Water use in engineering dormitory in Greenland - Apisseq

Sisimiut - Greenland

Kotol, Martin

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APISSEQ
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Author:
Martin Kotol

Preface

The report contains information about the annual water use in the engineering dormitory Apisseq. The report begins with brief description of the dormitory and then presents the water use, its fractions (cold water and DHW) and also the energy use related to DHW heating. Significant portion of the energy is covered by the solar plant.

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1 Introduction

In summer 2010 the new dormitory Apisseq was finished in Sisimiut, Greenland. The intention was to build an energy efficient building in which the modern technologies, not yet commonly used in the Arctic, could be installed and tested. The aim of the technologies has been to minimize the energy consumption and provide the occupants of the building with healthy and comfortable indoor environment.

The building was equipped with a complex monitoring system (Vladyková et al. 2010) which will document the performance of the whole building as well as of some individual systems over their lifetime.

The Domestic Hot Water (DHW) is first preheated by the hot water from accumulation tanks heated by solar collectors on the roof. The rest of the heat is delivered by district heating. The circulation losses are covered purely by district heating.

The entire water use in the building relates to its occupants and their activities such as cooking, drinking showering, toilet flushing or doing laundry.

For purpose of this report one year period from 1st November 2011 to 31st October 2012 was considered.

1.1 Key numbers

1414	m^2	Heated floor area
41	pers.	Occupancy (this number varies over the season)
38	pcs	Evacuated solar collectors
4	m^3	Accumulation tanks total capacity

2 Water use

The annual water use was 1581 m^3 out of which 816 m^3 (51.6 %) was used for DHW. It can be seen in Figure 1 that the lower occupancy during the summer months has a significant effect on water use. The average water use per occupant when June and July neglected was 115 l/(pers·day) out of which 61 l/(pers·day) was DHW at the average temperature 54.4 °C. The temperature of the cold water was in average 5.5 °C and the monthly averages can be found in the Figure 1.

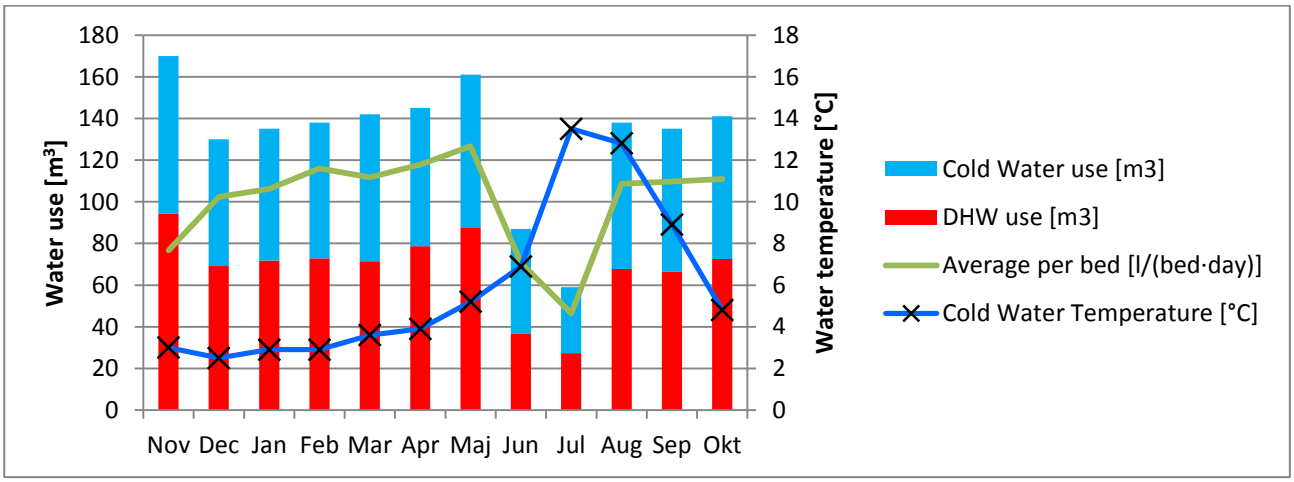

Figure 1 Water use and cold water temperature

3 Energy use

The amount of energy related to DHW heating was 51,145.4 kWh out of which 41% (20,896.0 kWh) was covered by solar heating. The rest (30,617.7 kWh) was covered by district heating. The electricity for the circulation pumps as well as for the frost protection of the outside pipeline was not measured during this period. This will further increase the total energy use related to DHW.

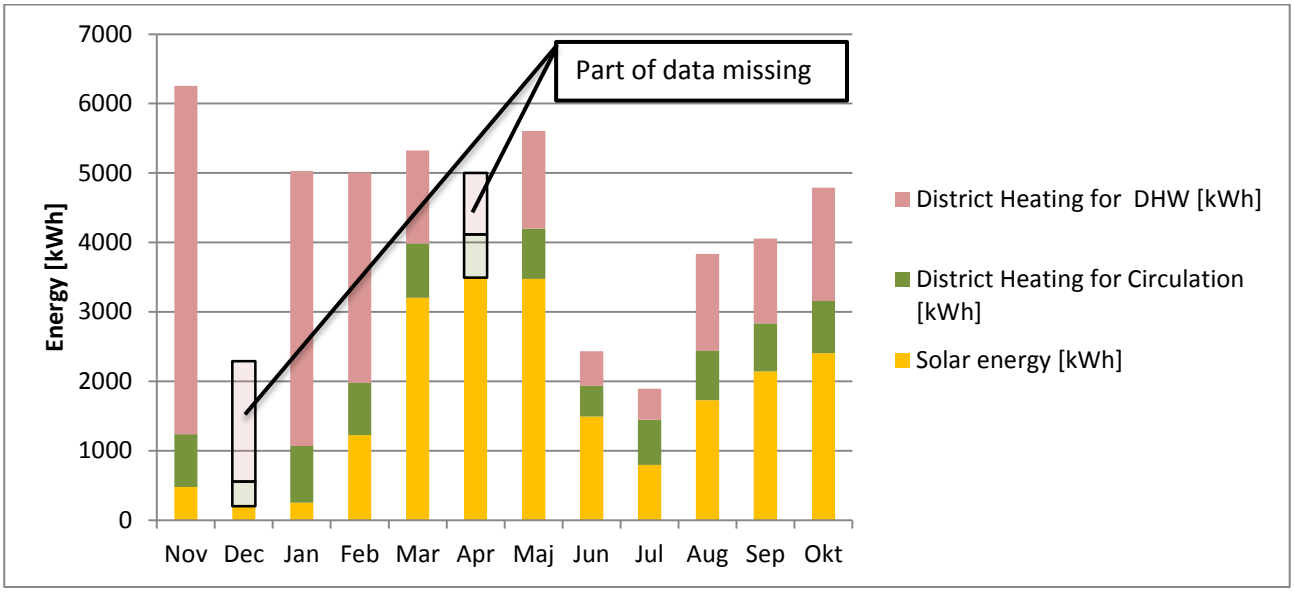

Figure 2 Energy use related to DHW

4 Conclusion

The amount of energy from district heating used for DHW was as high as **30,617.7** kWh which is 10.1 % of the annual heat demand of the entire building (303,600.0 kWh). Partial savings can be achieved by the following actions:

- Installing the low flow shower heads
- Adjusting the solar system for better performance
- Installing the waste water heat recovery
- Heating the circulation water by solar energy when available

References

Vladyková, P., Kotol, M., Vladyková, P. & Kotol, M. 2010, Monitoring system in new dormitory APISSEQ, Sisimiut, Greenland, DTU Byg.