



Project information

Project type:	ECO-rehabilitation
Address:	Allegade 2, Helsingør Harbour
End construction year:	2010
Building type:	Old ship building yard refurbished into cultural institution
Storeys:	3-4
Persons in building:	-
Gross area BTA:	13,000 m ²
Total eligible costs:	€ 559,000
Total costs:	€ 2,925,000

Special ECO-technologies applied:

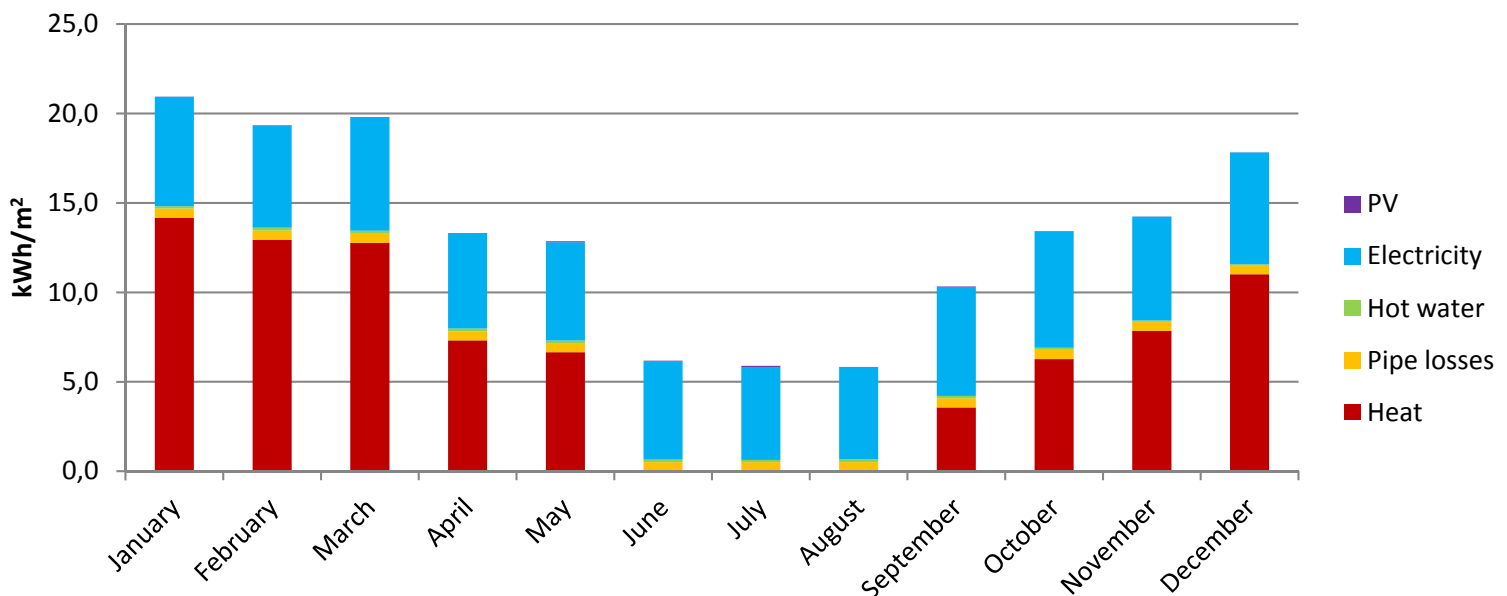
- Reuse of existing building
- Low energy lighting and LED lighting on shelves in library and daylight utilisation
- PV plant installed
- PIR sensors in 95% of all rooms
- Optimization of windows and glass façade
- Climatic buffer zone in arcade
- External solar shading
- Thermo active constructions
- Natural ventilation
- Reduction of standby consumption
- Installation of sub meters
- Low energy pumps with A-label
- Ground water cooling
- "Cradle-2-Cradle" floor in untreated Danish oakwood



Photo by Hasse Ferrold

Energy consumption

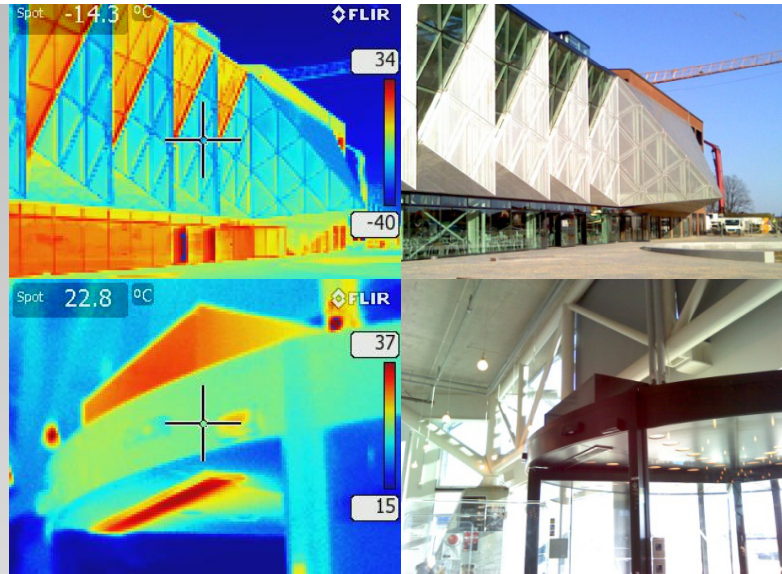
Energy consumption 2012



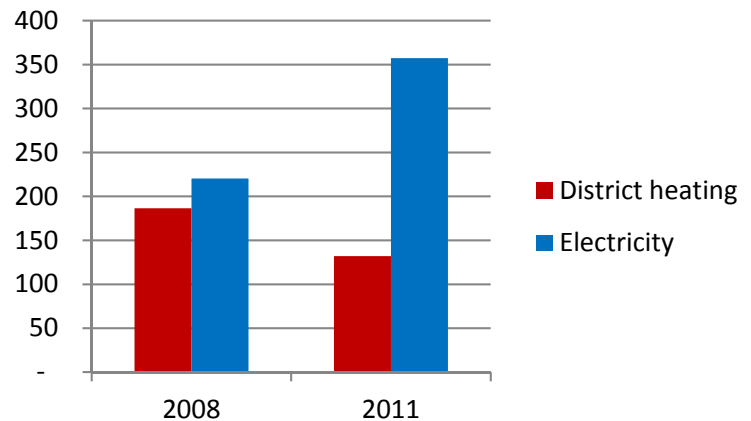
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Lessons learned:

- It is important also to calculate embodied energy in the overall balance of refurbishment of buildings
- The CO₂ emission is unknown during the years of rehabilitation (2009-2010). The emission is higher after the rehabilitation as the building is 4739 m² larger.



CO₂ emission



- Monitoring data includes all electricity (lighting, ventilation, cooling, it, kitchen and theatre)

Key figures

Heat trans.	Unit	Before	Concerto spec.	Actual
Outerwall	W/m ² K	0.6-1.0	0.4	0.19
Roof	W/m ² K	0.4	0.2	0.13
Floor	W/m ² K	0.6	-	0.15
Windows	W/m ² K	2.9-7.0	-	1,1
Glazing	W/m ² K	-	1.1	0.9
Doors	W/m ² K	>2.0	2.0	<1.5
Vent. rate	h ⁻¹	3-5	> 2	2

Energy consumption	Unit	Before rehab.	Concerto spec.	Actual 2011	Actual 2012
Heat	kWh/m ²	224	59	96	83
Pipe losses	kWh/m ²	-	18	6	6
Ventilation	kWh/m ²	-	28	Incl.	Incl.-
Hot water	kWh/m ²	-	25	1	2
Total heat	kWh/m²	224	130	99	90
Lighting	kWh/m ²	-	20	Incl.	Incl.
Other	kWh/m ²	-	45	Incl.	Incl.
Total elec.	kWh/m²	n.a.	65	61	69
PV	kWh/m ²	0	-10	-0.1	-0.4
Total	kWh/m²	> 224	195	164	159

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