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*Publication date:*  
2012

[Link back to DTU Orbit](#)

*Citation (APA):*

Qu, J., Villumsen, O., & Villumsen, A. (2012). *Sustainable Mobile Tourist Hut for Greenland*. Paper presented at The International Polar Year 2012 Conference, Montréal, Canada.

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## Sustainable Mobile Tourist Hut for Greenland

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**Abstract:** Greenland is experiencing growing tourism in recent years, which increases demand for tourists' accommodation. Small huts are a traditional way for overnight stays in Greenland due to scattered population and lack of infrastructure. However, the existing huts in Greenland cannot provide satisfactory service for tourists. Meanwhile, climate change is threatening the arctic environment and causing retreating of ice so tourist attractions might change in years. Therefore mobility and sustainability are two key factors of new tourist huts.

The aim of our work is to develop Lightweight and stand-alone mobile tourist huts with heating and renewable solar energy supply, and to explore sustainable waste management solution. The new huts can be disassembled into parts and transported to other locations with dog-sledges, trucks or boats and hence leave no 'footprints' to the vulnerable arctic environment. The hut units can be freely combined together to meet various demands from different groups (single person, family, hiking team, etc.). To ensure its lightweight the hut is made of fiberglass. Its sandwich wall system consists of Z-sections of fiberglass vertically embedded (every 400mm) between fiberglass layers. Polyurethane foam (50 mm thick for the wall and 75mm for the floor) is filled in as insulation material. Considering many places in Greenland are not covered by electricity grids the energy supply for the hut comes from photovoltaic panel. The produced electricity can be either supplied to the load or stored in the battery for later use. Besides PV panel, solar vacuum pipes are mounted to provide domestic hot water. Another big challenge for the hut is toilet waste treatment. In the existing tourist huts in Greenland there is no sewerage system and the users can only take away their solid waste in plastic bags. Thus composting toilets could be an option. Composting toilets are either with or without urine diversion. But for the Greenlandic tourist huts a composting toilet without urine diversion is a better solution because the urine pipes need maintenance since there is a possibility that they get clogged or frozen in the winter. Heat needed by the composting process in the winter is provided by the solar system.

So far a prototype of the lightweight tourist hut with a total area of 13.4 m<sup>2</sup> and a weight of 735.08 Kg has been built. This first product will be installed at the ice cap in Kangerlussuaq serving as a toilet for tourists and will be tested after installation in 2012. The hut will be fixed on the ground in order to be protected from the strong wind in Greenland. Due to the harsh climate, small population and lack of maintenance in Greenland the mobile tourist hut is a suitable solution for tourists' accommodation. After the prototype is installed, the thermal performance and other practical issues of the hut will be evaluated. The design of the mobile tourist hut could be optimized according to the evaluation.