



Report

Prospects of self-construction solar collectors in Slovakia

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1. Central questions

Which experience from the Austrian solar thermal assembling movement can be used in Slovakia?

How could the self building initiative in Slovakia get set off?

Which groups and organisations are interested and should be involved?

Proposals for the implementation (step by step)

In which content and in which regions are self building collectors feasible?

Costs, targetgroup?

Strategies for support of the self building group?

2. Introduction

Slovakia has a technical potential¹ of 21 % for solar thermal energy. At the moment the square meter area in Slovakia cannot be defined precisely. Most people from the solar thermal branch do not want to give any estimation about installed square meter area in Slovakia. Mr. Novak from the ministry of economy estimated roughly a number of 50.000 m² installed solar thermal collectors for 2004.²

The number of installed self-constructed collectors is – until now - nearly like nothing. Although a small group of people has already started with do-it-yourself collectors more than 8 years ago. And a certain potential for self construction collectors is actually given. Even though the idea of a do-it-yourself movement should be implemented with a rather certain target group – people motivated acting environmentally sound. People owning a family house. And of course – people who are interested in team-work.

At first sight the biggest motivation for a self construction solar installation is the profitability. A self made collector is expected to be cheaper than an industrially made collector. The heating costs can be reduced. People using solar installation sets get more independent

¹ Technical potential of all RES. Solar thermal energy is predicted to have about 16.300 TJ technically available potential (in 2012) of totally 73.094 TJ technically available potential for all RES in Slovakia 2012 (source: NEES Slovakia 2002)

² Statement from interview serial ECB, 14th april 2005

from energy price developments. But an efficient collector system, even if it is “Self-made”, has also its price.

The following studie points out the profitability of a solar thermal system, with a focus on the self-installation and self-construction of a kit-collector.

Furthermore the experiences and development of the self construction movement in Austria is exemplyfied with the phases of development dynamics. Out of that an implementation strategy is derived and leads to a recommendation for the initiation of a do-it-yourself movement.

Eminently important is the fact, we may not forget, that the Slovak situation now is absolutely different to the Austrian situation at the time, when the first self building groups started.

3. Experiences from Austria

Self made collectors are more or less the roots of the solar thermal energy movement in Austria and some neighbor countries.

History

When the first solar self construction group was founded in St. Marein, Austria in the winter of 1982/83, it already included 23 families who had joined forces to build a solar water heating plant. Consequently - beginning in 1986 and 1987 - a large number of solar construction groups formed throughout Eastern Styria. The growing demand for lectures and organisational concepts finally led to the establishment of the association **AEE** Arbeitsgemeinschaft ERNEUERBARE ENERGIE³ in 1988. The first construction groups outside of Styria were set up in Carinthia within the same year, followed by the first construction group in Lower Austria one year later. In 1989, AEE also received the European Award for Environmental Protection and the Austrian National Award for Energy Research.

Activities

The creation of a nationwide consulting infrastructure made it possible to give organisational and technical support and advice to DIY⁴ construction groups throughout the country. This was mainly due to the co-operation with other organisations (Environmental Advisory

³ Translation of the association’s name: Working group for renewable energy

⁴ do it yourself

Service, energy saving associations, agricultural colleges, ÖAR - Regional Consultants, institutions for adult education,...).

Implementation strategy

- Setting up pilot facilities in a new region
- Countrywide, extensive, independent lectures about the use of solar energy in various communities
- Field trips to pilot plants
- Dimensioning of the solar plants by members of the AEE
- Establishing construction groups comprising 10 to 50 people
- Absorber production
- Installing the plant, either "do it yourself" or with the help of a local installer

Results

The population's continuing interest in the use of solar energy can largely be seen as a result of the introduction of various subsidies for the installation of solar plants.

Having started as a small workshop in St. Marein near Graz in 1987, the project has become extremely successful during the first ten years. The activities of the different solar construction groups supported by the AEE give a great impetus to the Austrian solar market. Growth rates ranging from 70 to 100 % of newly installed solar collector area every year have led to a solar boom that has meanwhile obtained international recognition.

Assembling group

- Interested people found an assembling group
- Buying syndicate for the system components – (raw materials, kits)
- Production of the collector in the assembling group
- Supervision of the assembling group by a former assembling group leader

Self-construction-movement

A social movement. Positive experience in the first assembling groups

- Lectures Know-how of the assembling group leader grows by attending other assembling groups Meetings of assembling group leaders: discussions and exchange for improvement of their knowledge.

Do-it-yourself construction movement – an institution

The extensive spread of the movement required founding an institution, which gives support to the construction groups as well as to the new interested people.

Lectures and organisational concepts were accomplished by the members of the 1988 funded association **AEE** Arbeitsgemeinschaft ERNEUERBARE ENERGIE.

Furthermore this group of beneficial working people supported the improvement of technical systems. New experience got exchanged during meetings for former and present assembling group leaders. Following the AEE offered trainings for new assembling group leaders. The solar-interested people got information by brochures and excursions to existing solar plants encouraged building their own solar thermal installation. The association assisted in answering questions to solar collector building and also dimensioning the size of the collector sets. So the solar construction movement got more and more professional.

4. Potential cooperation partners

Eco-Villages

In Slovakia some eco-villages arose in the countryside, which follow the aim to use biological building material and to bear an environmentally sound life. Their inhabitants may rank around the number one target group.

NGOs

The NGOs are the first address for the next steps in implementation of a strategy for supporting self construction development. The organizations in Slovakia have already done a lot of pre-work and e.g. Ekopark has already 8 years of experience with solar self construction. The NGOs know the interested villages and mayors and, of course, the local population has much more trust towards the compatriots of the environmental organizations than towards the foreign representatives of such organizations.

Mayors of villages

Unfortunately the mayors, which were contacted by the Slovak partner ECB, did not follow the invitation to join the workshops or interview series. Probably the implementation of a strategy has to start with the NGOs and the especially interested eco-villages.

5. Factors of success

Generally the most important factors for the successful implementation of self construction groups can be separated in cultural, social, economical and technical factors.

Cultural factor

The best pre-conditions for the development of a self construction group exist in the country side. Owners of family houses do not have to worry about any approval.

Agricultural collectives do already have an organisational structure for buying syndicates, which gives a further advantage for self construction groups in the country side.

A further cultural point is the opportunity to spread the success of self construction groups in the media. In the case of the Austrian self construction movement national and international awards were given to the pioneers of self construction.

Social factor

The institutional self construction movement can work as a non profit organisation. On the one hand it is opportune to found a special association, on the other hand it is easier and also possible to cooperate with an existing association. Through this organisation the diverse assembling group leaders exchange their experience. Interested people can use the organisation's contacts with owners of already existing solar installations. (Brochures, lectures and buying syndicates are organized by the organisation and support the interested people)

A further favourable social factor is the division of work in an assembling group. In former Austrian interviews the members of assembling groups told that the knowledge came from different professionalists (carpenter, tiler, plumber, metal working), which joined the group. At the end of the construction period nearly all of them were able to perform all the necessary tasks in the collector construction.

Economical factor

The economical advantages are the low investment cost, especially due to buying syndicates (e.g. from a number of 100 squaremeter bought collector area the buyers get 25 – 30 % price reduction) and the installation, which is own working time. In the profitability analysis the installation time is not included. (30 minutes of installation are calculated for one squaremeter, of course the people have to perceive it as a spare time job)

Technical factor

A really big advantage for each former member of an assembling group is their knowledge they obtain from this learning and working process. All of the interviewed former members of assembling groups in Austria had a better understanding of installation engineering after the time in the assembling group. They are able to solve small failures of the solar installation by their own. Servicing work can be done by themselves and most of them said to know each component of the solar installation in detail.

6. Target group

If the community wants to start a self construction group they need at least 100 squaremeters for self installing. Less than this number would not be feasible in a mattering economical extend.

Ideal opportunities for public installations are schools, communal buildings, hotels, industrial objects, farms, e.g.

Individual projects can be implemented and work as a reference object and makes the people curious. A trouble-free functioning plant is the best promotion for solar thermal energy.

Although the real target goup for self construction of solar installations is seen in the family house owners. Especially around Bratislava where the people earn enough money to afford the investment cost. On the other hand the people need enough time and enthusiasm to

decide for a do-it-yourself installation. Especially people who are used to work technically (agriculture, handicraft) are part of the potential target group.

Furthermore the decision to build a solar installation system requires a certain amount of environmental friendliness even when the investment costs seem to be rather acceptable.

The eco villages in Slovakia will be the primary contact for the initiation of a self construction group. According to the results in the search for interested interview partners in Slovakia for this project nearly no mayor of a usual village was interested in such a movement.

7. Economical view

Results from the profitability analysis

- The reference object – average household around Bratislava

One family house hold with the warm water demand of 300 l daily (4 – 6 persons) in Bratislava region. The sum of global radiation is about 1.213,75 kWh/m². The degree of latitude is 48,12 °, of longitude is –17,1 °. The water for domestic use shall have a temperature of 55 °C (because of legionnaires' disease). For the cold water temperature was hypothesized 8 °C in February and 12 °C in August. The roof is optimally south-oriented and the inclination has 30 °. The additional heating is a 17 kW gas condensing boiler.

The life cycle of the solar thermal installation is at least 25 years.

- Dimensions

Following to the demand of warm water it requires an absorber-area of about 9 m² and a solar storage tank with a volume of 500 litres.

- The material – a high quality absorber, prices for the self construction kit

The absorber is a strip absorber with an environmentally friendly sputtered surface. (Sputter technique means that the surface coating is produced with the help of a combination of strong negative current and inert gas in a vacuum chamber. In the chamber a metal releases atoms, which form a surface coating on the absorber. By adding oxygen at different flow rates, the oxidisation can be controlled to produce optimal surface properties.) The irradiation losses are rather low (minus 60 %) comparing to the absorbers from the old self construction absorber technology.

Collector-costs:

		Without VAT	With VAT
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9 m ²	Collector-kit	1.620,00 ⁵	1.944,00
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Prices in Euro, collector kit from an Austrian distributor.

The material for the collector as well as the material for the additional components can be mainly bought in Slovakia. Therefore the analysis is calculated with prices from the Slovak market (June 2005) as far it is possible to obtain the material. The only material, taken from the Austrian market is the sunstrip absorber (9 m²) with the special gums and profiles.

(The prices are from June 2005, without any warranty.)

	Collector-kit, splitted up	Without VAT	With VAT
9 m ²	Sunstrip absorber plus gums, profiles	1.073,00	1.287,60
9 m ²	Safety glass	154,00	183,00
9,45 m ²	OSB-board 10 mm	34,00	40,50
9 m ²	mineral wool board(230 °C)	16,40	19,50
14 running metres	wood 50/50	3,60	4,30
		1.281,00	1.534,90

Collector price, using the regional creation of value in Slovakia, in Euro

Using a buying syndicate (up to 100 m² collector area) the price gets a reduction of 20 – 25%. The material from the Austrian distributor (Absorber, profiles, gums) is calculated with minus 25 % in the buying syndicate. The Slovak material is calculated with 20 %.

Absorber, gums, profiles minus 25 %	630,00	756,00
Further components minus 20 %	166,40	197,84
Collector kit price – buying syndicate	796,40	953,84

Buying syndicate (up to 100 m²), the price reductions for 9 m², in Euro

The collector-kit price without value added taxes is about 796,40 Euro per 9 m² and 88 Euro per m².

Costs of the components not including the collector

(The prices are from June 2005, without any warranty.)

The prices for the solar storage tank, the circulating pump, the electronic regulation, copper tubes and the antifreezer give approximately 1.172 Euro without VAT (1.395 Euro with VAT). In a buying syndicate with a theoretically price reduction (up to 10 persons) of 20 % the material can be bought for approximately 937,90 Euro without VAT (1.116 Euro with VAT).

Material costs for a do-it-yourself solar installation in Slovakia

⁵ Conversion rate 1 Euro = 39 Skk, May 2005

Approximately 1.784,30 Euro without VAT (2.129,30 Euro with VAT) costs a high-quality solar installation with a forecast of covering 63 % of the annually warm water demand. In summer time (April-September) it covers more than 90 percent of the warm water demand. The approximate installation costs amount about 500 Euro (incl.VAT) if they are performed by a plumber in Slovakia.

- Dynamic amortisation period

The amortisation period is defined as the period that it takes for covering the investment costs through the saved energy costs. (The period it takes to get a capital value equal zero). Considering the tax rate the dynamic amortisation period is usually longer than the static amortisation period.(The static amortisation period is often used as a simple method to calculate the risk of an investment).

In this case study the profitability analysis is calculated with an energy price increase rate of 3 percent for the BAU⁶ development. Referring to the gas price development of the last years (especially 2001 to 2002 and 2002 to 2003) in Slovakia a further calculation with an energy price increase rate of 9 % seems to be reasonable.

Result for the situation without any improvement in legislation and a BAU energy price increase: 17 years.

Improvements in legislation could be an investment subsidy of (e.g. like in Vienna) 30 % for a warm water solar installation. Another grant could be the deduction of the value added tax of 19 %.

Results:

	3 % e.p.i. ⁷	9 % e.p.i.
No subsidy	17 years	12 years
No VAT	14 years	10 years
Subsidy 30 %	11 years	9 years

Dynamic amortisation period of a do-it-yourself solar installation in Slovakia, now and with improvement.

- Solar heating costs

The solar heating costs give a very good opportunity to compare it with the cost of other energy sources. The investment costs and the running costs are taken into account and related to the average heat production of the solar installation during the service life.

⁶ business as usual

⁷ energy price increase

	3 % e.p.i.	9 % e.p.i.	Solar heating costs	(Euro/kWh)
<i>No subsidy</i>	17 years	12 years		0,05
<i>No VAT</i>	14 years	10 years		0,04
<i>Subsidy 30 %</i>	11 years	9 years		0,03

Solar heating costs and amortisation period for three scenarios of state support.

- Completing interview comments

Finally two comments from the interviews concerning the estimations of concerning the willingness to pay and unserious offers of installers

Mr. Slaninka, expert for self-made collectors estimates that an average 4-people-household with middle income is able to afford a solar thermal plant for warm water heating for about 40 000 SKK (about 1030 Euro). The actual prices of solarthermal configuration are about 60 000 SKK (2 heliostar collectors, 200 l reservoir, without VAT 19 %) to 150 000 SKK (4 heliostar collectors, 400 l reservoir without VAT 19 %).

The households with higher income could afford a solarthermal configuration for about 90 000 SKK (about 2 300 Euro)

Mr. Brezak from BtPro Ltd., a contract partner of Thermosolar, estimates that an average 4-people-household with middle income is able to afford a TSWW for about 70 000 SKK, with higher income they would afford an installation for 160 000 SKK. He sells the cheapest collector (a heliostar) for 70 000 SKK = 1.795 Euro (incl. VAT and installation). If another type of collector is used (not heliostar) the price is lower, down to 50 000 SKK.⁸

But these numbers do not agree with the collector prices of thermosolar. The high-quality product from thermosolar "heliostar 400 VC", has a squaremeter-price of 271 Euro not including VAT. For a family house with 4 – 6 persons (300 l warmwater per day) are demanded about 9 m² collector area for covering 67,4 % of the annually warm water demand. Price, for collectors only: 2.843,50 Euro including VAT, additionally the final consumer has to pay for: solar storage tank, pump, control and installation.

8. Strategies for support of self building groups

The transferability of the the idea of a self construction movement is not without controversy. Slovakia

⁸ Statement from interview serial ECB, 11th april 2005

Implementation strategy according to the Austrian pattern

- Setting up pilot facilities in a new region
- Countrywide, extensive, independent lectures about the use of solar energy in various communities
- Field trips to pilot plants
- Dimensioning of the solar plants by members of the AEE
- Establishing construction groups comprising 10 to 50 people
- Absorber production
- Installing the plant, either “do it yourself” or with the help of a local installer

Implementation strategy mainly considering the Slovak conditions and interests

- Contact with the target groups (eco-villages, NGOs)
- Starting a strategy with the involved people.
- Know how exchange between Slovak and Austrian partners
- Starting with the pioneer-plants (eco-village)
- Chance for momentum

9. Discussion

The Solarstrat Workshop on May 18th 2005 in Bratislava gave a chance to the stakeholders of solar thermal energy use to comment the solar self construction.

After the revolution in 1989 in former Czech and Slovak Federal Republic there was strong resistance against integration to common initiatives based on negative experience from communism, therefore the situation in the Czech republic and also in Slovakia is different than in Austria (Yvonna Gaillyová).

The supporters of assembling groups suppose that initiatives for self made collectors can help to promote solar energy utilisation among wide public. By this means the self construction movement will also support the professional made collectors. A good reputation of a solar installation in the neighborhood causes the so called “domino effect”. In the opinion of the Slovak solar pioneer Mrs. Gaillyová, the people are mainly interested in self made collectors because they enjoy the assembly and would like to have it installed on their own roof. The interested people should be supported by experienced experts and/or by an organisation , which can provide know how.

According to the win-win-principle, the representative of the biggest solar enterprise in Slovakia agreed with the fact that self construction initiatives could help to promote the solar utilisation in some regions. Even when he is convinced of similar high prices of the self made collectors than the heliostar collectors of his enterprise have.

After the profitability analysis and comparing collector installations of similar proceeds the self made collector in our case study is eminently cheaper than the professional industrial made collector.