



## SO-PRO - Work Package 6

### Needs and requirements for successful solar thermal contracting

Project Partner: SAENA

#### 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. Within the contracting an ESCO (energy service company) takes over the planning, financing, implementation, operational management, maintenance and continuous optimisation of the energy supply system within the premises of a company or a public body (= contracting customer) over a longer period. The refinancing of the effort is done by the achieved energy costs savings within the company or public body or by selling energy (heat, including process heat, and possibly also electricity and cooling) to the contracting customer at an agreed price.

By the implementation of energy saving measures (e. g. energetic optimisation of buildings or energy supply systems) the contracting is refinanced by the saved energy costs and called energy saving contracting (ESC).

The optimisation of the energy supply system or the delivery of energy (electricity, heat – including process heat -, cooling energy, steam and water), e. g. by installing a new energy system, is refinanced by an agreed price for the delivered energy and is called energy delivery contracting. If in this case a solar thermal system is used for the energy delivery it's called solar thermal contracting. Depending on the main focus of the contracting, further modified contracting models are to be found in praxis.

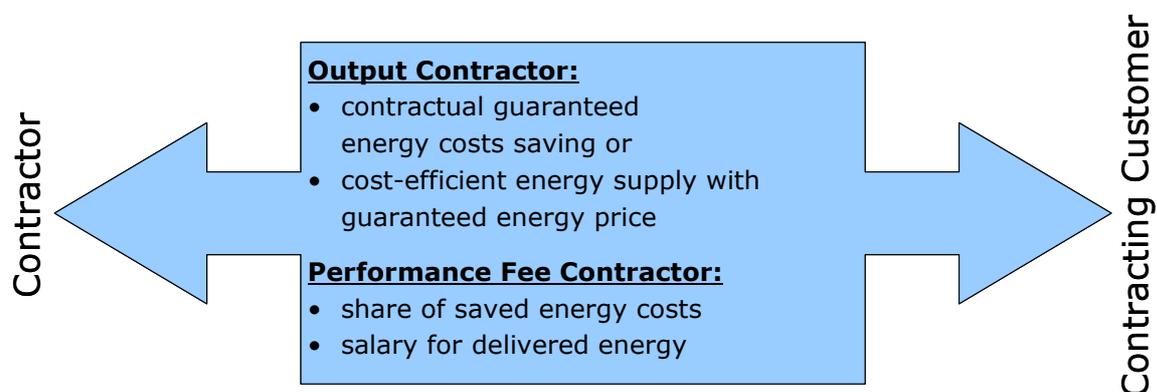


Fig. 1: Operation mode of energy contracting

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

The principle split of tasks and responsibilities is the following:

#### The ESCO...

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

#### The client (company)...

- 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

The mayor difference of contracting regarding other financing models (e.g. leasing or grand) lies in the level of risk adoption, the basement for refinancing of the upfront investment and additional profits for the costumer. The contracting costumer delegates the financial and technical risk to the responsibility of the contractor. Furthermore the outsourcing of the upfront investment enables the contracting costumer to realise investments in the energy system even if the own capital is not available or needed for the core business. Additional charges like interest rates or leasing rates do not accrue. Moreover the costumer profits from the know-how and the staff capacity of the contractor and may concentrate the own activities on the core business. Thereby projects often can be realised in shorter terms, synergy and efficiency effects can be used, new ideas and competences can be integrated. The overall advantage of contracting projects is the holistic approach, which leads to a win-win-situation for contracting customers and energy service companies.

### **Development of the contracting market**

In some countries, markets for energy efficiency contracting, CHP biomass, biomass heating have developed well. 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.

*Example: Market situation for solar thermal contracting in Saxony*

Actually the use of solar thermal in Saxony is well established in the building sector. Solar thermal is mainly used for hot water, heating and heat supply via local heat nets for buildings. Between January 2002 and Mai 2009 approximately 330.000 m<sup>2</sup>

collector area had been installed (in Germany round 9,3 Mio. m<sup>2</sup>). The marked for solar thermal process heat still needs to be developed.

In Germany especially the energy efficiency contracting (ESC) has developed well. There is a noticeable trend to projects with a mix of assembly section. Especially in Baden-Württemberg, Bayern, Hessen, Berlin und Bremen a well developed contracting market can be found. With investments of round about 50 million Euro per year ESC became a supporting pillar for the energy efficiency market<sup>1</sup>. Most of the projects are realised within the existing building stock in the public sector and public health sector. Round about 500 ESCOs are active in Germany<sup>2</sup>.

In Saxony projects with contracting have been implemented in the building sector. Actually an energy saving contracting in the theatre in Chemnitz is supported proactively by SAENA in cooperation with the Berlin Energy Agency. Following the model of energy saving contracting will be further developed by including measures at the building structure. Regarding solar thermal contracting a pilot project will be supported proactively within the project SO-PRO. While heat supply via biomass-contracting has been implemented in a few projects, examples for solar thermal contracting are not known.

In the frame of the funding directive "Energy and Climate Protection 2007" contracting is considered already. The contracting consulting, which in most cases is a barrier for potential contracting users, is promoted. The costs for consulting including the evaluation of proposals and a suggestion for the contract award in the frame of a tender for an energy contracting (energy saving contracting and energy delivery contracting) are eligible on regional an interregional (pooling) level. Actually enterprises are not considered within the promotion fact.

Contracting projects that fit into the funding facts of the directive "Energy and Climate Protection 2007" are eligible as well. Therefore the applicant – in this case the contractor – needs to belong to the eligible actors which may be private persons, municipalities and small and medium size enterprises. Problematic for solar thermal projects is the fact, that for projects with renewable energy sources no funds are available at the moment. Hence the solar thermal contracting project could only be promoted if it combines a solar thermal installation with energy efficiency measures and reaches the status of a model project.

With federal funding solar thermal systems up to 40 m<sup>2</sup> collector area can be promoted via the "Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA)" with a subsidy. Systems with more than 40 m<sup>2</sup> collector area can be promoted by the "KfW-Mittelstandbank" with a low interest credit and repayment grant.

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<sup>1</sup> EuroHeat&Power, 39. Jg 2010, Heft 7-8 (Jul-Aug 2010), Seite 40

<sup>2</sup> Energieagentur Nordrhein-Westfalen,

<http://www.energieagentur.nrw.de/Contracting/page.asp?TopCatID=2739&CatID=3385&RubrikID=3385>; Stand 19.08.2010

### *Example: Market situation for solar thermal contracting in Upper Austria*

In Upper Austria the use of solar thermal systems is well established. Presently about 0.7 m<sup>2</sup> solar collectors per inhabitant are installed, which is European wide leading value. However, so far market development mostly focused on small scale installations for single family homes. In the last years, more and more installations for apartment buildings were built. Moreover, there is a large potential for solar thermal collectors in companies which still has to be exploited.

In addition, Upper Austria has a well established market for energy contracting. This is mostly due to a specific regional funding programme for this financing and operation model started already more than 10 years ago. At the beginning, the target group of the support programme were municipalities and only performance contracting projects were supported. In a second step the programme was extended to companies and also projects where renewable energy installations are implemented, are now supported. In total, more than 50 projects were supported by the programme.

More than 100 energy contracting projects were realised in Upper Austria, the majority of them energy efficiency contracting and in recent years, an increasing number of biomass heating contracting projects were realised. One major bottleneck in significantly increasing the number of contracting projects is the number of qualified and active ESCOs.

So far, only a few projects were realised (mostly for public buildings) where solar thermal installations were included in contracting projects.

### **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:

- solar thermal is often 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

<b>Solar contracting</b>	<b>main benefits of solar contracting</b>	<b>main barriers &amp; arguments against solar contracting</b>
<b>costumer</b> (company that buys heat from the ESCO)	<ul style="list-style-type: none"> <li>- comprehensive energy service from planning to installation and maintenance provided by one company (the ESCO)</li> <li>- no investment costs &gt; more time and money for core process (production)</li> <li>- stable heat price over the contract period</li> <li>- guaranteed solar yields (maximal output is in the ESCOs interest)</li> <li>- guarantee of state-of-the-art technical and economic solution</li> <li>- positive image, CO<sub>2</sub> reduction</li> </ul>	<ul style="list-style-type: none"> <li>- long contract period</li> <li>- loss of control</li> <li>- services of the ESCO have to be paid</li> <li>- solar energy heat price is probably higher than heat price from fossil fuels</li> </ul>
<b>ESCO</b>	<ul style="list-style-type: none"> <li>- new business field (increased competitiveness), additional profit</li> </ul>	<ul style="list-style-type: none"> <li>- probably new technology (risk when doing the first few projects), planning risks</li> </ul>
<b>Bank</b>	<ul style="list-style-type: none"> <li>- new business field</li> <li>- physical securities</li> </ul>	<ul style="list-style-type: none"> <li>- unknown and therefore very often sceptical</li> </ul>
<b>Government</b>	<ul style="list-style-type: none"> <li>- CO<sub>2</sub> emission reduction</li> <li>- renewable energy projects</li> </ul>	<ul style="list-style-type: none"> <li>- unknown and therefore very often sceptical</li> </ul>

## Specific barriers for solar thermal contracting in Saxony

Discussions with the stakeholders revealed the following specific barriers:

- Need for back-up systems:

Under the climate conditions in Germany, solar thermal always needs a back-up system for the colder months. Hence the solar system needs to function in combination with another heating system.

- The limited offer:

Contracting is rarely established in the region. Compared to other projects, solar thermal systems have longer payback times which makes them a less interesting business field for ESCOs. The limited number of active ESCOs can find projects with better economic viability in the biomass heating field where also excellent supply chains are in place. The group that has the highest economic interest in solar thermal contracting, the solar contracting producers, in general do not have the necessary capital for starting ESCOs businesses (they usually need all their capital for expanding their production business).

- Funding schemes and legal framework:

With the existing funding schemes and legal framework energy contracting projects and solar thermal projects are not supported sufficiently.

- Lack of awareness and knowledge:

So far, solar contracting is often not considered as an option when realising a heating installation in industry. Furthermore no even solar thermal is considered in most cases, because of long payback times and more difficult supply structures in comparison to common solutions.

## 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 prerequisite 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
- warranty period
- 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

## Strategies to overcome the barriers on solar-contracting in Saxony

- 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 could help to inform about solar thermal contracting and to make the topic more attractive for ESCOs.
- Networking  
Know-how transfer between market actors by joint projects or round table meetings, etc.
- 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.
- Road-map:  
Development and Implementation of a road-map to support market development, including the following aspects:
  - point out and overcome knock-out barriers
  - identify relevant market players
  - contact to market players
  - networking
  - definition of the technical and economical framework
  - information, awareness raising and promotion due events, publications, regional website, media work, etc.
  - identify existing projects
  - identify pilot projects candidates
  - coordination of the "pilot" contracting process