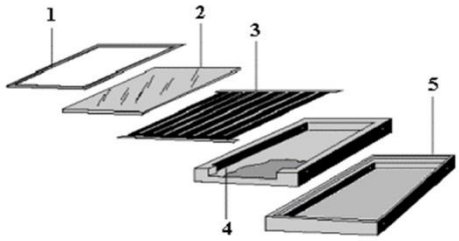

Fig. 1 Basic construction parts of standard flat liquid solar collector (Fiedorová & Rybár, 2011)

Basic contruction parts of the proposed collector - SOLABLOCK

- glazing frame
- transparent cover (Insulating double-glass unit)
- conversion insulating monobloc
- connecting brass fittings

Transparent cover

- The collector’s transparent cover has to be the most sunlight permeable, on the other hand, it should hold back long-wave radiation to reduce heat loss to the

surroundings, especially when exposed to the wind (Fiedorová & Rybár, 2011).

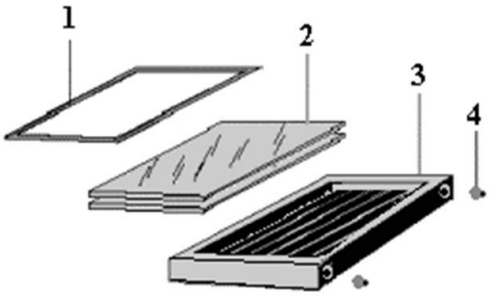

Fig. 2 Basic construction parts of the proposed solar collector - solablock (Fiedorová & Rybár, 2011)

Transparent cover can be made of these materials:

- Glass
- Plastic
- A combination of materials

As a transparent cover we can use thermal glazing with an air gap. Double glazing compared to one glass solution leads to reduction of heat loss, but at the same time decreases the light transmittance, so rises optical losses of the collector. Double glazing also increase the mass of the collector (Fiedorová & Rybár, 2011).

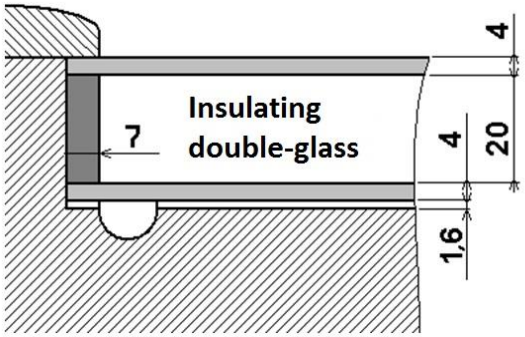

Fig. 3 Location of insulating glass unit in the housing of SOLABLOCK collector (in cross section) (Fiedorová & Rybár, 2011)

The absorber

In the conventional design of flat solar collector, the absorber is formed of plates or lamellas made of metal with good thermal conductivity. We have chosen the philosophy to arrange/designe collector absorber in a way to eliminate the need for heat-conductive metal element, so the captured heat is shared with the heat transfer fluid by the shortest route. Active absorber area is washed by liquid directly without dividing walls. High thermal resistance of chosen construction material (foam glass) prevents heat dissipation into the monoblock body (Rybár R. et al., 2012). The concept of the proposed collector SOLABLOCK counts with monoblock design element collector, which integrates thermal insulation, tub, or simply said a frame in one unit – monoblock.

Material that is being considered in the design of the proposed monoblock collector is a foam glass FOAMGLAS (Fig. 4), which in addition has good thermal properties compared with plastic sealing material. Foam glass has higher compressive strength, water resistance and chemical inertness at low weight (Rybár et al., 2011; Rybár R. et al., 2012)

Fig. 4 Samples of foam glass (Rybár et al., 2011)

Glazing frame

In the case of the proposed collector SOLABLOCK, there will be plastic frame made of polypropylene using a sealing under glazing frame, based on EPDM (synthetic rubber) or silicone. The solablock collector is not liable for defects arising from leaking rainwater unlike conventional collectors. It's because SOLABLOCK has virtually no internal spaces (Rybár et al., 2011).

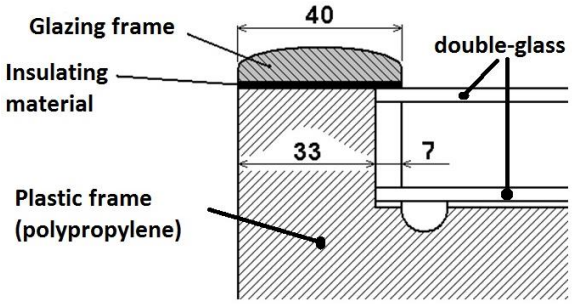

Fig. 5 Final cut with glazing frame, double-glass, sealing and polypropylene tub (Rybár et al., 2011)

CONCLUSION

The exploitation of solar energy can be useful in many ways. First by substituting the fuel that is used on heat power stations, it reduces the air and environment pollution, it reduces the usage of oil and other fuel that can be used in more important purposes, by substituting nuclear fuel it reduces the radiation threat, and at the same time solar power can make us more secure, by reducing the dependence upon uninterrupted fuel supply. In this study, we designed and we are heading to an experimental prototype called SOLABLOCK collector. We try to investigate its usability, performance and acceptance in wide field of use. It has a potential to make this world greener, cleaner and technologically more advanced. People want the green technologies and we can see, this phenomenon is spreading all over the world. People event want to travel to see new technologies. This is the idea we want to accomplish. So after the production phase, it can be used in train/bus stations, airplanes, homes, schools, factories, hospitals, farms and hotels, which surely will raise tourism in each region. We hope the evaluation of the system will prove its performance to be at least comparable with the performance of traditional flat solar collector. The advantage of the system includes simple construction, minimized dimensions and low cost. The solablock collector proposal is currently in the conceptual stage of a design unit and main structural parts. All ideological and theoretical assumptions will be needed to verify, clarify or correct the basis of measurements and experiments carried out on a prototype collector with an emphasis on examination of the main potentially critical parts (Rybár et al., 2010; Rybár et al., 2011). The result should be able to compete with conventional collectors. We believe that solablock with it is unique properties and low price is on the right way to be ahead of the competition and also promising in financial point of view.

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