

HEAT SUPPLY OF THE SHIPYARD THUN OF THE BLS AG

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INTRODUCTION

As operator of Lake Thun cruises BLS AG is planning to build a new shipyard. They also want to establish the building construction standard Minergie-P-Eco for future renovations and new buildings as well as the use of renewable energies.

Objectives were:

- Determine the heat demand of the new shipyard
- Prepare a proposal for heating
- Recommendations for future buildings and the «Energy Building Standard»



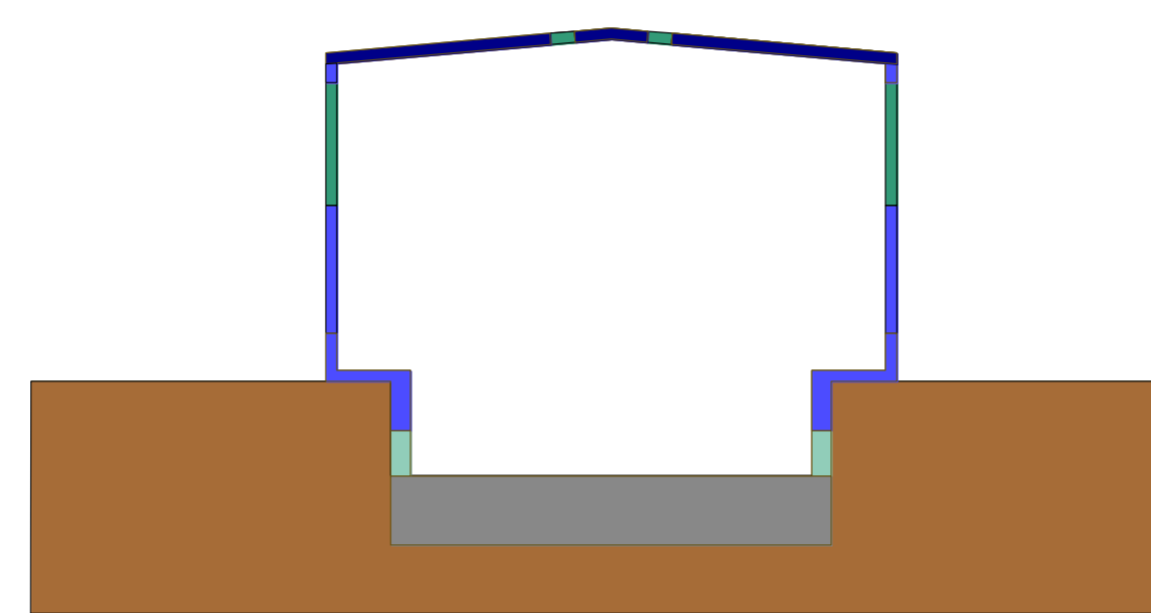
The existing shipyard in Thun, built in 1906 (Google Maps)



Model drawing of the new shipyard

THE HEAT DEMAND

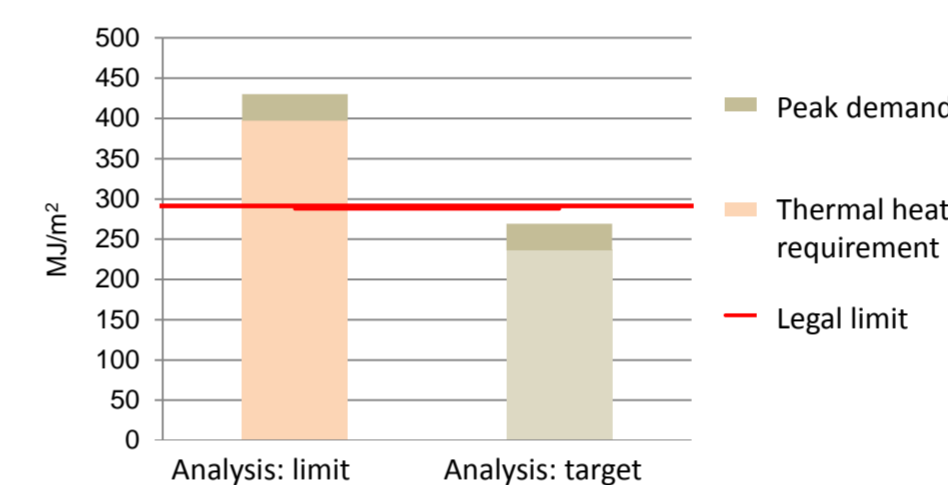
- The regulatory heat demand limit is calculated according to the specification of the Cantonal Energy Regulation (KE nV)
- The new building is simulated with the Thermo 6 program using various U-values :
 - «Analysis: limit value»
 - «Analysis: target value»



Cross-section of the new shipyard

Building element	Analysis: limit value [W/m ² *K]	Analysis: target value [W/m ² *K]
Roof	0.2	0.09
Walls over 2m in ground	0.2	0.11
Windows	1.3	0.9
Walls under 2m in ground	0.28	0.15
Floor	0.55	0.55

U-values of the two simulations



Heat demand according to simulation variation

- The regulatory heat demand limit is 288 MJ/m²
- With the U-values «Analysis: limit value» the cantonal limit is exceeded by 30%
- With the U-values «Analysis: target value» the limit is met
- Thus insulation values similar to those of the «Analysis: target values» should be installed

PROPOSED HEATING

- For the selection of the heating unit a cost-benefit analysis is carried out
- Ecological and economical criteria are used
- The different weighting of the criteria must be observed

Economic Analysis

Criteria	Weighting	Heating systems							
		HP groundwater	HP Outside air	HP Lake water	Woodchips	Pellet	Oil-fired furnace	Gas-fired furnace	
		Values	Values	Values	Values	Values	Values	Values	
Economical criteria	Space requirements	25%	10.0	9.9	10.0	1.0	5.0	8.5	9.9
	Investment costs	25%	8.2	7.5	8.2	1.0	4.9	10.0	8.1
	Annual costs	50%	10.0	8.3	9.4	3.0	3.8	1.0	3.7
	Total utility value		9.6	8.5	9.3	2.0	4.4	5.1	6.4
	Rank		1	3	2	7	6	5	4

Ecological Analysis

Criteria	Weighting	Heating systems							
		HP groundwater	HP Outside air	HP Lake water	Woodchips	Pellet	Oil-fired furnace	Gas-fired furnace	
		Values	Values	Values	Values	Values	Values	Values	
Ecological criteria	Primary energy demand	25%	10.0	4.7	7.8	2.6	1.6	1.0	4.7
	Global warming potential	25%	9.1	8.7	8.9	10.0	9.2	1.0	3.2
	eco-points (ecological scarcity method)	50%	6.4	1.2	4.3	9.9	10.0	1.0	8.6
	Total utility value		8.0	4.0	6.3	8.1	7.7	1.0	6.3
	Rank		1	4	3	1	2	5	3

Cost-benefit Analysis

Criteria	Weighting	Heating systems							
		HP groundwater	HP Outside air	HP Lake water	Woodchips	Pellet	Oil-fired furnace	Gas-fired furnace	
		Mark	Mark	Mark	Mark	Mark	Mark	Mark	
Ecological criteria	Primary energy demand	25%	10.0	4.7	7.8	2.6	1.6	1.0	4.7
	Global warming potential	25%	9.1	8.7	8.9	10.0	9.2	1.0	3.2
	eco-points (ecological scarcity method)	50%	6.4	1.2	4.3	9.9	10.0	1.0	8.6
Economical criteria	Space requirements	25%	10.0	9.9	10.0	1.0	5.0	8.5	9.9
	Investment costs	25%	8.2	7.5	8.2	1.0	4.9	10.0	8.1
	Annual costs	50%	10.0	8.3	9.4	3.0	3.8	1.0	3.7
	Total utility value	100%	8.8	6.2	7.8	5.1	6.0	3.1	6.3
	Rank		1	4	2	7	5	6	3

- The groundwater heat pump is the most economical choice
- The wood chip furnace is marginally more ecological than the groundwater heat pump
- Based on the cost-benefit analysis, the groundwater heat pump is recommended

RECOMMENDATIONS FOR NEW BUILDINGS & THE ENERGY BUILDING STANDARD

What is the Energy Building Standard?

- An internal guideline of the BLS on the energy consumption and the energy production of new buildings and renovations
- Minergie-P-Eco is required as a building standard
- The energy for heating should increasingly come from renewable energy sources

Request for the Minergie-P-Eco-Building standard:

- The shipyard is planned without Minergie standard, therefore it will not reach that standard.
- If the Minergie-P-Eco-Standard is required, buildings will have to be planned and built accordingly.
- The cantonal legislation continues to move in the direction of buildings with very low energy consumption, similar to Minergie-P-Standard.

Request for the use of renewable energies:

- The request for heating with renewable energies is feasible and based on the criteria selected above ecologically and economically sensible.

The Energy Building Standard is likely to anticipate future legislation and is therefore recommended.