

*Example Tender Package*

**Solar heating systems for single family houses**

Incomplete preliminary draft

October, 2000

IEA 24 Solar Procurement - Subtask B

## *Example Tender Package*

### **Solar heating systems for single family houses**

#### Incomplete preliminary draft

This example of a tender package contains documents that are intended as examples of tendering for a project within IEA task 24 Solar Procurement. The example is intended for a project with tendering for *Solar Heating Systems for Single-Family Houses*. The example is based on an actual Danish request for proposal for 3 sizes of solar heating systems for single-family houses in connection with a campaign carried out by an energy supplier. However, this example of a document is to some extent more general in order to serve as a guideline for other tender documents within IEA task 24. In the process of the further development of the tender documents it is anticipated that even more common usable documents will be prepared.

Another example of a package has been prepared for a project with tendering for *Collector Subsystems for Large Solar Heating Systems*.

In addition to the fact that the two documents have been prepared as examples of different solar heating systems, the two documents have also been prepared as examples of projects with different levels of information and specification requirements.

The document for *Large Solar Collector Systems* reflects a high level of information that is often required for large projects while the documents for *Solar Heating Systems for Single-Family Houses* reflect a lower level of information for minor and more informal projects.

Both tender packages are prepared on the basis of a third package called the "*Brutto Text*" which contains alternative formulations which can be used for different projects at different levels. The documents do not reflect the different national laws, and therefore adaptations to such might be needed.

For comments or suggestions about the documents please contact *Klaus Ellehauge*:  
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IEA Task 24, "Active Solar Procurement" evolved in 1998, with the objective of creating a sustainable, enlarged market for active solar heating systems. It will run for five years. For more information see Appendix D or the website address: <http://www.ieatask24.org>

October, 2000

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# **1 REQUEST FOR PROPOSAL**

## **Technology procurement competition**

### **Solar heating systems for single family houses**

**A National/International technology procurement competition forming part of IEA Task 24, Solar Procurement**

**On behalf of the           xxxxxx**

**And the Buyer Group   xxxxxx**

**for IEA Task 24**

## 1.1 Executive Summary of the request for proposal

### Address

Tenders in **sealed envelopes**, clearly marked: **Tender for Solar heating systems for single family houses at Thy Højspændingsværk and Morsø Elforsyning Purchasing Agency**, and addressed to

Organisation:           xxxxxxx  
Attention:               xxxxxxx  
Box:                       xxxxxxx  
Address:                 xxxxxxx  
Phone, Fax, e-mail    xxxx, xxxx, xxxx

### Deadline:

Tenders must be received no later than **12.00 Wednesday 31 May 2000** (local time). Proposals received after the closing time will not be accepted. Proposals received by fax will be rejected.

### Scope

This request for proposal deals with a campaign for solar heating systems for single family houses at the companies Thy Højspændingsværk and Morsø Elforsyning (Thy high-tension power station & Morsø electricity supply).

The request for proposal is part of the IEA 'Technology Procurement, Solar Heating' project (International Energy Agency, Solar Heating and Cooling, Task 24, Solar Procurement), where Sweden, Denmark, Canada, the Netherlands and Switzerland are co-operating on joint procurements of solar heating technology for a sustainable enlarged solar market.

## 1.2 General information

### *1.2.1 Project description - scope of work*

In February 2000, Thy Højspændingsværk and Morsø Elforsyning (Thy high-tension power station & Morsø electricity supply) in co-operation established an purchasing agency that will deal with renewable energy. The purchasing agency (not yet named, but in the following referred to as the THMEPA) will carry out a solar heating campaign this year. The target group of the campaign comprises all users in the supply area - i.e. app. 28,000 users. Within the supply area of the THMEPA the interest in solar heating is increasing – probably because a considerable amount of households are situated in areas outside the collective energy supply (gas/district heating). In connection with the campaign a sale of 100 to 200 systems is anticipated.

The campaign is supported by the Danish Energy Agency and it should start in May 2000 and remain in force until (and including) December 2000.

In connection with the campaign the THMEPA will price three different solar heating systems so they can be offered to customers at fixed prices and also be stated in the sales material.

Pricing takes place on behalf of tenders from the suppliers and in co-operation with selected heating, ventilation and plumbing firms.

### ***1.2.2 IEA Solar Procurement***

This request for proposal is part of an international collaboration with the objective of creating a sustainable, enlarged market for active solar heating systems. IEA Task 24, "Active Solar Procurement" evolved in 1998 and will be in force for five years. A further description is given in Appendix D.

### ***1.2.3 Delivery***

The following three systems will be sold during the campaign:

- Type A: Domestic hot water system for a small family
- Type B: Domestic hot water system for a large family
- Type C: Domestic hot water system/space heating system

Below, a brief technical description of the three systems will follow:

#### Type A: Domestic hot water system for small families

This system is intended for a small family with a limited consumption of hot water (typical consumption 80-140 litres/day). The main components of the system are one or more solar collector components with a total area of app. 3-4 m<sup>2</sup> and a storage device with a total volume of 140-230 litres. Solar heating control and collector circuit components form part of the storage device.

#### Type B: Domestic hot water system for large families

This system is intended for a family with a considerable consumption of hot water (typical consumption 140-200 litres/day). The main components of the system are one or more solar collector components with a total area of app. 5-7 m<sup>2</sup> and a storage device with a total volume of 230-300 litres. Solar heating control and collector circuit components form part of the storage device.

#### Type C: Domestic hot water system/space heating system

This system is intended for a family that in addition to domestic water also is interested in obtaining space heating through the solar heating system. The main components of the system are a solar collector with a total area of app. 7-10 m<sup>2</sup> and a storage device with a total volume of 230-300 litres. Solar heating control and collector circuit components form part of the storage device.

#### *1.2.4 Marketing, sales promotion and fees*

The THMEPA will undertake all work connected with marketing and sales promotion. When a customer has "agreed" to purchase a solar heating system then one of the associated heating, ventilation and plumbing firms will enter into a contract with the customer. The heating, ventilation and plumbing firm will buy the components for the system at prices that have been given in the tender and have been agreed between the supplier(s) and the THMEPA. The heating, ventilation and plumbing firm then resells the complete system to the customer at a fixed price. The objective is to offer the systems at special campaign prices in order to intensify customer interest in the systems.

The heating, ventilation and plumbing firm in question shall pay a minor sales fee to the THMEPA for each solar heating system that is sold. The fee shall cover all marketing and sales promotion costs.

### **1.3 Qualifications for submitting entries**

The solar heating systems that are the subject of this competition shall consist of components that are or can be type approved at the Danish Test Laboratory for Solar Heating Systems

### **1.4 Submission of tenders**

#### *1.4.1 Submission date and address*

Tenders must be received by the *Thy Højspændingsværk and Morsø Elforsyning Purchasing Agency (THMEPA)* no later than **12.00 Wednesday 31 May 2000** (local time). *Three sets of all documents*, in the form of one original and two copies, shall be supplied.

Please note: Tenders received after the closing time and date will not be accepted. It is in the Tenderers' best interest to deliver their tender to the *THMEPA* well in advance of the closing time and date.

Tenders should be submitted in **sealed envelopes**, clearly marked: **Tender for Solar heating systems for single family houses at Thy Højspændingsværk and Morsø Elforsyning Purchasing Agency**, and addressed to

Organisation:           xxxxxxx  
Attention:               xxxxxxx  
Box:                       xxxxxxx  
Address:                 xxxxxxx  
Phone, Fax, e-mail    xxxx, xxxx, xxxx

Also mark envelopes, wrappers etc.: **Tender for Solar heating systems for single family houses at Thy Højspændingsværk and Morsø Elforsyning Purchasing Agency.**

### **1.4.2 Forms to be used**

All tenders must be completed on the blank Tender Form included in Appendix A. All tenders shall state the price for each unit requested, and shall include a complete Form of Tender and must be signed by the Tenderer with his business address. The Form of Tender must be included with other contract documents when the tender is submitted.

### **1.4.3 Information to be included**

(see forms)

## **1.5 Opening of tenders**

Authorised officers in the THMEPA will open and document all tenders in a protocol.

## **1.6 Evaluation**

### **1.6.1 Who is going to select the tenders?**

Choosing which systems should be offered at fixed prices takes place on behalf of information obtained from suppliers, and through a co-operation between the THMEPA and the heating, ventilation and plumbing firms.

### **1.6.2 How will the evaluation be done?**

As mentioned above, a substantial improvement in the total cost/performance relationship is most important in achieving greater market penetration of solar heating technology. For this reason, the cost aspects of the system and hardware components, performance and the erection/installation time and cost aspects will be decisive in evaluating entries received.

Other aspects considered will be included in the evaluation with the relative weightings as shown below (example):

- Cost of systems including erection/installation aspects, based on the supplier's information (Installation costs may be based on tender, specialist judgements and real tenders from installers if installation is not included.) 60%
- Environmental aspects, aesthetic aspects, degree of completeness of information in the proposal 20 %
- Maintenance/life term and warranty aspects 20 %

### **1.6.3 Final evaluation**

The THMEPA will nominate one or more winners.

#### **1.6.4 Right to accept or reject tenders**

The THMEPA reserves the right to reject incomplete proposals.

The THMEPA has the final decision regarding the selection of the systems to be included in the project.

#### **1.7 Questions and Addenda**

Please submit any questions concerning these documents in writing, to:  
the THMEPA xxxxx, or by e-mail to xxxxx

Questions received will be collated and replied to not later than 2000-04-27. All questions and answers, in Danish and in English, will be available from this date on web sites <http://xxxxxx> and [www.ieatask24.org](http://www.ieatask24.org).

Any alterations required will be issued to all Tenderers as written addenda. Addenda shall be considered as an integral part of the contract documents. The Tenderer shall list in its tender all addenda that were considered when the tender was prepared.

#### **1.8 Time plan**

Competition documents (Stage 1) sent out/published	2000-02-28
Submission of written questions concerning the competition documents	2000-03-31
Written replies to written questions received	2000-05-15
Latest date for submission of competition entries	2000-05-31
Evaluation	2000-06-01 -2000- 07-31
Nomination of the winner(s)	2000-08-15
First deliveries	2000-11-01
Last order in this Contract	2001-05-31
Last delivery in this Contract	2001-07-31

#### **1.9 Prices**

The informed prices shall include solar collector components and storage devices as stated in chapter 4. **The stated prices shall be net installer prices excl. VAT for the solar heating campaign.** (However different national laws may state that prices to the individual customer include VAT)

Delivery costs (package, freight, insurance etc.) to the address of THMEPA **shall** be included in the stated prices for solar collector components and storage devices. Terms of delivery will be determined in connection with subsequent clarifications.

The prices shall be valid for orders from the date of agreement and up to (and including) 31 May December 2001.

On behalf of the informed prices the THMEPA will in co-operation with consultants determine the best storage device and solar collector component combinations.

Please use the form on the following page in connection with price information.

**1.10 Warranty**

The warranty should follow the Danish legislation and type approval scheme.

Minimum warranty for:	Collectors	10 years
	Vessels	5 years
	Controls	5 years

**1.11 General Conditions**

See APPENDIX B, General Conditions of Contract

## 2 SPECIFICATIONS

### 2.1 Documentation

Documentation consists of:

- Test certificates
- Documents required in standards (i.e. installer instruction manual etc.)
- Specifications given in Form for submission of tender, technical description (Appendix A)
- Additional documents

The requested documentation is specified in connection with the requested specifications as given below.

### 2.2 General specifications and test certificate

Solar heating systems offered within these tendering procedures have to fulfil requirements according to existing or upcoming European test standards for:

- Solar Collectors
- Factory made systems (piping safety etc) and/or
- Custom built systems (piping, safety etc.)

**For references to standards and test methods see section 3.**

Or:

systems are tested according to type approval at the Danish Solar Energy Testing Laboratory, (systems without the approval at the tendering time will need the approval before signing of contract) Conditions for approval is stated in "Typegodkendte solvarmeanlæg i Danmark, Fabrikant hæfte, August 1996" from the above Laboratory. For English version please contact the Laboratory.

*Documentation:*

- Test certificates from internationally recognised test institute preferably working according to EN45001, and/or other documents stating that requirements and tests are fulfilled".
- Documents required in standards (i.e. installer instruction manual etc.)

and/or

- other documents stating that requirements and tests are fulfilled or test certificates from the Danish Solar Energy Testing Laboratory.

### 2.3 Additional specifications and documentation

### **2.3.1 Components and pipework**

#### **2.3.1.1 Collector**

The objective is to utilise the same solar collector components for all three systems. The requirements to the solar heating component are as follows: Type approved solar collector with a collector cover of polycarbonate or glass. The absorber shall be made of metal.

#### **2.3.1.2 Collector loop**

Type A, B, C

##### **Collector circuit components:**

The collector circuit components shall fit the storage device in question and shall include all necessary parts for the solar collector circuit, cf. the Danish Energy Agency's outline of type approved solar heating systems (e.g. circulation pump, expansion tank, pressure gauge, non-return valve, trap strainer, scalding protection, stop valves, flow regulating device etc.). The expansion tank can, if necessary, be placed outside the storage device. Piping between the storage device and the solar collector shall not be included.

Type C:

##### **Valves for solar collector circuit:**

Valves used when changing between domestic water and domestic space heating consist of two-way or three-way valves. The valves can, if necessary, be included in the storage device.

#### **2.3.1.3 Heat Exchangers**

Type A, B, C

##### **Heat exchanger in tank for solar heating tank:**

The tank shall have a spiral heat exchanger or a mantle heat exchanger (low flow tank).

##### **Heat exchanger in tank for supplementary heating:**

The tank shall be designed with a heat exchanger (spiral heat exchanger) for boiler operation.

Type C:

##### **Heat exchanger in solar collector circuit for space heating:**

The heat exchanger for space heating consists of an insulated plate heat exchanger. The heat exchanger can, if necessary, be included in the storage device. It has to be possible to use the heat exchanger in connection with a total solar collector area of up to app. 10 m<sup>2</sup>.

#### **2.3.1.4 Storage device – type A**

The storage device shall consist of a type-approved tank with a total volume of 140-230 litres. Solar heating control and collector circuit components shall form part of the storage device. Collector circuit components and solar heating control can, if necessary, be delivered separately.

### **2.3.1.5 Storage device – type B**

The storage device shall consist of a type-approved tank with a total volume of 230-300 litres. Solar heating control and collector circuit components shall form part of the storage device. Collector circuit components and solar heating control can, if necessary, be delivered separately.

### **2.3.1.6 Storage device – type C**

The storage device shall consist of a type-approved tank with a total volume of 230-300 litres. Solar heating control and collector circuit components shall form part of the storage device. Collector circuit components and solar heating control can, if necessary, be delivered separately. Valves and insulated plate heat exchanger shall be included in the price of the storage device.

### **2.3.1.7 Control system**

#### **Type A, B**

##### **Solar heating control:**

Differential control with or without temperature display. The control can, if necessary, be prepared for domestic space heating.

##### **Temperature display:**

It must be possible to read the following temperatures on the control or on the thermometers in the tank cabinet:

- Solar collector temperature
- Temperature in the upper part of the tank (above the level of the immersed electric heater)
- Temperature in the middle/lower part of the tank

#### **Type C**

##### **Solar heating control:**

Double differential control with or without temperature display. Controls that can operate according to a strategy called "Automatic priority" have high priority. There are several types of "Automatic priority" but the common feature is that the solar collector at adequate temperatures always deposits heat in the hot water tank or in the space heating circuit. The following is an example of "Automatic priority": a given temperature is requested at the bottom of the hot water tank before changing to space heating production. If this requested temperature is not obtained (perhaps due to lower solar radiation), then the solar heating system automatically changes to domestic heating production.

If solar radiation suddenly increases and the solar collector temperature increases to a value above the temperature at the bottom of the tank, then a change takes place to hot water production.

##### **Temperature display:**

It must be possible to read the following temperatures on the control or on the thermometers in the tank cabinet:

- Solar collector temperature
- Temperature in the upper part of the tank (above the level of the immersed electric heater)
- Temperature in the middle/lower part of the tank

- Return temperature for central heating plants

### **2.3.1.8 Integration with existing installation**

#### **Electric backup:**

The tank shall be equipped with a thermostatically controlled immersed electric heater.

#### **Domestic hot water circulation:**

The tank does not have to be "optimised" for domestic hot water circulation.

### **2.3.2 System performance**

#### *Documentation:*

- Test certificate of a solar water heating system or test certificate of collector module and storage incl. statement of test institute and test year.

### **2.4 Cost**

- Calculation of ratio/total investment/net solar energy production will be carried out by the THMEPA.
- For all types (A, B, C) the calculation will be based on the heat demands used for type approval at The Danish Solar Energy Testing Laboratory.
  - Hot Water load: 160 litre/day (10 - 50 °C)
  - Space heating demand: 15.000 kWh/year (from 23<sup>rd</sup> of September to 8<sup>th</sup> of May)

### **2.5 Installation**

#### *Description of the installation work*

The solar supplier will for his cost liase with the installation personnel and provide the necessary training and documentation to ensure quality installation and commissioning of the solar systems.

An estimate of the time required to install the proposed solar systems on the properties in question well be made in co-operation between the THMEPA and the heating, ventilation and plumbing firms.

### 3 STANDARDS, REFERENCES AND TESTS

#### 3.1 General

##### 3.1.1 Standards and tests

It is generally recommended that testing would be required according to existing or upcoming European test standards:

Solar Collectors:

- *CEN TC 312 prEN 12975-1 Thermal solar systems and components - Collectors - Part 1: General requirements*
- *CEN TC 312 prEN 12975-2 Thermal solar systems and components - Collectors - Part 2: Test methods*

Factory made systems (complete system testing):

- *CEN TC 312 prEN 12976-1 Thermal solar systems and components - Factory made systems - Part 1: General requirements*
- *CEN TC 312 prEN 12976-2 Thermal solar systems and components - Factory made systems - Part 2: Test methods*

Custom built systems (storage and control):

- *CEN TC 312 prEN 12977-1 Thermal solar systems and components - Custom built systems - Part 1: General requirements*
- *CEN TC 312 prEN 12977-2 Thermal solar systems and components - Custom built systems - Part 2: Test methods*
- *CEN TC 312 prEN 12977-3 Thermal solar systems and components - Custom built systems - Part 3: Performance characterisation of stores for solar heating systems*

The above standards are only for domestic hot water systems while standards for combined systems (space heating and domestic hot water) do not exist. In IEA task 26 Combisystems work is being carried out on characterisation of combisystems. It is recommended that user groups make use of the national participation in IEA task 26 or the national expertise on specifications for combisystems.

Specifications for domestic hot water systems can refer to the draft standards, but further specifications are needed to specify specific user wishes, products and/or installation circumstances.

## APPENDIX A, Form for submission of tender

### Solar collector components

It is possible to state prices for several sizes/types of solar collector components in the form below. Please note that the price of a solar collector component **shall not** include roof mountings, screws, air escape etc. Prices for roof mountings etc. will be determined in connection with subsequent negotiations. It is necessary to state the type number, cf. type approval scheme.

<b>3.1.2 Solar collector 1: Type number</b>	
Net installer price for campaign	
<b>3.1.3 Solar collector 2: Type number</b>	
Net installer price for campaign	
<b>3.1.4 Solar collector 3: Type number</b>	
Net installer price for campaign	

### Storage devices

It is possible to state prices for several of the storage devices in question in the form below. Please note that the price of a storage device shall **include 10 litres glycol**. It is necessary to state the type number, cf. type approval scheme.

<b>3.1.5 Storage device: Type A</b>	
<b>Type number</b>	
Net installer price for campaign	
<b>3.1.6 Storage device: Type B</b>	
<b>Type number</b>	
Net installer price for campaign	
<b>3.1.7 Storage device: Type C</b>	
<b>Type number</b>	
Net installer price for campaign	

## **APPENDIX B, General Conditions of Contract**

Not included here – may be national or international well known Conditions

## **APPENDIX C, Model form of framework agreement**

Not elaborated

## APPENDIX D, IEA task 24 Solar Procurement

### Introduction

A sustainable and much larger market for active solar water heating systems is necessary if the sun is to be an important source of energy for water heating in the future.

An important way to create such a market is through price reductions. This can be done from the demand and supply sides. This task focuses on the demand side via the creation of large Buyer Groups. Large volume purchasing can reduce marketing costs and stimulate innovation in the development of products with improved cost performance.

With the objective of creating a sustainable, enlarged market for active solar heating systems, IEA Task 24, "Active Solar Procurement" evolved in 1998 and will run for five years. Interested parties, such as utilities, homebuilders, and non-governmental organisations (NGOs), are invited to take part in purchasing solar water heaters.

### Background

As part of the IEA, Solar Heating and Cooling Implementing Agreement Canada, Denmark, the Netherlands, Sweden and Switzerland are co-operating in Task 24 "Active Solar Procurement" on joint procurements of solar heating technology.

The Danish Energy Agency is the main financier of the (national) element of the work.

It has been noted at the international level that:

- although many countries have put a considerable amount of work into research, development and demonstration of solar heating technology there has not yet, despite this, been any significant market breakthrough. However, the work that has been carried out in these fields over many years has created a sound knowledge base for solar heating technology.
- the market for solar heating is local, and sales are generally through local contractors to a few environmentally aware buyers. Most systems are manufactured in the same country as that in which they are installed, and there are significant price differences between countries.
- today, solar heating installations are too expensive to achieve any larger scale market penetration. A considerable fraction of this cost is simply due to the high proportion of marketing input needed in order to sell just a few installations. In addition, production volumes are low, insufficient to support rational production, which also contributes to an unnecessarily high cost.

### Objectives

The objective of this IEA project is to create an organised Buyer Group interest in solar heating systems. This potential market exists in the form of the Buyer Groups in each of the countries: other countries are considering joining the project. The purchasing volumes thus created create new opportunities for manufacturers to invest in more efficient production processes and to rationalise their marketing and distribution. In this way, technology procurement projects can open the way for manufacturers to find larger national or international markets.

The overall objective is to create and maintain an expanding market for solar heating systems. An important factor in any such attempt to influence the market is that the cost/performance relationship must be improved. This also includes more rational installation methods, as installation costs constitute an important part of the total cost.

### Scope - Solid initial market

By pooling the market into strong buyer groups, forward-looking buyers can influence production and encourage manufacturers to use more innovative technologies to develop products, components, and systems. Through the introduction of buyer groups, a solid initial market base will be formed, which will reduce investment risks and unit costs.

This will be fulfilled through major cost and price reductions for all cost elements, including marketing and installation, as well as performance improvements by means of joint national and international purchasing. The task deals with small active solar water heaters, although large systems may also apply.

The major results of this work will be to encourage a steady growth in the solar domestic hot water (SDHW) market and to promote the evolution of the market, from being national to becoming international.

**The project organisation and the Buyer Group (national)**

One of the tasks of the project group is to bring together a *Buyer Group*, whose members commit themselves to the purchase, within the framework of the project, of solar collectors for larger solar heating systems.

**Further information on IEA task 24 Solar Procurement**

More information on solar procurement and the opportunities available together with cases of procurement projects within solar heating and within other technologies can be found on the website address:

<http://www.ieatask24.org>