

SOLAR PROCUREMENT

Collaborative Buyer Actions For Efficient Distribution

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ABSTRACT

- The market for Active Solar Systems is very local.
- Solar domestic hot water (SDHW) systems are currently too costly for the mass market.
- A large part of the cost is marketing in order to sell and install the systems one by one.
- Production volumes are low, which contributes to the high price.

If this technology is ever to become a significant option for water heating, expanding the market is essential. One approach is to find large buyer groups, whose large volume purchases can reduce the marketing costs and justify investments to reduce the cost and/or improve the performance. Co-operative and technology procurements open new opportunities for efficient market actions.

A Solar Procurement Project has just started as a Task within the IEA Solar Heating and Cooling Programme. It consists of two Subtasks: Procurement and Marketing, and Creation of Tools. Four countries have joined the project so far. More countries are welcome to take part. This procurement project could open opportunities for manufacturers, who can and want to operate in larger national or international markets, result in a performance/cost increase and create a sustainably larger market.

1. INTRODUCTION

1.1 General possibilities

Reduction of energy use by half, reduction of total costs almost by half, and/or speeding-up both the development process and the realisation of individual projects are results achieved by using *co-operative and technology procurements*. With this market-demand process major buyers and users articulate their needs in functional terms, aggregate their purchasing power, and accelerate the innovation and diffusion process. Through parallel work and early involvement of leading buyers and users, the risks are reduced for manufacturers [1 and 2]. Table 1 is an overview of the results achieved in some technology procurement projects in Sweden.

Project Area	Result
Lifts for existing buildings	Cost reduction by 48%
Refurbishment of bathrooms	Reducing total time from weeks to 2 days
Energy-efficient products/systems	Energy reduction 30-50%

Table 1. Overview of results - Technology procurement projects in Sweden.

1.2 Solar background

The IEA Solar Heating & Cooling Programme has been active with R&D co-operation since 1977 and about 90 projects have been undertaken. Today, 20 member countries participate in the programme. Recently a major IEA project ended - Task 14 “Advanced Active Solar Systems”. The final report summarises the research work and the result of about 15% improvement in price/performance ratio. Different countries also present their future “dream” systems. Substantial possible cost/energy improvements are foreseen as a result of these systems and product developments. Other studies have also indicated that, in the long run, a performance/price improvement of solar thermal systems of up to 50% is within reach through advanced production methods and more efficient retailing [3].

2. THEORIES AND DEFINITIONS

2.1 Innovation instruments

Over the years, researchers have consistently debated which *instruments* are most effective in producing *innovations* (new products, systems and processes which have left the laboratory and been introduced onto the market). Some researchers have emphasised the supply side (technology push), others the demand side (market pull). Several researchers are agreed that efficient organisation and communication are also important [4 and 5]. Technology procurement is a method of working on the demand side [6].

Interaction between users and producers and the organisation of the market have been stressed by Lundvall [5 and 7] and the importance of a “central coordinating agency” by Teubal [8].

2.2 Definitions

Technology procurement may be characterised as an entire acquisition process, aimed at directly stimulating innovation, and using performance criteria.

Co-operative procurement includes both

- technology procurement (of something not yet existing on the market), and
- acquisition of existing products/systems in some organised ways, for instance among the 25% most energy-efficient ones, which will get an increased market share.

3. EARLIER EXAMPLES

3.1 Many areas

Articulating the needs and communicating the purchasing power have been successful innovation methods used in a number of areas. Development of railway locomotives, electricity and telecommunication innovations and more efficient use of energy are examples of areas where the demand-side activities have resulted in better solutions.

3.2 Energy projects

A number of energy end-use projects have been fulfilled recently, using the technology procurement method. In Sweden, large energy reductions of 30-50 per cent have been achieved as a result of these projects. Table 2 illustrates the results from some technology procurement projects.

Project area	Result	Energy reduction
Refrigerator/Freezer	From 1.2 kWh/litre comparable volume per year to 0.8	by 33%
Clothes washers & dryers for laundry rooms	From 2.6 kWh/kg of laundry to 1.2	by 50%
Ventilation. Replacement of fans in residential area	From 750 kWh/apartment and year to 380	by 50%
Heat pumps	Two different suppliers chosen for development and deliveries	by 30 %

Table 2. Results obtained from some technology procurement projects in the energy field in Sweden. [2]

3.3 International examples

Similar methods have been used internationally, e.g. by the French organisation HLM, the Association of Municipal Housing Companies, in developing control systems for apartment houses, "Domotique", a form of intelligent buildings [9], and in the United States, a "Golden Carrot" programme was first used for energy efficient refrigerators (SERP) with 30-35 per cent energy reduction. It is now being followed by the Consortium for Energy Efficiency, CEE (with more than 25 utilities and other organisations all over the USA as members), in several fields, such as ventilating and cooling systems.

Different State collaboratives, mainly for more energy-efficient solutions, have been established in the North East and North West of the United States. We can also see other examples now coming up, like "Green" Groups or "ECO" groups, which will work

jointly, for instance in the United Kingdom, Germany and The Netherlands.

4. OBJECTIVES FOR SOLAR PROCUREMENT

The Executive Committee countries of the Solar Heating and Cooling Agreement have decided to start Task 24 “Solar Procurement”. Sweden has the Operating Agent role through the Swedish Council for Building Research, with Dr. Hans Westling, Promandat AB, as Operating Agent. Four countries have joined the project so far - Canada, Denmark, The Netherlands and Sweden. More countries are welcome to join during the first year.

The overall objective of the Task is to:

- create a sustainable, enlarged market for active solar water heating systems (mainly domestic systems).

This will be fulfilled through major cost and price reductions for all cost elements, including marketing and installation, as well as performance improvements and joint national and international purchasing. It is especially important in countries with low market activities.

5. APPROACH

The Task will deal primarily with small active solar water heating systems (although large systems may also be included).

The Task is formulated to stimulate the demand side in order to achieve its objective of market growth. Through different national projects, coordinated with respect to principles, timing and price/performance improvements, will be realised. Buyers of potentially large numbers of Solar Thermal Systems, such as housing associations, housing developers, local authorities and utilities, will be identified. The detailed realisation of the work will, to a great deal, be influenced by the buyer preferences.

By showing sufficient joint efforts through coordinated different national and international purchasing of at least 10,000 systems, corresponding to approx. 50,000 sq.m. of collector area, manufacturers of components and systems will be inspired to invest more in improving their products and in production facilities, resulting in reduced costs and prices. Even larger volumes would, of course, facilitate further market growth.

A performance/price improvement of up to 50 per cent (with variations between countries and types of projects) is anticipated. Harmonisation of different national solutions and bridging cultural barriers are also important means for reaching the objectives.

Through National Coordinators in the participating countries, the Task will assist buyer groups in the procurement process (Subtask A with The Netherlands as Lead Country). A manual with the essential principles for tendering, installation, quality control, marketing and financing will be prepared (Subtask B with Denmark as Lead Country). The mechanism designed to assist the buyers will be subject to review and refinement as a result of the different projects in the participating countries. The review

process will include all parties involved, including the solar energy industry.

The Task will have *two rounds* of procurements. The *first round* will consist of small projects (a few hundred systems) and promotion activities, coordinated at a lower level - for instance only some principles in requests for proposals. After the experiences have been evaluated, the *second round* will include larger projects, and a larger extent of joint efforts. Joint efforts by some countries may be initiated during the first round if possibilities and interested buyers have been identified.

Existing, or planned, CEN procedures will be used for the performance evaluation of the refined, or new, components and systems.

The project will be planned for a period of *five years*, see Fig. 1, and be organised with an Operating Agent, Subtask Leaders and National Coordinators.

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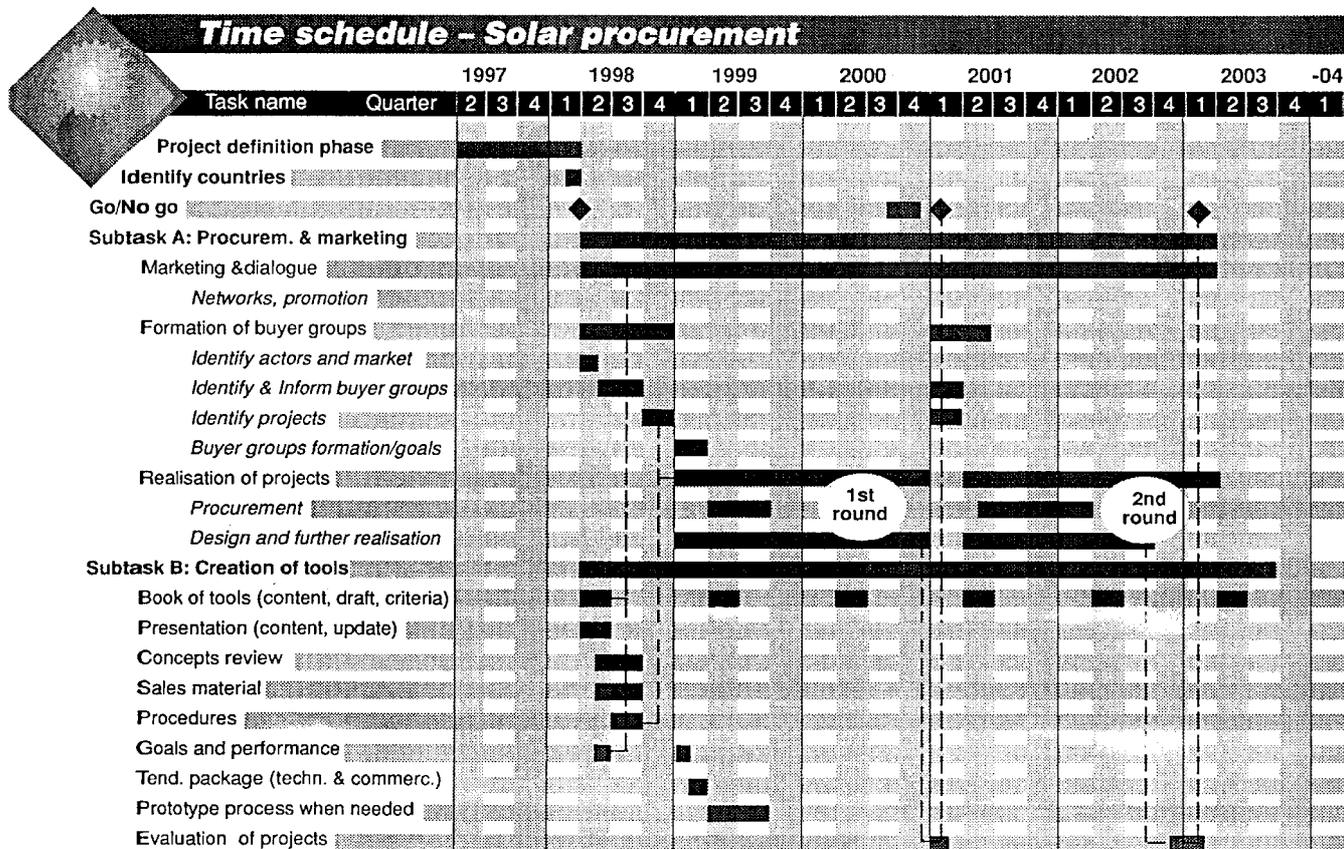


Figure 1. Solar Procurement - Time Schedule.

6. RESULTS

The major results of this Task will be a steady growth in the SDHW market in countries with poorly developed solar markets, and the evolution of that market from national to international.

Specific results expected from the Task will include:

- Installation of at least 10,000 SDHW systems or equivalent in larger systems in participating countries.

- Contribution to an improvement of the performance/cost ratio by up to 50% (with variation between countries). Development, verification and documentation of a viable and successful model for the procurement of SDHW units via large buyer groups.
- A "Book of Tools", which will deal with the creation of buyer groups, the establishment of goals, performance requirements, specifications and model procurement documents.

Each participating country will:

- Learn how to use large buyer groups to procure SDHW systems with higher performance/cost ratios.
- Install a significant number of SDHW systems through such a process.
- See the cost of installed SDHW systems decrease and the quality increase over the duration of the Task.
- Develop ideas for the continued steady growth of their SDHW markets.

This project will also help reduce the risks involved for manufacturers in their development efforts to find more efficient and reliable components and systems, and will give purchasers a good opportunity of working together in future-oriented groups of buyers.

REFERENCES

- [1] Westling, H: *Technology Procurement for Innovation in Swedish Construction*. BFR D17:1991, Stockholm, Sweden, 1991.
- [2] Westling, H: *Co-operative Procurement - Market Acceptance for Innovative Energy-Efficient Technologies*. B1996:3. NUTEK/IEA, Stockholm, Sweden 1996.
- [3] Mangold, D: *Kostenreduktion bei der Herstellung von Solarkollektoren durch Massenfertigung/neue Konzepte*. Diplomarbeit Nr. 9501 (1995). ITW Stuttgart, Germany, 1995.
- [4] Mowery, D.C. and Rosenberg, N: The Influence of Market Demand upon Innovation: A Critical Review of Some Recent Empirical Studies. *Research Policy*, No. 8, 1978.
- [5] Lundvall, B.Å: *Innovation as an Interactive Process: From User-Producer Interaction to the National System of Innovation*. In Dose, G et al: *Technical Change and Economic Theory*. 1988.
- [6] Edquist, C: *Technology Policy*. Tema teknik och social förändring. / Theme technology and social change, Memorandum./ Linköping, Sweden, 1990.
- [7] Lundvall, B Å: Innovation, the Organised Market and the Productivity Slowdown. For The Technology Economy Programme. *Technology and Productivity. The Challenge for Economic Policy*. OECD, Paris, France, 1991.
- [8] Teubal, M & Yinnon, T & Zuscovitch, E: Networks and Market Creation. *Research Policy* No. 20, 1991.
- [9] HLM, EDF, France Telecom, Gaz de France, Plan Construction et Architecture: *Appel à candidature. Interface domotique collective. Cahier des charges fonctionnell d'une base domotique pour l'habitat collectif*. Paris, France, July 1990.