



Project information

Project type:	New Eco school
Address:	Ranheimsveien 166 7056 Ranheim 2010
End construction year:	Primary school
Building type:	2
Floors:	650
Persons in building:	6800 m ²
Gross area BTA:	6243 m ²
Net heated area:	980m ²
Window/door area:	
Additional cost for eco-application:	94,1 €/m ²
Total building cost:	n.a.
Heat pump rated capacity:	2 x 150 kW

New elementary school with a strong focus on energy and environmental initiatives. Energy Requirements approx. 20% better than the current national requirements. Thermal energy and hot water are mainly supplied by seawater heat pump.

Special ECO-technologies used:

- Extra thick insulation in walls and ceilings
- Windows with low U-value
- Extra demands on tightness construction
- Seawater heat pump - 2 x 150 kW
- District heating for peak load

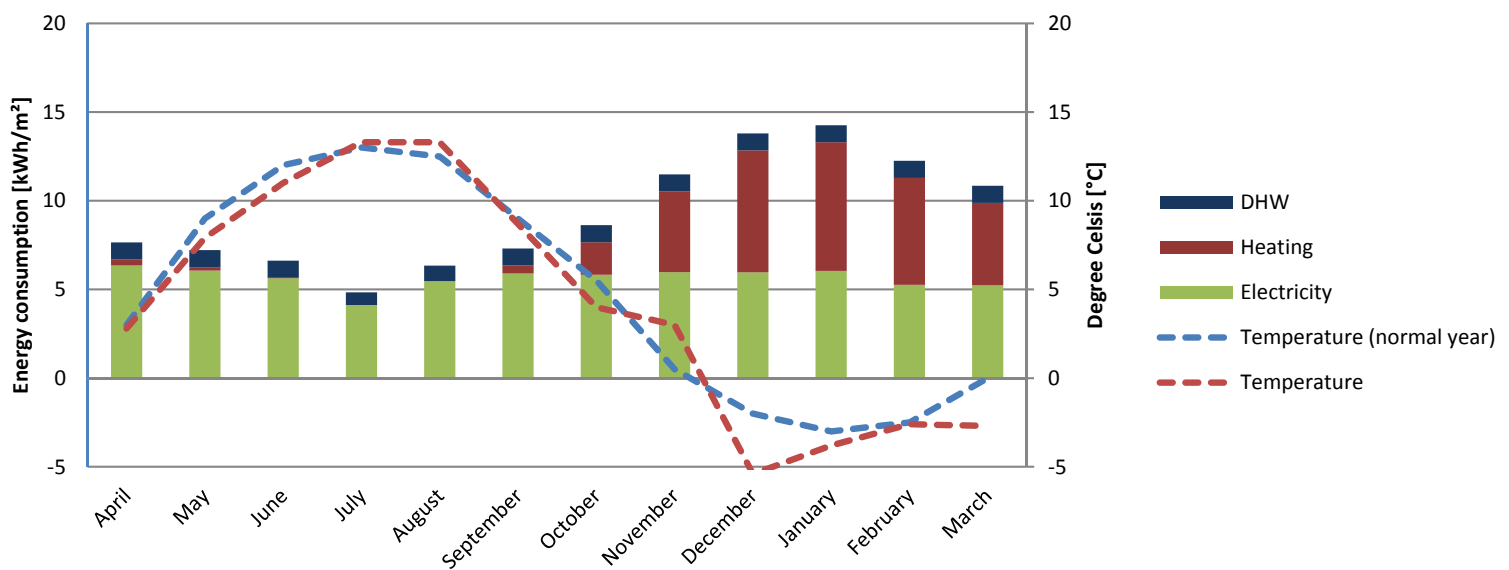
Sea water heat pumps:

- Heat pump school: 150 kW
- Heat pump sports hall: 150 kW
- Common seawater intake for heat pumps



Energy consumption

Energy Consumption 2012/13



ECO-City project partners

Ranheim school: Low-energy building with sea heat pump / heating

What has been done:

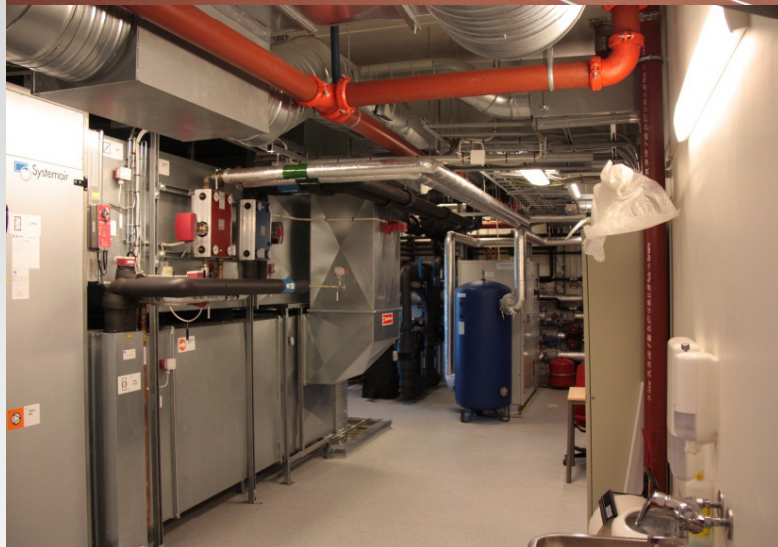
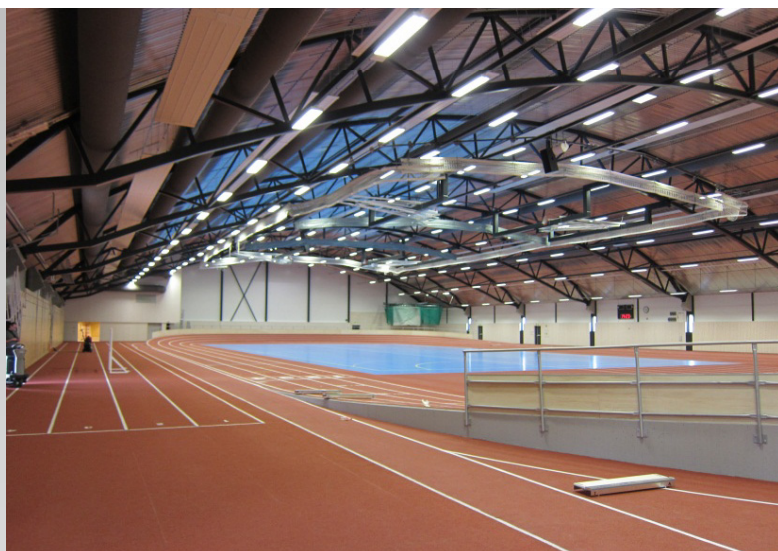
New Ranheim primary school was opened in the fall of 2010 and has a normal capacity of 650 students. Low energy consumption was achieved through good insulation, sealing and heat recovery and by avoiding cold bridges. The building is also pressure tested and thermo rayed to find and eliminate any air leaks and thermal bridges. Ventilation systems are balanced and have high heat recovery efficiency. The school is heated with radiators and underfloor heating based on district heating and heat from the sea. It installed a seawater intake as low temperature source of heat pumps by Ranheim Ranheim school and athletics hall. Ranheim athletics hall located on the neighboring property and is used by the school. Seawater is also used, as needed, to climate cooling.

Why it has been done:

Old Ranheim school was in poor condition while lying on a hard ground without the possibility of extensions. It was therefore decided to build a new and larger school located on the seafront. It was decided that the building would become a low energy building and that it would use its good location to install a sea-water heat pump. It was also decided to build a new athletics hall, and where this should be connected to a sea heat pump.

How it was done:

Measurements show that the energy consumption of the school is 111 kWh/m² per year. There have been significant problems with sea water heat pumps so that it is not currently operational. It is due to accumulation of silt and fine-material in heat exchangers and trouble to achieve the specified flow.



Key figures

U-values (ECO-new build)

W/m2K	National Regulation (new build)	Concerto Specification	Actual
Facade wall	0.22	0.18	0.19
Roof	0.15	0.12	0.13
Ground Floor	0.15	0.12	0.09
Window	2	2	1.12
Glazing	2	1.1	1.12
Shading			
Doors	-	-	1.12
Ventilation rate	4	3.7	4.2

ENERGY

[kWh/m ²]	National Regulation	CONCERTO specification	Actual 2012/13
Heat	125	75	43.4
space heating	54	29	
ventilation	40	27	
pipe loss	18	9	
DHW	13	10	11.2
Electricity	54	43	67.8
lighting	28	22	
cooling	0	0	
equipment	15	12	
other	11	9	
Total	179	118	111.2

ECO-City project partners