



## **Needs and requirements for successful solar thermal contracting**

**Region: Central Spain  
Partner: ESCAN**

### **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.

### Solar thermal contracting market and potential in Central Spain

Typical solar thermal contracting in Central Spain is established on the basis of a complete service providing, this is, the solar ESCO provides the equipment, installation, operation and maintenance, while the end-user pays a certain amount per month for the thermal energy. This payment is based usually on the energy consumption by the user, assumed a minimum consumption as mandatory.

It has been developed a solar thermal contracting for region central Spain, which one is a contract between the ESCO and the industry. This contract is in the Annex.

### **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

<b>Solar contracting</b>	<b>main benefits of solar contracting</b>	<b>main barriers &amp; arguments against solar contracting</b>
<b>client</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>- more time and money for core process (production) – no investment costs</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 Central Spain

Discussions with the stakeholders in Central Spain, in roundtables and events, revealed the following specific barriers to explain the low number of solar thermal contracting projects in the region:

- General barriers:
  - No (few) energy service companies exist
  - Low interested target group
  - No contracting market clearly defined
  
- Cultural barriers:
  - "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)
  
- Economic and financial barriers:
  - higher investment costs for the costumers/companies
  - more complex and expensive planning
  - legal restrictions against "third party financing" contracts
  - very low energy prices (fossil fuels, electricity) for large companies

### **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

The Central Spain regional support programmes for contracting requires the following criteria for granting financial support:

- the ESCO needs to proof that he/she has the necessary technical skills
- the quality of the panels must cover a minimum requirements to get higher subsidy
- the financial reliability of the ESCO and the client have to be proven, as well as fulfilling several legal requirements.
- a detailed energetic analysis of the project has to be carried out including a list of possible measures and a cost-benefit calculation
- beneficiary of the financial support is the installation owner, but this must be reflected in the financial calculations for the user. Then, the support has to be used to reduce the payment of the client to the ESCO. A written agreement about this has to be delivered.

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 know 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 Central Spain to increase the number of solar contracting projects in the region:

- Create awareness on solar thermal installations by ESCOs. Generally, their clients will be pleased as solar thermal has a very positive image and could therefore accept that the contract duration will be prolonged by a few months.
- In cooperation with the national energy agency, promote a specific financing credit for Solar ESCOs so-named SOLCASA, dedicated to buildings.
- Promote the solar ESCO concept in several events coordinated by SOPRO, as the regional conference, roundtables, etc. and also in publications.
- Promotion of Solar ESCO concept directly to industries and buildings by SOPRO in order to aware and create interest in end-users.

## Road map

The following road-map was developed and is implemented in Central Spain including the indicated 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.

<b>what</b>	<b>when</b>	<b>who</b>	<b>how</b>
FAQs on solar contracting	before the end of 2010	ESCAN	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	ESCAN	The So-Pro work programme foresees that pilot projects will be identified and supported
Inform on solar contracting to all customers where ESCAN makes energy studies or audits	ongoing	ESCAN	ESCAN develops energy audits to firms and buildings, and promotes the Solar ESCO
Inform solar contracting to solar companies and obtain information from them in order to gain information for potential users	ongoing	ESCAN	ESCAN keeps tight contact with solar ESCOs existing in the region in order to inform and involve them in SOPRO activities.
Inform about relevant ESCOs to end-users to favour new contracts	Before the end of 2010	ESCAN	ESCAN contacts to companies that might be interested in renewable energy project
Solar Contracting is included in SOPRO events	3 Roundtables 27/1/2010, 11/2/2010 and 17/11/2010 1 Regional Conference: 21/4/2010	ESCAN	Including Solar ESCO presentations at all events
Training course including solar contracting	17/6/2010	ESCAN	based on the feedback of the planned So-Pro activities, a special training course was performed and will be included in the European Energy Manager training course 2011/2012



**Annex: A proposal for Solar ESCO contract**

**CONTRATO**

ENTRE

EL (USUARIO)\_\_\_\_\_

Y

(LA EMPRESA ESE SOLAR) \_\_\_\_\_

PARA

LA INSTALACIÓN DE UN SISTEMA SOLAR  
TÉRMICO PARA LA VENTA DE ENERGIA EN  
“EMPLAZAMIENTO”

En \_\_\_\_\_, a \_\_ de \_\_\_\_ de 2010

**REUNIDOS:**

DE UNA PARTE: El/La Sr./Sra. (usuario) \_\_\_\_\_, Gerente de (empresa usuario) \_\_\_\_\_, facultado por razón de su cargo para la firma de este Contrato.

Y DE OTRA PARTE: D. (nombre) \_\_\_\_\_, (cargo) \_\_\_\_\_ de la empresa (ESE SOLAR) \_\_\_\_\_, autorizado para la firma de este contrato en virtud de \_\_\_\_\_.

Se reconocen, entre ellos, capacidad legal suficiente para el otorgamiento del presente Contrato y, al efecto

1º. Que (usuario) \_\_\_\_\_, tiene entre sus competencias la de promover el desarrollo sostenible de sus instalaciones utilizando para ello las fuentes de energía locales que menos afectan al medio ambiente (energías renovables), y en particular, la Energía Solar Térmica.

Además, (usuario) \_\_\_\_\_, apuesta firmemente por incorporar paulatinamente a todas sus instalaciones la utilización de la Energía Solar.

2º. Que la empresa \_\_\_\_\_ (en adelante la ESE SOLAR), es una empresa de reconocido prestigio a nivel nacional y europeo, que compartiendo las orientaciones clásicas de las empresas del sector de la energía solar, como son la tecnología o la eficiencia energética, apuesta por ambas, contribuyendo así a la conservación del medioambiente.

La experiencia de (la ESE SOLAR) \_\_\_\_\_ en la producción de ACI para industrias, centros hospitalarios, hoteles, instalaciones deportivas, piscinas públicas, etc, es extensa, habiendo obtenido óptimos resultados con la utilización de la Energía Solar Térmica y consiguiendo así grandes ventajas medioambientales.

3º. Que esta iniciativa de carácter empresarial, pretende que los beneficios económicos netos globales durante la vida útil de la instalación, que se establece en \_\_\_\_\_ años, se repartan entre el (usuario) \_\_\_\_\_ y la ESE SOLAR.

En base a lo cual se establecen las siguientes:

## **ESTIPULACIONES:**

### **PRIMERA. ALCANCE**

Es objeto de este Contrato el establecimiento de una colaboración entre (usuario) \_\_\_\_\_, y la ESE SOLAR, para llevar a cabo la instalación de un sistema solar térmico para agua caliente industrial en (emplazamiento) \_\_\_\_\_.

### **SEGUNDA. CESION DE USO**

(Usuario) \_\_\_\_\_, cede el uso de la cubierta de (emplazamiento) \_\_\_\_\_ a la ESE SOLAR, para la instalación de un sistema de energía solar térmica. Además se pondrá a disposición otro espacio necesario para llevar a cabo la instalación de los acumuladores, bombas, intercambiadores, así como todo el circuito hidráulico. Se adjunta a este documento la carta de autorización de dicha cesión de uso.

Asimismo, el (usuario)\_\_\_\_\_ autoriza el acceso a los citados lugares en las etapas de instalación y operaciones de mantenimiento y limpieza a los técnicos de la ESE SOLAR.

### **TERCERA. DESCRIPCIÓN DE LA INSTALACION**

La ESE SOLAR instalará en propiedad una instalación solar, compuesta de aproximadamente de \_\_\_\_\_ colectores solares térmicos del tipo \_\_\_\_\_, que suponen unos \_\_\_\_\_ metros cuadrados, cuya producción se ha estimado, utilizando el Programa de Simulación desarrollado específicamente, en \_\_\_\_\_ kWht, que significa un factor de aporte solar superior al \_\_\_\_\_% para el calentamiento de agua.

Los beneficios medioambientales de esta instalación, se cifran en una reducción de emisiones de CO2 de \_\_\_\_\_ toneladas en el entorno urbano de (tipo de población) de \_\_\_\_\_, evitándose también el consumo de \_\_\_\_\_ litros de (gas, gasóleo, electricidad, carbón) es decir, \_\_\_\_\_ tep (toneladas equivalentes de petróleo), durante la vida útil de la instalación, estipulada en 20 a 25 años.

### **CUARTA. PUESTA EN MARCHA DE LA INSTALACION**

El funcionamiento de la instalación a efectos de facturar energía térmica, se considerará una vez realizada la puesta en marcha, de conformidad con la normativa aplicable.

## **QUINTA. RENTABILIDAD Y PERIODO DE EXPLOTACIÓN**

La ESE SOLAR realizará la instalación y montaje, y será quien explote dicha instalación durante un periodo de \_\_\_\_\_ años. Durante este periodo de tiempo venderá la energía térmica producida al (usuario) \_\_\_\_\_, al precio que reseña la estipulación siguiente.

El estudio de la rentabilidad y viabilidad económica adjunta al presente Contrato. La ESE SOLAR será responsable del mantenimiento de la instalación durante \_\_\_\_ años. Asimismo instalará un sistema de monitorización para hacer el seguimiento y control de la instalación, registrando los parámetros fundamentales de la misma.

## **SEXTA. GARANTIAS DE RESULTADOS SOLARES DE LA INSTALACION**

La ESE SOLAR garantiza al (usuario) \_\_\_\_\_ la entrega de energía térmica que suministra el sistema solar, por un total anual de \_\_\_\_\_ kWh, que representa un factor de aporte solar del \_\_\_\_%.

La medida de los resultados se realizará a la salida del acumulador solar, en el punto de conexión con la instalación convencional.

En caso de no obtener los resultados solares anuales garantizados, sin una justificación previa técnica y documentada, la ESE SOLAR realizará una compensación económica al (usuario) \_\_\_\_\_ en cómputo anual por un 0,5% de la cantidad garantizada.

## **SEPTIMA. CONSUMOS MINIMOS EXIGIBLES AL (usuario)**

(Usuario) \_\_\_\_\_ está condicionado a la adquisición de unos consumos mínimos mensuales, que se detallan del siguiente modo:

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## **OCTAVA. ACTUALIZACION DE PRECIOS**

El (usuario) \_\_\_\_\_ pagará a la ESE SOLAR la cantidad de \_\_\_\_\_ c€ por cada kWh, producido por la instalación solar (que sustituye al combustible convencional). Dicha cantidad se considera como precio inicial, y se actualizará, con carácter anual, con un incremento del \_\_\_\_%.

Para ello, se dispondrá de un contador de energía validado, que estará situado en la conexión con la instalación convencional, sin menoscabo de instalar una válvula de tres vías que suministre el agua a la temperatura de consigna.

## **NOVENA. FACTURACIÓN Y FORMA DE PAGO**

El pago de las cantidades señaladas se realizará con carácter mensual, estableciéndose como fecha del mismo, el quinto día del mes siguiente al devengo de las mismas. La ESE SOLAR facturará mensualmente a (usuario) \_\_\_\_\_.

En la factura deben quedar bien claros los siguientes conceptos:

- Datos factura (ref. contrato, fecha factura, nº factura)
- Datos del contrato (contratante, forma de pago, fecha de cargo)
- Información sobre los Consumos:
  - kWht (reales o programados, en función de la forma de pago elegida)
  - Histórico de consumo real en kWht (últimos 12 meses)
  - Num. Contador
  - Lectura anterior
  - Referencia lectura anterior
  - Lectura
  - Referencia lectura
  - Total kWht reales
  - Desglose de gastos a pagar.
  - Total a pagar (sin IVA)
  - Total a pagar (con IVA)

El sistema de medida propuesto es la utilización de un contador de energía diferencial en continuo, que proporciona los datos de temperatura de entrada, temperatura de servicio y caudales.

Nota: el modo de facturación se elige por las partes. Se proponen decidir entre dos formas sencillas:

1. Facturación en función del consumo real medido por el equipo. En este caso se factura en función de la diferencia entre la lectura actual y la lectura anterior.
2. Facturación de los kWht programados de enero a noviembre (no obstante se indicarán en la factura los kWht reales medidos en el contador). En el mes de diciembre, se procederá a regularizar la situación entre los kWht programados y los reales, facturando la ESE SOLAR a principios del año nuevo si la producción es superior a lo previsto, o descontando en la primera factura del año, si fuese inferior.

## **DÉCIMA. AYUDAS Y SUBVENCIONES**

La ESE SOLAR podrá solicitar, a los efectos de este proyecto, las correspondientes subvenciones de la Comunidad de Madrid, o fórmulas de financiación favorables, o aquellas que considere oportunas para mejorar la economía o financiación de la instalación solar térmica.

## **UNDÉCIMA. MANTENIMIENTO**

La ESE SOLAR realizará las labores de mantenimiento necesarias que permitan asegurar el funcionamiento de la instalación, aumentar su fiabilidad y prolongar la duración de la misma. Se definen dos escalones de actuación que desarrollará la ESE SOLAR:

- a) Plan de vigilancia.
- b) Plan de mantenimiento preventivo.

## **DUODECIMA. SEGUROS Y SEGURIDAD**

La ESE SOLAR asegurará la instalación (con las siguientes garantías obligatorias y opcionales: coberturas básicas, riesgos extensivos, robo y expoliación, responsabilidad civil explotación, paralización / lucro cesante, y daños eléctricos) durante el periodo de vigencia.

Las condiciones de aseguramiento integral para plantas de energía solar térmica se recogen en el presente Contrato (especificar el anexo).

(Usuario) \_\_\_\_\_ adoptará todas las medidas de vigilancia necesarias para la protección de la instalación industrial, como si fuese otra instalación más propiedad de la planta.

## **DECIMOTERCERA. FINALIZACION**

A partir del \_\_\_\_\_ año del inicio de funcionamiento de la instalación, ésta pasará a ser de propiedad del (usuario) \_\_\_\_\_, haciéndose cargo el mismo del mantenimiento de la misma hasta el fin de su vida útil, estimada en 20 a 25 años. En tal caso, (usuario) \_\_\_\_\_ abonará a la ESE SOLAR una cantidad que equivale al \_\_\_\_\_% del valor inicial, fijado en \_\_\_\_\_€, en concepto de valor residual de la instalación.

En caso contrario, se procederá, previo acuerdo de las partes, a revisar las condiciones contractuales que fija el presente contrato, considerando amortizada la inversión.

## **DECIMOCUARTA. VIGENCIA DEL CONTRATO**

El presente Contrato comenzará a regir el mismo día de su firma y mantendrá su vigencia durante los \_\_\_\_\_ años siguientes.

## DECIMOQUINTA. RESOLUCION

Serán causas de resolución de este Contrato el incumplimiento de las obligaciones contraídas por cualquiera de las partes y el mutuo acuerdo de las mismas.

Y para constancia de las anteriores estipulaciones se firma el presente Contrato en la Ciudad y fecha al principio expresadas.

EL (usuario) \_\_\_\_\_

Fdo: \_\_\_\_\_

EL REPRESENTANTE DE LA ESE SOLAR

Fdo: \_\_\_\_\_