

**Invitation to take part in a  
Technology procurement competition  
Solar collectors for use in larger solar  
heating systems**

**A Swedish technology procurement competition  
forming part of IEA Task 24, Solar Procurement**

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**On behalf of the Swedish Purchaser Group for IEA Task 24,**

**2000-04-05:**

## **Background**

As part of the IEA 'Technology Procurement, Solar Heating' project (International Energy Agency, Solar Heating and Cooling, Task 24, Solar Procurement), Sweden, Denmark, Canada, the Netherlands and Switzerland are cooperating on joint procurements of solar heating technology. The Swedish Council for Building Research (BFR), the National Energy Administration (STEM) and the LIP Secretariat in Stockholm are the main financiers of the Swedish 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 purchasers. 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.

The objective of this IEA project is to create an organised purchaser group interest in solar heating systems. This potential market exists in the form of the purchaser 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.

This international project is being operated in two stages (see also under Time Plan), of which the first stage is at present in progress.

- Stage 1 (which was started in 1999) is concerned with national procurement activities for small solar heating systems and large solar collector units, with international coordination.

- A planned Stage 2 (from 2001 until and including 2002) will involve a greater degree of international harmonisation of performance specifications and coordinated procurement activities in a second round of purchasing.

These competition documents are concerned only with Stage 1, the Swedish procurement activities.

### **The project organisation and the purchaser group**

Operation of the Swedish part of the project is in the hands of a project organisation that administers and runs the project. The National Coordinator is Hans Isaksson, of K-Konsult Energi Stockholm AB. A related technology procurement competition, for solar heating systems for the supply of domestic hot water in detached houses, is being run in parallel with this competition.

One of the tasks of the project group is to bring together a ***purchaser group***, whose members commit themselves to the purchase, within the framework of the project, of solar collectors for larger solar heating systems. In this context, 'larger systems' are those requiring over 200 m<sup>2</sup> per project, although there can be departures from this target size. The Chairman of the purchaser group is Björn Johansson, of AB Enköpings Värmeverk. At present, the group consists of about a score of interested purchasers from local authorities, housing companies, construction companies and energy utilities. (See Appendix 4 for further details.) The purchaser group is assisted by an ***evaluation group*** (see below) for evaluating competition entries received.

### **The Swedish technology procurement competition for solar collectors for larger solar heating systems**

The Swedish 'Solar collectors for larger solar heating systems' technology procurement competition is for a complete system as specified in Appendix 1. It can be seen from Appendix 4, 'Composition of the Purchaser Group', that options have been placed for a total of about 8 000 m<sup>2</sup> of solar collectors for various projects. Publicity for, and marketing of, this technology procurement project will continue by various means, including advertising campaigns, until 15th August 2000. The objective is to have received binding orders by that time for at least 10 000 m<sup>2</sup> of collectors. If the amount of binding orders amounts to less than 4 000m<sup>2</sup>, the purchaser group reserves the right to discontinue the procurement.

### **Phases of the technology procurement competition**

The competition has been divided into the following phases (see also under Time Plan):

- *The evaluation phase* = evaluation of the collectors' technical performance and economic aspects, together with ranking of the tenders.

- *The delivery phase* = delivery in accordance with the framework incentive agreement (see the model form in Appendix 5), drawn up in accordance with the binding orders received by August 2000. See Appendix 4 for a list of those involved at the time of writing.

### **Advertising the technology procurement competition**

The competition will be advertised both nationally and internationally via the EU Official Journal. The competition documents (in Swedish) will be sent directly to known Swedish manufacturers. In addition, the Swedish and English documents will also be available on BFR's website <http://solupphandling.bfr.se> and on IEA Task 24's website at <http://www.ieatask24.org>

### **Qualifications for submitting entries**

The solar collectors that are the subject of this competition shall have been tested and certified by an impartial test organisation, or shall have been submitted to the Swedish National Testing and Research Institute (SP) for initial testing for SP's P-marking approval scheme.

A prerequisite for participation in the competition is the ability to be able to fulfil the above phases of the procurement and also subsequently to be able to mass-produce and deliver solar collectors having a performance equal to that of the submitted tender.

A check will be made to ensure that participants fulfil the general requirements in respect of financial soundness set out in the Public Procurement Act.

### **Submission of entries**

Entries must have been received by not later than 2000-05-31 at the address below. Three sets of all documents, in the form of one original and two copies, shall be supplied.

AB Enköpings Värmeverk  
Attention: Björn Johansson  
Box 910  
SE-745 25 ENKÖPING

**NB:** Mark envelopes, wrappers etc.: 'Enquiry documents IEA Task 24 - Large systems'.

### **Evaluation of entries**

Entries received before the closing date will be evaluated by an evaluation group, consisting of:

Björn Johansson, Chairman and convenor

Hans Westling, Promandat

Lennart Lundberg, Växjö City Council

Jan-Olof Dalenbäck, Chalmers University of Technology

Ivar Franzén, Eksta Bostads AB

If necessary, the evaluation group will call on the services of other experts.

***Obligatory requirements*** must be fulfilled.

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.

In addition to the obligatory requirements, there are also ***desirable requirements***. Achievement or bettering of the desirable requirements, and analysis of other information provided, will be included in the evaluation with the relative weightings as shown below.

<b>Evaluation/weighting</b>	<b>%</b>
• Cost of erection/installation aspects, based on the supplier's information	30
• Solar heat costs less than the obligatory requirement cost of SEK 200/MWh for 1000 m <sup>2</sup> and other specified conditions in Appendix 1	30
• Environmental aspects	10
• Aesthetic aspects	10
• Degree of completeness of information in the proposal	10
• Maintenance/length of life aspects	10

In the event of an order volume which, at the time of entering into the agreement with the winner of the competition, is less than 10 000 m<sup>2</sup>, the costs may be adjusted as set out in Appendix 1.

### **Final evaluation**

The purchaser group will nominate one or more winners.

The purchaser group reserves the right to reject incomplete proposals.

### **Property in the goods/system, origination rights etc.**

The manufacturer/supplier retains property in the goods/systems, origination rights etc. for the solar collectors described in the competition entry. If the entry contains information on components that will be the subject of patent applications, this shall be specifically pointed out in the entry.

### **Secrecy of competition entries and development**

Section 8, Paragraph 6 of the Secrecy Act applies to the competition documents and other documents relating to the project and held by AB Enköpings Värmeverk. One of the effects of this is that a company's commercial and operating affairs and circumstances, such as inventions, designs or economic conditions, that have not been made public in any other way are regarded as secret provided that it can be assumed that the company would suffer if such information became available to the public, to competitors or to others. This protection under the Secrecy Act applies for 20 years from the date of receipt of the documents.

### **Questions**

Please submit any questions concerning these documents in writing, to:

Björn Johansson, AB Enköpings Värmeverk, Box 910, SE 745 25 Enköping, fax number +46 171-25412, or by e-mail to [bjorn.johansson@varmeverket.enkoping.se](mailto:bjorn.johansson@varmeverket.enkoping.se).

Questions received will be collated and replied to by not later than 27th April 2000. All questions and answers, in Swedish and in English, will be available from this date on websites <http://solupphandling.bfr.se> and [www.ieatask24.org](http://www.ieatask24.org).

### **Time plan**

Competition documents (Stage 1) sent out/published	2000-04-05
Submission of written questions concerning the competition documents	2000-04-20
Written replies to written questions received	2000-04-27
Latest date for submission of competition entries	2000-05-31
Evaluation	2000-06-01 - 06-30
Nomination of the winner(s)	2000-08-15
First deliveries, Stage 1	2000-11-01

## **Performance specification - Solar collectors for larger solar heating systems**

General

Extent

1. Solar collectors
2. Connection
3. Cost
4. Environment
5. Marking

## GENERAL

The following is a description of the requirements drawn up by the purchaser group for the International Energy Agency, Solar Heating and Cooling, Task 24, Solar Procurement technology competition.

## EXTENT

This performance specification covers **solar collectors for larger solar heating systems** for use in Sweden (which has a Nordic climate). The collectors must be suitable for mounting on new or existing buildings, on flat or sloping roofs. Those suitable for mounting on flat roofs must also be suitable for ground mounting. In other words, the mounting arrangement can vary, depending on the construction of the building and/or roof as follows:

- mounting on a frame support structure (on a flat roof or on the ground)
- mounting on an existing roof, retaining the under-roof as a sealing layer. (The purchaser group has specified that the solar collectors must be mounted on the existing under-roof structure, or must replace it.)
- as roof hatches, with the collectors also providing a sealing function.

The enquiry material is for the solar collector system itself, i.e. for the collectors, including the necessary hardware for mounting the collectors on frames, directly on the roof or integrating them into the roof, together with all necessary interconnection components. See also Item 1.1.

*Site-built solar collectors (i.e. collectors that are finish-assembled on the roof) are not covered by this enquiry.*

### 1. Solar collectors

#### Obligatory requirements

1. The solar collectors must have been approved when tested by SP or by some other internationally recognised test institute, or ***an application must have been submitted*** to SP for the collectors to undergo initial testing for SP's P-marking scheme.
2. Collectors not yet certified, but for which applications have been submitted to SP for initial testing for P-marking, must have completed ***all the initial testing*** (or must have been tested by some other internationally recognised test institute) before they can be nominated as the winners.
3. It must be possible for the solar collectors to be mounted in at least two of the following three alternatives:
  - a) on a frame (on a flat roof or on the ground)
  - b) on the roof, while retaining the existing under-roof as a weatherproof layer
  - c) on the roof trusses, to serve as a fully weatherproof structure.

### **Desirable requirements**

- 1: It should be possible for the collectors to be mounted in all three of the obligatory mounting requirements above, i.e.:
  - a) on a frame (on a flat roof or on the ground)
  - b) on the roof, while retaining the existing under-roof as a weatherproof layer
  - c) on the roof trusses, to serve as a fully weatherproof structure.
- 2: The area of each collector module should be of an appropriate size to facilitate transport, installation and connecting up.

*A larger module has better thermal performance, but the area of the collectors must be such as to enable them to be rationally transported and installed.*

### **Information required**

- 1: A test certificate from SP or some other internationally recognised test institute, or notification of submission for testing for P-marking (see also obligatory requirement 1.2).
- 2: Manufacturing drawings of the collectors, with details of materials.
- 3: Details of collector dimensions and weights.
- 4: Installation instructions.

Instructions shall be provided for mounting the collectors in at least two of the following three alternatives. See also Appendix 3.

- a) on a frame (on a flat roof or on the ground)
- b) on the roof, while retaining the existing under-roof as a weatherproof layer
- c) on the roof trusses, to serve as a fully weatherproof structure.

*Sharp corners and edges, and the use of a large number of loose parts, should be avoided. If the weight of any item exceeds 60 kg, it must be provided with lifting points, devices etc.*

## **2. Connection**

### **Obligatory requirement:**

The collectors must be designed so that they can be easily connected into larger hydraulic units suitable for use in/with larger systems.

### **Information required**

- 1: System drawings that show how the units are intended to be connected into larger hydraulic units, with information on pressure drop, suitable thermal media and flow rates.
- 2: Instructions for commissioning.

## **3. Costs**

### **Obligatory requirements**

- 1: The cost of solar heat, SK, must not exceed SEK 200/MWh, at an annuity rate of 0.08 and when operating at a mean temperature, TC, of  $0.5 * (T_{in} + T_{out}) = 50$  °C.

The cost of heat shall be given on the basis of an order quantity of 10 000 m<sup>2</sup>. (See also below under 'Cost variation as a function of purchased quantities'.)

*Base calculation of the energy yield of a collector on insolation for Stockholm in 1986 on an unshaded south-facing collector mounted at an angle of 45°. These parameters are also those used by SP in its evaluation and testing. Collectors tested by some other test institute must give values as based on historic insolation data for Stockholm for 1986 and the above orientation.*

*The cost of solar heat shall be taken to mean the cost of the collectors, including all components necessary for connecting them to an operating solar collector system/array of at least 200 m<sup>2</sup> in size, and including two connection points and any necessary shut-off, venting, connecting or safety devices. Costs of support frames, installation, transport and value-added tax are not to be included in this calculation.*

*As an example, the solar heat cost of SEK 200/MWh can be achieved with an energy yield of 380 kWh/m<sup>2</sup>,year if the cost of a complete collector installation of the minimum competition size (200 m<sup>2</sup>) does not exceed SEK 950/m<sup>2</sup>, excluding the cost of support frames, transport and value-added tax. Alternatively, it can be achieved by collector arrays with other cost/yield relationships at TC = 50 °C, e.g. SEK 800/m<sup>2</sup> and 320 kWh/m<sup>2</sup>,year, SEK 1200/m<sup>2</sup> and 480 kWh/m<sup>2</sup>,year or SEK 1500/m<sup>2</sup> and 600 kWh/m<sup>2</sup>,year.*

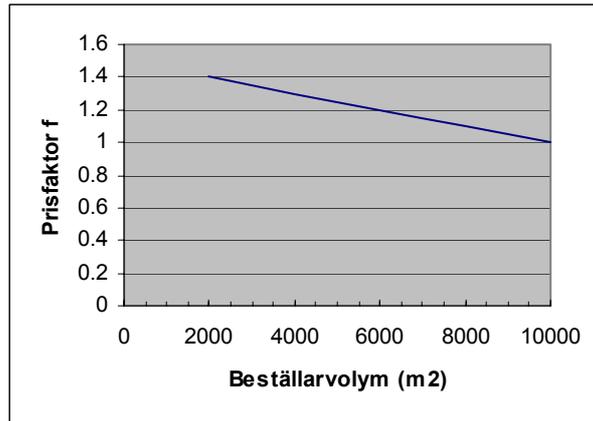
- 2: The collectors shall have at least two years' guarantee.
- 3: It must be possible to transport the collectors by road and install them in a straightforward manner at a low cost.

**Cost variation as a function of purchased quantities**

*If, at the time of signing the contract, the purchaser group's ordered quantity is less than 10 000 m<sup>2</sup>, the cost of solar heat as above,  $SK_{tender}$ , may be upwardly indexed as follows:*

$$S_{off}^{BV} = f \times S_{off}^{10000} \quad \text{with } f = 1.4 - (BV-2000)/20000$$

*where BV is the quantity ordered in m<sup>2</sup>, and  $SK_{tender}$  is the tendered cost of solar heat in SEK/MWh. The lower limit for application of this index is 4000 m<sup>2</sup>.*



**Pricing for individual sub-orders less than 200 m<sup>2</sup>:**

*If the quantity of any individual sub-order is less than 200 m<sup>2</sup>, the supplier shall be entitled to charge separately for the (inter) connection components which, in accordance with obligatory requirement 3.1 above, are to be included in the supply, subject to a maximum of 10 % of  $S_{tender}^{BV}$ .*

**Information required**

- 1: Typical erection costs for a minimum order unit (200 m<sup>2</sup>).

*The erection costs shall include erection/installation and connection of the collectors to a solar collector system/array, having two connection points for the supply and return connections, and including miscellaneous materials, support framework, lifting equipment as needed for installation on a three-storey building, site costs and costs of safety equipment. Labour costs shall be given in the form of man-hours, with other costs in SEK.*

Quote costs for at least two of the following three alternatives:

- a) collectors mounted on a frame (on a flat roof or on the ground)
  - b) collectors mounted on the roof, while retaining the existing under-roof as a weatherproof layer
  - c) collectors mounted on the roof trusses, to serve as a fully weatherproof structure.
- 2: Typical freight costs for a distance of 300 km (within Sweden), for a minimum order unit (200 m<sup>2</sup>).

**4. Environment**

**Obligatory requirements**

Thermal insulation materials may not contain CFC gases, and nor may they contain materials which, at stagnation temperatures, can release gases that can cause serious irritation of the skin or eyes.

**Information required**

- 1: Environmental declaration (see Appendix 3).

- 2: Indication of whether the system manufacturer or sub-contractor(s) is/are certified to ISO 14000 or EMAS.

*Solar collectors and all other materials used in the system are intended to save energy and to reduce pollution and emissions. For this reason, the design of the collectors shall, as far as possible, accommodate ultimate re-use of the materials at the end of the collector life. Materials that cannot be re-used/recycled shall not be used unless absolutely necessary.*

## **5. Marking**

### **Obligatory requirements:**

Each collector module shall be marked in a suitable and easily accessible position with a plate etc. showing the following information:

- The name of the manufacturer
- The type number, model name/number etc.
- Production or serial number and year of manufacture
- The maximum permissible pressure in the collectors (MPa)
- The maximum stagnation temperature (°C)
- The volume of heat transfer medium for the whole module
- The weight of an empty collector module.

### **Information required**

A description of the data plate and its position.

**Tests, standards and references**  
**- Solar collectors for larger solar heating systems**

**SOLAR COLLECTOR TESTING**

***SP's initial testing:***

- Examination of drawings and materials specifications
- Examination of installation and operation and maintenance instructions
- Pressure testing
- Stagnation and thermal shock testing
- Resistance to wind and snow loading
- Resistance to rain
- Determination of thermal performance
- Calculation of annual energy yield at  $T_c = 25, 50$  and  $75\text{ °C}$
- Resistance to freezing
- Material tests (certain components)
- Preparation of description of properties

***SP's procedure for P-marking of thermal solar collectors***

After the initial qualifying tests and inspections, collectors are exposed outdoors for a year under stagnation conditions, which can be regarded as accelerated testing. They are then examined, and must show no substantial deterioration in performance, and no substantial changes in components or materials. If all the required tests are successfully passed, and when procedures for future quality control and manufacturing inspection have been agreed with the manufacturer, the particular type of collector may display the P-symbol of approval.

***Theoretical yields***

SP calculates the collectors' expected annual energy yields at  $T_c = 25\text{ °C}$ ,  $50\text{ °C}$  and  $75\text{ °C}$ . These values must be stated in the competition entries. When evaluating the entries, the evaluation group will make its own calculations of solar energy yield, based on efficiency factors stated in the test certificate.

SP's annual energy yield figures are calculated for south-facing collectors, mounted at an angle of  $45^\circ$ , and using meteorological data for Stockholm for 1986, for which year the total available insolation amounted to  $1062\text{ kWh/m}^2$ . Calculation is performed using the MINSUN simulation program, using efficiency parameters as measured by SP. Note that the theoretical annual yields will be used primarily for comparison purposes. The actual energy yield of a solar heating system depends not only on available insolation, but also on system design, collector orientation, user habits etc. The reference area, which is usually the same as the transparent frontal area of the collectors, is used when calculating the thermal performance and annual energy yields.

Mean temperatures of  $T_c = 25\text{ °C}$ ,  $50\text{ °C}$  and  $75\text{ °C}$  are defined as being the mean values of entry and exit temperatures of the heat transfer medium when passing through the collectors.  $50\text{ °C}$  is a suitable temperature for comparing solar collectors.

***Solar collector testing in accordance with prEN 12975-2***

In addition to the above, testing in accordance with prEN 12975-2 includes the following:

- Resistance to shocks and hail.

## STANDARDS AND REFERENCES

### Standards applied

In general, testing is performed in accordance with a preliminary European standard, prEN 12975-1:1997. It prescribes minimum requirements in respect of performance, materials, tests and documentation. In addition, this competition includes certain requirements that are specific to the competition, including such as reference to the 1994 Swedish Building Regulations, the Swedish climate conditions and the requirement for low system costs. These requirements are clarified below.

### Standards and building regulations:

prEN 12975-1:1997 E

Thermal solar systems and components – Collectors – Part 1: General requirements

prEN 12975-2:1997 E

Thermal solar systems and components – Collectors – Part 2: Test methods

National Board of Housing, Building and Planning: BBR94, Building Regulations. BFS 1993:57, with updates BFS 1995:17 and BFS 1998:38.

Hans Wennerholm. Rules for P-marking of thermal solar collectors. SP Swedish National Testing and Research Institute. CEN TC2312/N16, 1994.

## INFORMATION ON SOLAR COLLECTOR TESTING

For further information on development testing and performance testing and evaluation in accordance with SP's P-marking regulations, please contact Hans Wennerholm (+46 33-16 55 40) ([hans.wennerholm@sp.se](mailto:hans.wennerholm@sp.se)) or Peter Kovacs (+46 33-16 56 62) ([peter.kovacs@sp.se](mailto:peter.kovacs@sp.se)).

During the period 1998-2000, the Swedish National Energy Administration (STEM) is subsidising the testing of solar collectors by SP by 50 %. This subsidy is available for: 1) development testing, and 2) testing and evaluation for P-marking. The subsidies are handled by SP, from whom further information is available.

***Performance details***

***- Solar collectors for larger solar heating systems***

Type/name of the system:	
Place of manufacture:	
Company submitting the tender:	
EN ISO 9000 quality assurance, certificate no.:	
Date/Signature:	
Name in block capitals:	
Address:	
Telephone:	
Fax:	
E-mail:	

**Contents**

1. Information required
2. Technical description
3. Environmental declaration
4. Other documentation

**1. Information required**

Enter the information required in the right-hand column. Enter quantified data in figures, with other requirements confirmed as appropriate, in accordance with Appendix 1, Performance Specification, e.g. by 'Fulfilled', 'Included', 'See technical description' (pages 4-10 in this appendix), 'See our Appendix x' etc.

COMPETITION CONDITIONS			PROPOSAL
OBLIGATORY REQUIREMENTS	DESIRABLE REQUIREMENTS	FORM OF PRESENTATION	
<b>1. Solar collectors</b>			
1: Certification			
2: Submitted to SP for initial testing for P-marking			
3: Two of three mounting arrangements			
	1. All three mounting alternatives		
	2. Purpose-designed.		
		1. Test certificate	
		2. Drawings	
		3: Dimensions and weights (per collector module)	Width m Height m Depth m Weight kg
		4: Installation instructions	
<b>2. Connection</b>			
1. System drawings with technical instructions for array			
2. Commissioning instructions			

<b>3. Costs</b>			
1: Max. SEK 200/MWh			SEK/MWh
2. Guarantee (at least two years)			years
3. Low transport and erection costs			
		1. Erection cost (for 200 m <sup>2</sup> )	Labour hours Other costs SEK
		2: Transport cost (200 m <sup>2</sup> x 300 km)	SEK
<b>4. Environment</b>			
1: No CFCs or other hazardous gases in the insulation			
		1: Environmental declaration (see App. 3, Item 5)	
<b>5. Marking</b>			
1: Data plate			
		1: Information on plate and siting	

## 2. Technical description

The solar collectors shall be documented in sufficient detail to enable the evaluation group to form a reasonable idea of the system's cost/performance relationship. In addition, the documentation must clearly indicate the most important material and environmental characteristics, in order to be able to gain an idea of the collectors' life and of the environmental impact of both normal operation and subsequent disposal. Please use the following forms in order to facilitate presentation and make it easier to compare all entries on an equal basis.

### Definitions:

Solar collector module: The smallest constituent unit of a solar collector (e.g. a solar collector case).

Hydraulic solar collector unit: The combination of parallel and series-connected collector modules that forms a unit for connection. Hydraulic collector units are then, in turn, connected only in parallel.

Solar collector system: An area of solar collectors, consisting of one or more hydraulic collector units.

Solar collectors <sup>1)</sup>	Description
Type (flat plate, vacuum, CPC etc.)	
Method of mounting (Yes / No) - on frame (flat roof and ground) - on sloping roof - on roof trusses	
Minimum slope angle (°)	
Lifting device (required if module weight exceeds 60 kg)	
Number of fixing points per module	
Module dimensions - gross area (m <sup>2</sup> ) - glazed area (m <sup>2</sup> ) - absorber area (m <sup>2</sup> ) - width (horizontal) (m) - height (up the roof surface) (m) - thickness (m) - reflector area (m <sup>2</sup> )	
Module data - Weight including heat transfer medium (kg) - Max. operating pressure (MPa)	
Solar collector coefficients, test results	$\eta_0$ = $b_1$ = (W/m <sup>2</sup> ·K) $b_2$ = (W/m <sup>2</sup> ·K <sup>2</sup> )
Thermal yield , in accordance with test certificate.	At 25 °C (kWh/m <sup>2</sup> ) At 50 °C (kWh/m <sup>2</sup> ) At 75 °C (kWh/m <sup>2</sup> )
Stagnation temperature (ambient temperature 30 °C, and insolation 1000 W/m <sup>2</sup> )	
Cover sheet	



Refer if necessary to attached documents, illustrations, photographs etc.

**5. Environmental declaration**

The solar collector modules offered and specified in these documents

Type .....

Serial no. ....

contain the *following reusable materials per 200 m<sup>2</sup>*:

Metals	Aluminium	kg
	Iron and steel	
	Galvanised steel	
	Copper, brass, bronze	
	Other metals	

Other	Glass	kg
	Polymers (plastic, rubber etc.)	
	Foamed materials	
	Mineral wool and glass fibre	
	Wood	
	Other material	

Recommended heat transfer medium/media

- Chemical substance
- Environmental impact
- Discharge restrictions

In addition, each 200 m<sup>2</sup> of solar collector contains the following quantities *of the following non-reusable* materials:

.....

.....

In addition, the system contains the following products (e.g. tin, Teflon™, paints and varnishes, toxic substances etc.), the use of which is covered by restrictions due to their adverse environmental impact:

.....  
.....

**6. Other documentation**

The following documentation must be attached to the entries:

- *Drawings of the solar collectors, showing dimensions and with details of materials and any restriction on mounting angle*
- *Drawings and instructions for connecting the solar collector unit into hydraulic modules*
- *Installation instructions for the solar collectors, including transport instructions*
- *Instructions for recommended heat transfer medium, as well as for filling, draining and changing the medium*
- *Recommended heat transfer medium flow rate*
- *Any instructions needed for protection against overheating and/or freezing*
- *Instructions for replacing the glazing*
- *Any special requirements in respect of maintenance*
- *Instructions for end-of-life disposal*
- *Illustrations, photographs etc. to illustrate aesthetic aspects (not obligatory).*

Appendix no.	Description


## **Technology procurement of solar collectors for larger solar heating systems**

### **The purchaser group**

Publicity for the technology procurement programme for larger solar heating systems is being run from the autumn of 1999 until 15th August 2000, by which time options on collector quantities should have been firmed up into orders. As at 31st March 2000, options to purchase collectors have been given by the companies listed below. In addition, further marketing activities are being carried out, which means that further new purchasers should come forward.

The companies listed are members of the sector associations etc. listed below.

### **Purchasers who have placed orders or given options for the technology procurement of solar collectors for larger solar heating systems:**

Behrn Fastigheter  
Birka Energi AB  
BOEK AB  
Bromölla District Council  
Byggnadsfirman Bullarhöjden  
Byggnadsfirman Lund AB  
Drott AB  
Eksta Bostads AB  
Höör District Council  
Kungälv District Council  
Mölnålsbostäder AB  
Trosa Närvärme AB  
Regionfastigheter Sydväst  
PRB Boden  
Skanska Bostäder AB  
Stadsfastigheter i Malmö  
Sonne kommunfastigheter  
Sydkraft AB  
Vattenfall AB  
Västerviks bostads AB  
Västerås City Council  
Örebro City Council  
Örebrobostäder AB

### **Companies that have expressed interest in participating belong to the following sector organisations:**

- Byggtrepreneurerna (Swedish Construction Federation)
- HSB Riksförbund
- Sveriges Bostadsrättsföreningars Centralorganisation, SBC
- HBV
- Kommun- och Landstingsförbundet (Swedish Association of District and County Councils)
- SABO
- Riksbyggen

- Sveriges Fastighetsägaresförbund (Swedish Federation of Rental Property Owners)
- Svenska Fjärrvärmeföreningen (The Swedish District Heating Association)

### **The purchaser group project**

The group was invited to join the technology procurement project as potential purchasers of solar collectors for installation as follows:

- a) mounting on a frame support structure (on a flat roof or on the ground)
- b) mounting on an existing roof, retaining the under-roof as a sealing layer (the purchaser group has specified that the solar collectors must be mounted on the existing under-roof structure, or must replace it)
- c) as roof hatches, with the collectors also providing a sealing function.

As at 31st March, the purchaser group has given options for the purchase of about 8000 m<sup>2</sup> of solar collectors, as follows:

- a) mounting on a frame support structure (on a flat roof or on the ground)  
500 m<sup>2</sup>
- b) mounting on an existing roof, retaining the under-roof as a sealing layer      7 000 m<sup>2</sup>
- c) mounting on roof trusses, providing a sealing function      500 m<sup>2</sup>

Publicity for, and marketing of, this technology procurement project will continue until 15th August 2000, by which time it is hoped that the existing options will have been firmed up into binding orders for at least 10 000 m<sup>2</sup> of collectors. If the amount of binding orders amounts to less than 4 000m<sup>2</sup>, the purchaser group reserves the right to terminate the procurement.

***Model form of framework agreement***

**FOR THE SUPPLY AND DELIVERY OF SOLAR COLLECTORS FOR LARGER SOLAR HEATING SYSTEMS**

The following points will be included in any framework agreement:

1. The parties to the agreement:  
The purchaser:  
The supplier:
2. The purchaser undertakes to support the ordering of at least ..... m<sup>2</sup> of solar collector in the form of call-off orders from various property owners/organisations/private persons, as based on the terms and conditions in this framework agreement. Orders are subject to the receipt of any necessary public authority permissions etc. and to the achievement of approved test results.
3. Delivery of systems . . . .
4. The competition is divided into phases, as described in the competition documents. The Purchaser shall authorise the start and continuation of each phase.
5. Contract documents  
These consist of the contract, the competition documents and appendices, any requirements associated with orders, the competition entry and applicable parts of AOLS 81.
6. Prices  
Solar collectors: SEK/MWh  
Erection/installation cost:  
Transport cost:  
Prices including value-added tax.
7. Times
8. Testing in accordance with ...
9. Guarantee
10. Terms of payment
11. Property rights, design rights etc. and the right to refer to this competition in marketing.
12. Confidentiality
13. Service and maintenance
14. Representatives
15. Resolution of any disputes
16. Termination (if results cannot be achieved within the intended time etc.)
17. Call-off rights within the prescribed time period for the specified group of purchasers.
18. Rights to, and prohibition of, assignment.