



Needs and requirements for successful solar thermal contracting

Region: Podravje, Slovenia
Partner: Energap

What is solar thermal contracting?

One approach to overcome the challenge of high upfront investments (compared to lower operation costs) of renewable energy installations is the instrument of energy contracting. Here an ESCO (energy service company) invests in and operates a renewable energy installation located within the premises of a company or a public body and sells energy (heat, including process heat, and possibly also electricity and cooling) to the owners/users of the buildings at an agreed price.

The basis of a solar thermal contracting project is a contract between the ESCO which states the main conditions and rules for a longer-lasting partnership. Contract duration can be 5-15 years (for solar thermal, possibly on the longer side).

The principle split of tasks and responsibilities is the following:

The ESCO:

- plans, installs, maintains and finances the solar thermal plant
- guarantees a certain heat price over the contract period

The client:

- provides the (roof) area for the solar thermal collectors and space for the buffer storage
- buys heat (for hot water, space heating, process heat) and/or cold (for cooling) from the ESCO

Attractive as this in theory, there are not many countries in Europe that have managed to set up a functioning market for solar contracting.

In some countries, markets for energy efficiency contracting, CHP biomass, biomass heating have developed. Also, in some countries, a large number of PV contracting projects were realised. PV contracting can be economically attractive if an appropriate feed-in tariff (or investment subsidy) for the plant is granted.

Even in countries that have developed other contracting markets, solar thermal contracting projects are very rare.

In the region of Podravje the solar thermal installations are well developed and established especially for the private household sector and much less in the services sector. About 3% of households have solar thermal installations with an average surface of 5,9 m². Industrial solar thermal process heat applications are unknown and they do not exist in Slovenia. Also the knowledge about the possibilities to integrate solar thermal heat in industrial processes is very poor. Slovenia does not have any producer of solar thermal installations. Therefore they are also not very experienced planners for it. Usually they just sell the complete system that are not planned and tailor made for specific users.

The Slovenian energy contracting market is not developed. There are only one or two ESCO companies in Slovenia. Also the potential clients they do not have the knowledge about such financial mechanisms and possibilities. In 2009 some projects in the field energy supply contracting models have started. Within the system new heating installations were set. This includes general system optimisation and complete renovation including the exchange of the energy carrier (usually from oil to gas, rarely biomass). Since the law about public private partnership has been adopted in 2007 also in the public sector some biomass heating systems and public lighting contracting has started. They have a limited success because of not well defined agreement conditions. And such examples give a bad impression of the contracting model. Until today there are no solar installations that have been financed via a contracting scheme in our region and in Slovenia. Solar thermal energy has not been identified yet as a market potential.

In education activities that have been carried out in our region two contracting models were presented and also studied. The clients were more interested in energy efficient contracting system where we guarantee the savings. The reasons are:

- The heating systems in companies are usually very old and are not efficient, they use mainly heating oil and with changes out of it a big savings can be calculated. It is interesting especially in solar thermal where we replace a part of fossil fuels. Usually the whole heating systems are changed and solar thermal contracting can be additional options and savings come out of different prices of gas or biomass and constant price of heat from solar system.
- Savings can be calculated as the savings in litres of oil or m³ at current price of gas if we are able to define exact baseline
- In agreement yearly energy audit is defined where conditions are checked
- Agreement could be adjusted on a yearly basis and include all differences in basic conditions
- If company is interested in saving CO₂ emission they can be a basic units to calculate savings
- With the guaranteed saving we higher the trust of the client in the system.

- In public sector department for budget audits gives a positive opinion on such agreement because they are transparent. The ESCO is not able to make a big profit out of it (5-7% profit rate allowed). Private companies are also interested. Some potential ESCOs are a bit unsure to cooperate that way with private sector since the long term of agreement. In public sector 10 year agreement period is almost guaranteed.

The problems with such system are that a detail monitoring system should be already used or developed for the whole processes that we can calculate the savings. In Slovenia only good and efficient companies have established such systems. The software for monitoring energy use is able to give us the information on the energy use (including indicators) via different scenarios with or without implemented measure – for example solar thermal heat supply.

In Podravje region we will try to implement two different contracting models in solar thermal and for 3 years we will study them.

Barriers for solar thermal contracting

Solar contracting for industrial process heat has to overcome the market barriers for solar thermal process heat, for contracting in general and specifically for solar thermal contracting. Therefore, market introduction of this instrument represent a real challenge, even in countries with well-developed solar markets as well as contracting markets. However, for the reasons outlined above, it seems worthwhile at least to try it.

One main barrier is the barrier is the "chicken-and-egg" problem: as solar thermal in industry as well as contracting are often relatively unknown, there is no demand for it from potential customers, and as there is no demand, not many are interested in offering the services, especially as a lot of general promotion of the instrument is required before any business can be done. Also, specific skills and access to capital are necessary for the ESCOs.

Therefore, in many countries the number of ESCOs is low.

There are also some solar thermal specific barriers in industry:

- It often is a "new technology" for planners active in industry and therefore, they lack the know-how about subsidies, solar systems/technologies, pilot projects.
- potential customers do not believe that the simulated (projected) solar results will be realised
- both planners and customers have doubts about system and installation quality and they fear that the integration of a solar thermal system in the existing heat supply

might interfere with the existing heat distribution system and possibly even with the industrial process itself

- higher investment costs for the costumers/companies (compared to very low operational costs)
- often very low prices for fossil fuels, electricity in industry

Main benefits & barriers (or perceived barriers) for solar thermal contracting

Solar contracting	main benefits of solar contracting	main barriers & arguments against solar contracting
client (company that buys heat from the ESCO)	<ul style="list-style-type: none"> - comprehensive energy service from planning to installation and maintenance provided by one company (the ESCO) - more time and money for core process (production) – no investment costs - stable heat price over the contract period - guaranteed solar yields (maximal output is in the ESCOs interest) - guarantee of state-of-the-art technical and economic solution - positive image, CO₂ reduction 	<ul style="list-style-type: none"> - long contract period - loss of control - services of the ESCO have to be paid - solar energy heat price is probably higher than heat price from fossil fuels
ESCO	<ul style="list-style-type: none"> - new business field (increased competitiveness), additional profit 	<ul style="list-style-type: none"> - probably new technology (risk when doing the first few projects), planning risks
Bank	<ul style="list-style-type: none"> - new business field - physical securities 	<ul style="list-style-type: none"> - unknown and therefore very often sceptical
Government	<ul style="list-style-type: none"> - CO₂ emission reduction - renewable energy projects 	<ul style="list-style-type: none"> - unknown and therefore very often sceptical

Specific barriers for solar thermal contracting in region of Podravje

Slovenia has no tradition in any energy related contracting examples. Therefore the first and the most difficult barriers are no knowledge and experiences on the ESCOs and potential client side. Many workshops have already been held in this field. But clients are still afraid that the system will not work and they do not have experiences with long agreement except with banks. The reason is that there have been many bankruptcy procedures in transition period (1990-2000). This affects the ESCO's and client's security. The banks in Slovenia are not experienced in any special financial arrangement. They do not have professional teams to support the implementation of ESCO system. Companies in Slovenia are usually small and their financial scheme is

not always a good guarantee for banks. Not many of companies have their own money to invest.

Also the legal background is not very sure. Ministry for economy proposed the contracting models in their sustainable energy strategies but Ministry for finances they do not have knowledge about it and they do not give any explanation how to find a way. They do not support the contracting models in public sector since they treat the contracting models as a credit and public sector has legal limitation on the high of their credits regarding their own budget. So there is no best practice yet in the implementation of contracting and it gives all partners some uncertainty.

Companies have also expressed the fear that the integration of solar thermal heat supply system could unbalance their production process and makes troubles. In Slovenia there are only few planners that are possible to plan a RES system in industrial processes. They are afraid to take a responsibility.

In private sector (apartment's buildings) one or two larger heating systems have been optimized with contracting projects in 2009 and 2010. With the positive result we will be able to show them as the best practice examples.

The stakeholders also exposed the problem of long return of investment periods in solar thermal contracting. Also the investments are high since the solar system can only be a parallel option to the main thermal supply system.

The problem is also that larger companies with a long business tradition and good long term security usually have the money to do the installation on their own. More financially unstable companies that would have a greater interest in an ESCO project are usually a less reliable partner for the ESCO company. Also there is the thought of allowing someone to setup and run a system inside of your production facilities, which is something what some private companies might be opposed to regardless what kind of, profit they might gain.

There is also a lack of national and local founding schemes for solar systems. The current founding is limited only to private individuals that are installing small water heating systems for households.

Technical aspects (relating to quality and measurement)

Solar Keymark

Especially in industry and in contracting, only quality solar systems should be used. That can for example be ensured by agreeing in the contract that only solar collectors featuring "Solar Keymark" are to be installed.

Solar Keymark is the first internationally recognised quality mark for solar thermal products. It is based on three issues:

- initial type testing to EN 12975 or 12976
- an implemented manufacturing Quality Management System
- annual review of QMS and bi-annual product inspection

By obtaining the Solar Keymark, the consistent factory made quality of solar collectors can be demonstrated and it is also a pre-requisite for regulatory and financial incentive schemes in many European markets.

A Solar Keymark can only be issued by an accredited and empowered "Certification Body" after the product has been tested by an accredited "Testing Laboratory".

Solar heat meters

Solar heat meters consist of the following components:

- flow meter (water is used almost exclusively as heat transfer medium)
- temperature sensors (to measure the temperature difference)
- processor (often also called integrator)
- For larger installations, generally, a remote reading service (M-bus and modem / radio) will usually be added.

For initial verified meters, the accuracy is normally defined for a period of time. To keep this guaranteed, accuracy calibration is necessary every 3-6 years.

Elements of a solar contracting agreement

A solar contracting agreement defines roles and responsibilities of ESCO and client could encompass the following element:

- scope of services and guarantee of the contractor
- contract duration
- delivery guarantee (xy MWh/year)
- price, price structure, price index
- invoicing and payment schedule
- minimum consumption by the client
- compensation if heat is not delivered
- main technical features of the solar installation
- right to install solar system and access to the site
- ownership during and after the contract

- measurement method and point
- maintenance measures (extent, frequency, costs), technical auditing
- liability, insurance and warranties in case of damages
- provisions in case of bankruptcy and/or change of ownership of the ESCO or the client
- subcontracting
- confidentiality issues, conflicts of interest
- reasons to terminate the contract, settlement of disputes
- appendix: technical part, scope of supply and services

Critical aspects that are to be taken into account in the case of solar contracting are among others:

- how to calculate the solar gains?
- to guarantee solar earnings?
- not only solar yield metered in kWh are important, but it is necessary to take temperature levels and amounts of heat needed into account
- exact definition of properties - which parts of the solar installation are owned by the contractor and which are owned by the clients (e.g. who owns pumps?)
- exact definition of the time when the property passes on to the client
- financing costs and insurance issues

Strategies to overcome the barriers

- Information and awareness raising for contracting:
very often contracting is not known and therefore not considered as an option to implement and finance solar thermal systems. Information and awareness raising is therefore crucial.
- Promoting existing projects:
Existing (and well-functioning) installations can help to make the instrument known and to establish confidence.
- Identify companies that could become "Solar ESCOs". These could be, for example:
 - existing, active ESCOs which add this technology to their current portfolio
 - large solar thermal companies which develop solar contracting as a new business field
 - larger maintenance and facility management companies that are active in industry
- Training:
Very often the lack of qualified ESCOs hampers further market penetration of solar

thermal contracting. A training programme can help to inform about solar thermal contracting and to make the topic more attractive for ESCOs.

- FAQ – List of frequently asked questions:
Very often similar questions are asked concerning contracting projects. A list of frequently asked questions with answers can clarify first uncertainties.

The following main activities are implemented in Podravje region to increase the number of contracting projects in the region:

- Information and education activities (roundtables, workshops) are carried out for different target groups.
- Roundtables where potential ESCOs and users can meet are organized.
- The information is oriented to explain and show the best practices in other EU countries.
- Increase the efforts in triggering best practice examples, using the promotional activities foreseen in the project.
- Special promotional activities will be done for planners in industrial processes.

Road map

The following road-map was developed and is implemented in Maribor, Podravje region including the following activities. It aims to increase visibility of solar contracting as an interesting option, to encourage ESCOs to consider solar thermal as an option. The activities will be based on the regional network established.

what	When	who	how
FAQs on solar contracting	before the end of 2010	Energap	taking into account stakeholder inputs from previous events (round-tables) and the questions continuously raised in training seminars
Give advice and technical support to all project identified within the So-Pro activities as potential pilot projects	before the end of 2010	Energap	The So-Pro work programme foresees that pilot projects will be identified and supported
Include the solar contracting option in business advice activities	ongoing	Energap	Energap is active also in energy audits in industry
Inform relevant ESCOs about potential contracting projects	ongoing	Energap	Energap is often contacted by companies that are interested in renewable energy project

Strategies to overcome the barriers in region of Podravje

The first step is to get the right information about the stakeholders in the private sector that would be interested to run a solar contracting project. We will support the potential partners with all needed information and data. We will explain in detail the whole solar thermal system with the integration in industrial processes.

Best practices will be a part of a persuasion strategy for possible partners. Unfortunately it is difficult to find good best practices in the region of Podravje or in Slovenia. Therefore we intend to use also examples from abroad.

The training area is also our big tool for showing all the main market players how to deal with solar heat as a possible source of revenue for ESCO projects. The point being that we need to make all partners see the possibilities of solar heat in this area.

We have already identified the majority of the main market players in the field of solar thermal power already during the course of the SOPRO project, so during this phase we intend to focus more on the ESCO companies to promote our agenda.

In the area of public buildings we are currently also running many activities and lobbying for energy contracting projects that also involves solar contracting. All of this is targeting a change in awareness for the individual decision makers in the municipalities that solar contracting is a good thing if it is implemented correctly and if it allows for all partners to benefit from the project. As we cover many municipalities we intend to make a wider spread of our activities. The same as we also made in general for the SO-PRO project.