

## Case Studies



### Case 7:

#### Apeldoorn solar project

1000 SDHW have been installed in new housing as a standard facility (out of 1700 house units). The buyer groups that made this possible were housing associations and property developers. There was a call for tender for 1000 systems. The aim of improving the cost-benefit ratio was achieved with an average cost reduction of 20%.

Advantage:

- Possibility for call for tender for 1000 solar heating systems
- Price reduction on solar heating systems
- Systematic control of the quality
- Product innovation

Lessons learned:

- Overall price increase for new houses

### CASE STUDY 7

#### Solar Procurement Projects: "The Apeldoorn Solar Project"

**Title:** Solar Water Heater Project in the 'Woudhuis' housing development area.

**Location:** Apeldoorn, the Netherlands.

#### 1 Short description of the project:



Through a systematic and integrated 'project approach', 1,000 SDHW systems were introduced and installed at a large scale as a standard facility in new housing developments. The systems are offered to: *housing associations and property developers*. An important aspect in this large scale

and volume approach is: *optimise conditions for reducing installation and purchase costs*. Another important characteristic in this approach is the opportunity for systematic quality control, such as: integration of the system introduction with housing and urban planning quality and with conventional (auxiliary) water heating systems, special training, inspection and monitoring.

Participants:	Role:
Organisation	Form of action-taking
Municipality of Apeldoorn	Initiator/Subsidiary
Property developers (9)	Purchaser/Executor
Housing associations (3)	Purchaser/Executor
Energy Company Nuon	Initiator/Subsidiary/Inspector/Publicity
Agpo/ZEN	Supplier
Ecofys	Consultancy
ITA	Installer
Various architects (15) and contractors	Building and design Executor/Installer

Time schedule:	
01/10/1990 to 31/09/1991	Project Exploration and formation of Project Group; Plan preparation, Presentation to Development Team
01/10/1991 to 31/07/1992	Preparation Subsidiary Facilities; Feasibility study for a leasing scheme (contract); Information to architects/project managers; formulation of call for tenders; contractual agreements
01/08/1992 to 31/12/1995	Preparation work: final contractual arrangements, consultations and meetings; assessment system placement; assessment auxiliary heating
01/08/1992 to 31/12/1996	Technical information; project coordination and planning; financial project administration; programming and management
01/10/1992 to 31/12/1996	Training of installation personnel and system inspectors; inspection and evaluation; Monitoring functioning of 30 installed systems and gas and water use; follow-up inspections; register of failures; user survey/interview
01/09/1993 to 31/09/1997	Celebration of the first 500 installed systems (1993) Information and promotional actions; congress at the end of the project



*Technical product information:*

*Supply of:* Drain-back systems with a flat plate collector (2,7 m<sup>2</sup>) and 100-litre storage. At the architect's request three types of collectors were offered (1.7\*1.7 m/ 3.4\*0.9 m horizontal and vertical).

*Offered forms:* Different size, colour and dimension of collectors and boiler vessels.

*Cost calculation notices:* Expected savings for the buyer groups over 20% as compared to the prevailing reference price of NLG 4,000 (exclude VAT) for a complete installed SDHW system (as per 1991).

## **2** Project goals

### **General objectives:**

- To demonstrate the integration of Solar Water Heaters for moderate climates in large-scale housing as a standard facility in new housing developments.

### **Specific objectives:**

- To approach and involve urban developers, housing associations, property developers, builders, architects and installation consultants in all planning stages of the project;
- To train architects, contractors and installers in quality control. Inspection and monitoring of the installed SDHW systems;
- To reduce the cost of SDHW system sales through the optimization of the cost/benefit ration in a large-scale application;

### **Targets:**

- The realization of 1,000 Solar Water Heater systems being installed in the new housing development area 'Woudhuis' of Apeldoorn with a total of 1,700 house units.

## **3** Design characteristics

*Special aspects of integration of the systems in floor plans:* Special attention is given to inform the architects about the requirements and conditions of the design and installation of SDHW system at an early stage in the project. Assistance was given by Ecofys for optimal integration of the systems in the floor plans, due to regular modifications in design (architectural) and construction details. The architects indicated the placement of the various parts of the installation work in the house setting, taking careful notice of the construction and architectural details. With the building constructor as

coordinator of all installation work, the installer designed the details of the piping system and has responsibility over the complete SDHW system. The factual installation of the collector was contracted out to the roofer, who guaranteed the quality of the roof and all its parts.

*Inspection/monitoring tests:* A total of 794 installed systems have been inspected by Nuon, with imperfections in 306 systems (1995). In 1996 only one out of 44 inspected systems showed a failure.

*Most prevailing problems:* too low or high water temperature; collector control errors, causing the pump to operate at the wrong time or not at all; leakage of the connections to the boiler vessel; incorrect filling of the collector circuit and insufficient fall of the pipes to and from the collector (drain-back).

#### **4** Financial characteristics

*Price setting:* The prices of the systems were set at NLG 3,225 (1,500 ECU) (excl. VAT), which is approximately 20% lower than the reference price of NLG 4,000 (as per 1991). Subsidies were allocated by the Ministry of Economic Affairs, Nuon (NLG. 1,000 per system for the entire Apeldoorn project), the municipality (NLG 200 per system), the EU (35% of the costs for the demonstration project) and Novem.

*Bidding procedure:* In the project planning stage, six architects were approached having responsibility for the housing design of the first 600 living units and were given information on the solar project, purpose and functioning of a SDHW system. The architects' requests on size dimensions and colour of the systems were included in the call-for-tenders as formulated by Ecofys. The call-for-tenders for 1,000 systems was issued for complete SDHW systems, in which preference was given to conventional SDHW systems above systems integrated with auxiliary heating. After negotiations, the property developers and the housing associations selected Agpo/ZEN to supply and provide the systems as executed by the installation company ITA. The contract with the installer refers to standard specifications (e.g. maximum lengths of pipes.)

#### **5** Sales promotion

*Brief description of marketing and promotional aspects:* During planning and preparation no real publicity and information dissemination was launched. With the execution of the project, experiences were first introduced during a national workshop, followed by a sequence of information and promotional activities.

*The information/publicity means consisted of:* a conference organised by Nuon (1996), which resulted in a Solar Energy Action Plan, the development of an information centre at which a model of a SDHW system and an electronic panel of its functioning were visually demonstrated. Furthermore, a brochure about the project was

composed for local governments and other interested parties, various articles on the Apeldoorn project were written, a CADDET brochure on the case was published and references were made in many business magazines. Nuon also installed a user information phone service on the project.

*The promotional materials consisted of:* besides a special brochure on the Apeldoorn Solar project, a photo-and video report on the Apeldoorn case was compiled by Nuon, a folder on the Apeldoorn 'Woudhuis' housing development area and solar systems was prepared for potential buyers and presented at a buyers' manifestation, and a periodical 'bulletin' called 'Zonnewijzer' was issued twice a year for all users of a SDHW system.

*Mass media and communication:* At the start of the Apeldoorn 'Woudhuis' housing development project, the Solar Project was presented and broadcasted as a news-item by one the leading commercial television stations in the Netherlands (RTL4).

## **6 Ownership and responsibilities**

*Owner solar heating unit:* the private property owner or each of the three housing associations own the solar system

*Included in the sales contract:* in the final contract the housing associations and the property developers signed a contract with the installation company ITA for the purchase of 940 systems. For the remaining systems the municipality of Apeldoorn and Nuon signed for the purchase to property developers at a later stage. The property owners purchased the SDHW systems included in the buying of the house.

*Financiers of the units:* The property developers and the housing corporations signed for the purchase of 940 systems, while the municipality and Nuon guaranteed the purchase of the remaining 60 systems. Subsidies on the systems were given by Nuon and the municipality.

*Supply and installation guarantee:* The guarantee comprises a 5-year warranty period for all system components and installation work. This guarantee is delivered by the supplier and the installer.

## **7 Results**

*Brief description of sales results and overall project achievements:*

By 1994 a total of 500 systems were installed, by the end of the project period the target of 1,000 system units was realised. The aim of improving the cost-benefit ratio was achieved and resulted (through large scale introduction) in an average cost reduction of about 20%. A

leasing option was not realized due to unclarity in juridical terms for lease obligations of the homeowners.

The integrated and systematic project approach reached a far wider target group than the individual approach and has a strong benefit in terms of price, quality and communication. Other overall results are achieved in recognition and reliability (by means of publicity/promotion/ quality of product and systematic control) of large scale solar projects in new housing developments. Through means of training effective monitoring, inspection and evaluation resulted in adequate solving of the most prevailing problems.

### Project experiences and conclusions



The

project approach has shown an opportunity for systematic control of the quality and installation work, reduction of a competitive reference price and a learning effect for all actors having a positive effect on comparative solar water heating activities in other new housing developments. The project approach has largely determined the growth of the Dutch solar market from 550 annually in 1990 to 8,000 in 1997 and consumer prices decreased by 40% as compared to individual systems.

The experiences from this case have led to further product innovations at Agpo in e.g. size and connection of vessels, improvement in electronic control for gas-fired auxiliary heaters, and systems for small households.

The project approach was adapted to existing dwellings as well.