



Project information

Project type:	New Eco school
Address:	Sørenga 2 Trondheim 2008
End construction year:	Primary school
Building type:	3
Floors:	550
Persons in building:	6 880 m ²
Gross area BTA:	6200 m ²
Net heated area:	1100 m ²
Window/door area:	n.a.
Additional cost for eco-application:	69,3 €/m ²
Total building cost:	n.a.
Heat Pump rated capacity:	133 kW

Special ECO-technologies used:

- Solid wood construction
- Low-energy houses. Extra thick insulation walls and ceiling
- Windows with low U-value
- Maintenance-free outdoor wood paneling
- Building Details. Focus on air tightness requirements in buildings
- Heat pumps (ground heat) for heating and cooling.
- District Heating

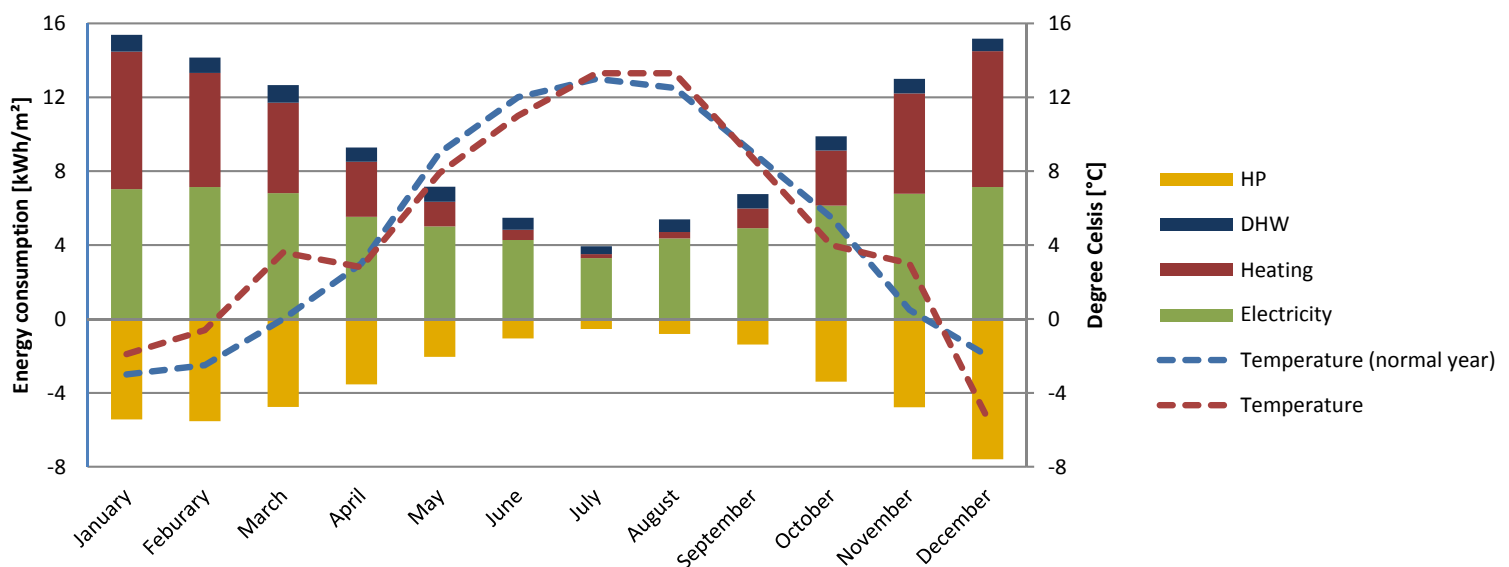
Ground heat pump:

- Rated power 133 kW
- Heating / cooling and domestic hot water
- There are 14 wells drilled into the soil and rock
- 200 m deep wells
- Ground Temperature stable at 4-5 °C



Energy consumption

Energy Consumption 2012



ECO-City project partners

Nardo school / kindergarten: Low Energy Building with economies rock heating heat pump / district heating

What has been done:

New Nardo school and kindergarten was completed in 2008 as a pilot project for low energy consumption building and the use of solid wood in construction. Low energy consumption was achieved through good insulation, sealing and heat recovery and by avoiding cold bridges. The building is also pressure tested and termo rayed to find and eliminate any air leaks and thermal bridges. It was dug 14 wells in the ground that obtains energy in rock. These contribute to the heating of the building, preheating of the tap water, and to cool the building during the summer when it is needed. The building is also connected to the district heating network. The ventilation system is divided into zones and there is demand controlled ventilation in the building. There is extensive use of energy meters in building to measure the consumption of any items. The unit is controlled by the central operations control. Wood materials used in carrying structures, exterior cladding and interior.

Why it has been done:

The original school from 1969 to 1997 was demolished when it was more financially advantageous active than conducting a complete renovation. It was also decided that the school would be a pilot project both in terms of low energy consumption and the use of solid wood.

How it was done:

Measurements show that the energy consumption of the school is approximately 75-80 kWh/m² per year, while the old school had a consumption of about 260 kWh/m² per year. In the first years after the building was opened, it was billed as the most energy efficient school in Norway



Key figures

U-values (ECO-new build)

W/m ² K	National Regulation (new build)	Concerto Specification	Actual
Facade wall	0.22	0.18	0.15
Roof	0.15	0.12	0.15
Ground Floor	0.15	0.12	0.13
Window	2	2	1.1
Glazing	2	1.1	1.1
Shading			
Doors	-	-	1.1
Ventilation rate	4	3.7	3

ENERGY

[kWh/m ²]	National Regulation	CONCERTO specification	Actual 2012/13
Heat	125	75	11.6
space heating	54	29	
ventilation	40	27	
pipe loss	18	9	
DHW	13	10	9.0
Electricity	54	43	68.4
lighting	28	22	
cooling	0	0	
equipment	15	12	
other	11	9	
Total	179	118	80.0

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