



Needs and requirements for successful solar thermal contracting in North Rhine-Westphalia

1 What is solar thermal contracting?

In Germany only a few solar thermal process heat installations exist. The great barrier for such an investment are the high installation costs compared to standard technologies like gas or fuel oil boiler. Because of the long pay back period (more than 10 years) industrial companies often refuse such an investment.

One possible solution to overcome this problem might be energy or solar contracting. Energy contracting is a kind of third party financing. An energy service company (ESCO) plans, installs and operates an energy supply system based on e.g. solar thermal. The customer, here the industrial company, buys the needed energy in form of hot or warm water. The ESCO refinances its investment with the drawing from the energy supply.

The basis of a solar 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 ESCO...

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

The client (company)...

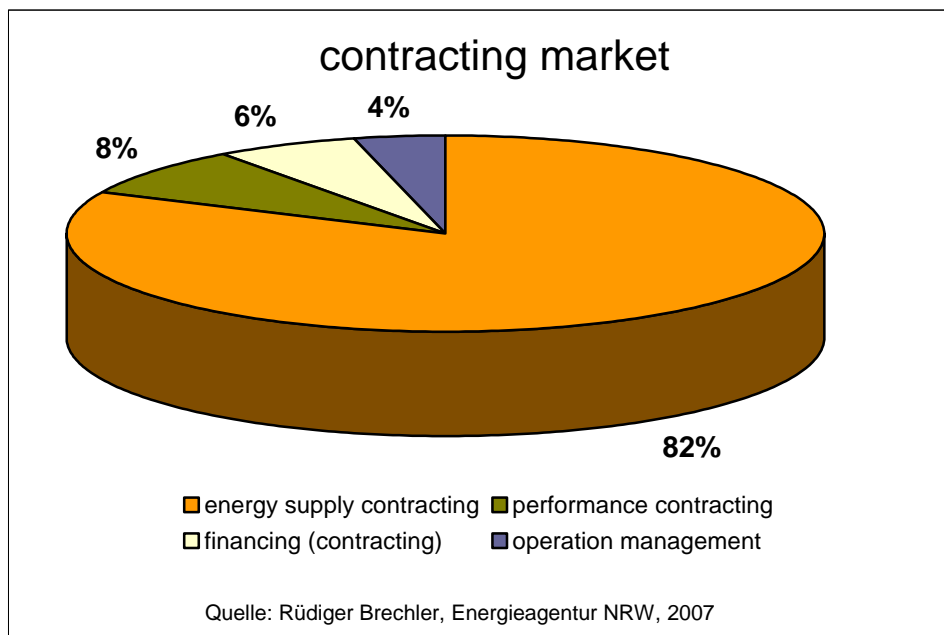
- provides the (roof) area for the solar thermal collectors and space for the buffer storage
- buys heat (for hot water, space heating, process heat) and/or cold (for cooling) from the ESCO

A lot of public utility companies offer energy contracting for domestic customers in apartment buildings, flats and residential areas. Some specialized ESCOs provide complex energy services for headquarters, offices, hospitals and industrial companies. They supply for example heat, cold, compressed air and (sometimes) light. The technique used in contracting projects is mostly based on gas, fuel oil, biomass or CHP.



Contracting models in Germany can be simplified in two different basic concepts. The main features are: the aim of the customer, the way how the investment will be paid back and the question of property.

1. Energy supply contracting: The ESCO plans, installs and operates a new energy system. The ESCO is the owner of the installation and delivers energy to the customer. The customer has to receive the energy during the contract period only from the ESCO. After the contract period, the ESCO dismantles the installation or sells it to the customer.
2. Energy saving (performance) contracting: The ESCO plans and installs a new energy system and/or energy efficiency technology. Depending of the kind of technology the customer or the ESCO operates the installation. With the new technology energy savings will be realized. The customer pays to the ESCO the same energy price as before the installation as long as the energy savings refinance the investment. Especially in the case of efficiency technology the customer becomes owner of the installations at the beginning of the contract period.



Furthermore solar contracting can be divided in two technical concepts:

1. The ESCO plans, installs and operates only the solar thermal installation and supplies the customer only with solar energy. The customer produces the rest of the needed energy by his own.
2. The ESCO plans, installs and operates the complete energy supply system and delivers all needed energy (heat) including solar thermal energy.



2 Market situation in North Rhine-Westphalia

In Germany, and especially in North Rhine-Westphalia, the energy contracting market is well developed. Approximately 500 ESCOs offer their services nationwide. Nevertheless the market share only sums up to ~ 7%. So there is still a huge market potential for contracting projects in Germany.

Up to now there are no (bigger) solar contracting projects in North Rhine-Westphalia. Maybe some small contracting projects in the domestic market exist and combine a heat supply system based on gas or biomass with a solar thermal installation to deliver warm water for baths and showers. But these small projects are unknown.

3 Barriers for solar thermal contracting

Presently the main general barriers, which very often apply to contracting projects in general, for the increased application of solar thermal plants can be summarised as follows:

General barriers for contracting:

- Lack of information of the customers (industrial companies)
- Less experience of the ESCOs concerning "big" companies
- -> small contracting market for industrial solutions

Cultural barriers for solar contracting:

- "new technology" for planners, architects and also for banks or other financial actors
- missing know-how about subsidies, solar systems/technologies, pilot projects
- customers/companies do not believe that the simulated (projected) solar results will be realised
- doubts about system and installation quality
- technical arguments against the integration of solar thermal heat in the existing heat supply (could interfere with the existing heat distribution system and possibly even with the industrial process itself)
- aesthetic issues - building integration issues



Economic and financial barriers:

- higher investment costs for the costumers/companies
- long contract period
- more complex and expensive planning
- very low energy prices (fossil fuels, electricity) in industry

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

Solar contract- ing	main benefits of solar contracting	main barriers & arguments against solar contracting
costumer (com- pany 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



Barriers in North-Rhine-Westphalia

Up to now the SOPRO-Project pointed out the following barriers for solar contracting in North-Rhine-Westphalia (NRW):

- small and medium sized companies (SME's) often have a higher potential to realise solar thermal than big companies. But SME's are not very interested in contracting in general. The owners don't want to lose competence and influence to their processes. On the other side SME's are often not very attractive for high qualified ESCO's, because they promise only a small turnover and a high financial risk.
- Because of the climate conditions in NRW , solar thermal always needs a back-up system for the colder months. This makes "solar thermal only" projects comparatively complicated from a financial and organisational point of view as the solar system needs to function in combination with another heating system.
- Knowledge and awareness concerning solar process heat is missing. Solar contracting is often not considered as an option when realising a heating installation in industry.

4 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 recognized 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.

5 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

6 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.

Best practice: Best practice case studies would help to make the instrument known and to establish confidence.

Identify companies that could be 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.

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.

7 Road-map

The following road-map 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	ESV & Gertec	taking into account stakeholder inputs from previous events (round-tables).
Give advice and technical support to all projects identified within the So-Pro activities as potential pilot projects	before the end of 2010	Gertec	The So-Pro work programme foresees that pilot projects will be identified and supported
Inform relevant ESCOs about potential contracting projects	ongoing	Gertec	Gertec is often contacted by companies that are interested in renewable energy project
Consider a training course on solar contracting in cooperation with the energy agency of North-Rhine-Westphalia	2011/2012	Gertec & ea.nrw	based on the feedback of the planned So-Pro activities, a special training course could be planned