

## Introduction



De Waterspin is a project, which has been assigned the role of pilot for the Sustainable and Energy efficient Construction programme by the Dutch Ministry of Housing, Planning and the Environment and the Ministry of Economic Affairs. It has won the 1999 The Hague City Renewal Prize.

The project paid special attention to the themes of durability, ecology, use of second-hand materials, energy and water preservation, collectivity, self-management, accessibility for different income groups, reasonable prices and integration of living and working.

One of the major objectives of the project was to preserve the valuable characteristics of the site. Two existing buildings have been retained by renovation and two new buildings (I and II) have been built.

In one of the old buildings (*Alcatraz building*, 1908), nine rental homes, five offices and four workshops have been constructed.

The new Building I consists of eight social rental houses and Building II consists of eighteen owner-occupied houses in various price categories.

### Low energy consumption

All houses are energy efficient with thermal insulation at a level considerably higher than prescribed. The average EPC (Energy Performance Coefficient) is less than 1.0. In the new buildings the EPC are even lower. At that time, for all new buildings in the Dutch housing sector it was compulsory to have an EPC of 1.2 or less.

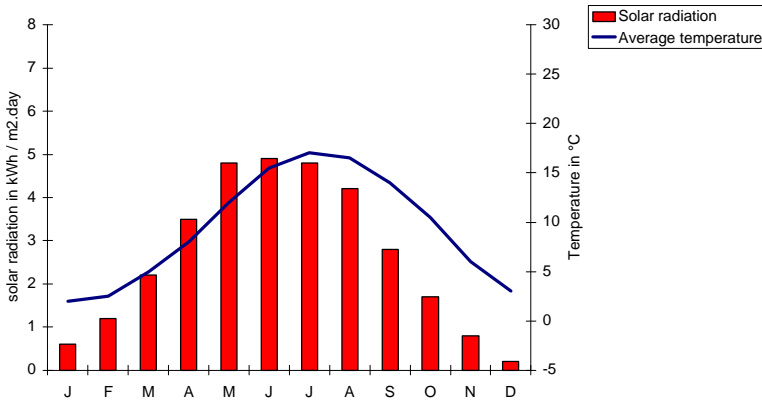
<b>Client</b>	<i>Woningbedrijf Den Haag/Zuid-oost, Den Haag</i>
<b>Architect</b>	<i>MBP architecten en Urban Planners</i>
<b>Environmental Consultants</b>	<i>W/E consultants sustainable building, Gouda</i>
<b>Building Services Consultants</b>	<i>W/E consultants sustainable building, Gouda</i> <i>WDC Consulting, Rotterdam</i> <i>St. Abakus, Amsterdam</i>
<b>Main Contractor</b>	<i>Kanters Bouwbedrijf, Puttershoek</i>
<b>HVAC Contractor</b>	<i>ENECO, Rotterdam (heat pumps)</i>
<b>Contact</b>	<i>W/E consultants sustainable building, w-e@w-e.nl</i>
<b>Publications</b>	<i>www.w-e.nl</i>

## Regional and Urban Context



### Relative position of the project

De Waterspin is located in the city-centre of The Hague and located close to the Central Railway Station The Hague. Buses and trams pass by very frequently. The project also provides bicycle storage.



### Climate

Type of climate	<i>mild, sea climate</i>
Altitude (m)	5
Latitude	52°1'
Longitude	
Average ambient temp	
January	2°C
July	17°C
Degree days (base 18°C)	3,054
Global irradiation (kWh/m²)	950
Sunshine hours (h)	1,400



### Process

The project was started as a result of a local initiative. Neighbourhood residents prepared a plan for the preservation of the existing buildings. Initially the City Council of The Hague intended to replace the existing buildings with houses and a parking garage. These plans were turned down.

Together with an architectural office, squatters, staff at City Renewal The Hague and initiative-takers of the Pander Living & Working Association the bio-ecological building project 'de Waterspin' succeeded.

The plan made room for a greater variety in types and houses and offices. The Housing Corporation The Hague/South East (Woningbedrijf Den Haag/Zuid-Oost) was prepared to be partner for the development and realisation of the plan.

## Block and Building



### Green Building Issues

- Heat pumps for space heating and domestic hot water
- Low temperature heating (55°/40°C)
- Various kinds of sustainable produced woods
- Water-based or natural paints
- Rainwater for WCs, washing machines and garden sprinklers
- Cleaning of water with a biological water filter

### Water management

Rainwater is collected on the roofs of all buildings and used for flushing the WCs. A pumping system brings the water to the WCs. Rain water for flushing the WCs saves annually 750 m<sup>3</sup> on tap water. Furthermore, water preservation is achieved by methods such as circulation limiters and special water-saving showerheads.

Another important water saving measure is the biological water filter. Helofytes are plants that grow in shallow water, like reed, reed-mace and rushes. Bacteria that reduce refuse in the water purify the wastewater from the washing machines. The reed provides necessary oxygen for the bacteria and it will stand heavy and changing water loads. The bacteria purify the wastewater until it is clean, clear and odourless. The water in 'de Waterspin' is then re-used for the common washing machines, cleaning the rooms and sprinklers in the garden.

### Heat pumps

Unique to The Hague was the installation of three energy-efficient heat pumps as a pilot for major Dutch housing development plans (Vinx locations). The energy distribution company ENECO installed three units of collective heat pumps that distract energy from ground water. Its constant temperature is 13°C. By means of a heat exchanger the ground water is upgraded to a temperature of 60°C. The heated water is used for low temperature space heating and a separate domestic hot water system, leading to a significant reduction of energy consumption.

It is estimated that the three heat pumps save annually some 28,000 m<sup>3</sup> natural gas.

### Use of environmentally sound materials

Construction materials are, as far as possible, of a durable nature, environmentally friendly and will require low maintenance. Recycled material (20% dump granulate) has been used to replace gravel in concrete and various kinds of sustainable produced woods have been used. For the paintwork on the outside low-solvent paint has been used, indoor water-based acrylate or natural paint has been applied. Low E-glazing has been used throughout the project. The insulation material in the north faces of the new buildings consists of cellulose.

Project Data	Project case		Reference case	
Construction and Renovation Construction costs (€)	1998 82,000 (per rental house)			
<b>Urban plan</b> Area Floor Area (m <sup>2</sup> gross floor area) Floor Area Ratio (m <sup>2</sup> gross floor area)	3,600 m <sup>2</sup> (total area) 3,896 1.1			
<b>Transport</b> Distance to car park Distance to public transport Frequency of public transport Bicycle storage Telecommunication	n.a. 100 m 10/ hour yes phone, cable			
<b>Waste separation</b> Construction and demolition waste Household waste Design for deconstruction	6 fractions vegetables/fruit/garden waste separate		5 fractions vegetables/fruit/garden waste separate	
<b>Building Materials</b> Construction Facades Roof  Window frames Internal walls Recycled materials	sand-limestone Western Red Cedar modified bitumen felt (APP)  European deal natural gypsum blocks 20% dump granulate in concrete		brick, wood, concrete brickwork blown bitumen, felt/EPDM with bitumen layer softwood with solid board implant gypsum no recycled materials	
<b>Insulation</b>	<b>area (m<sup>2</sup>)</b>	<b>U-value (W/m<sup>2</sup>K)</b>	<b>area (m<sup>2</sup>)</b>	<b>U-value (W/m<sup>2</sup>K)</b>
Ground floor area (m <sup>2</sup> /bldg)		0.29		0.40
Roof area (m <sup>2</sup> /bldg)		0.27		0.40
External wall area (m <sup>2</sup> /bldg)		0.30		0.40
Window area total (m <sup>2</sup> /bldg)		1.8		1.8
South (m <sup>2</sup> /bldg)				
<b>Ventilation system</b> Infiltration Exhaust Heat recovery Air exchange rate, heating season	natural natural no 1.2 - 2.0		natural natural no 1.2 - 2.0	
<b>Back-up systems</b> Space heating Domestic hot water Cooling Electricity production Ventilation	<b>system</b> heat pumps heat pumps  traditional	<b>energy source</b> ground water ground water  oil, gas	<b>system</b> central heating central heating  traditional	<b>energy source</b> gas gas  oil, gas
<b>Energy data</b>	<b>(kWh/m<sup>2</sup>)</b>		<b>(kWh/m<sup>2</sup>)</b>	
Space heating	39		83	
Space cooling	0			
Domestic hot water	54		54	
Electricity (total)				
lighting	5		5	
fans + pumps	2		2	
small power	21		21	
<b>Solar systems</b> Passive Active PV	sun-spaces			
<b>Water</b> Supply Toilet system (4, 6, 9 litres) Shower Bath Sewage Rainwater collection Grey water system	adjustable flush (3 or 6 l) water-saving shower taps no  rainwater for toilets waste water for washing machines		fixed flush (6 l) standard shower head yes  no no	