

Monitoring and Modifications to Apisseq Dormitory, Sisimiut, Greenland

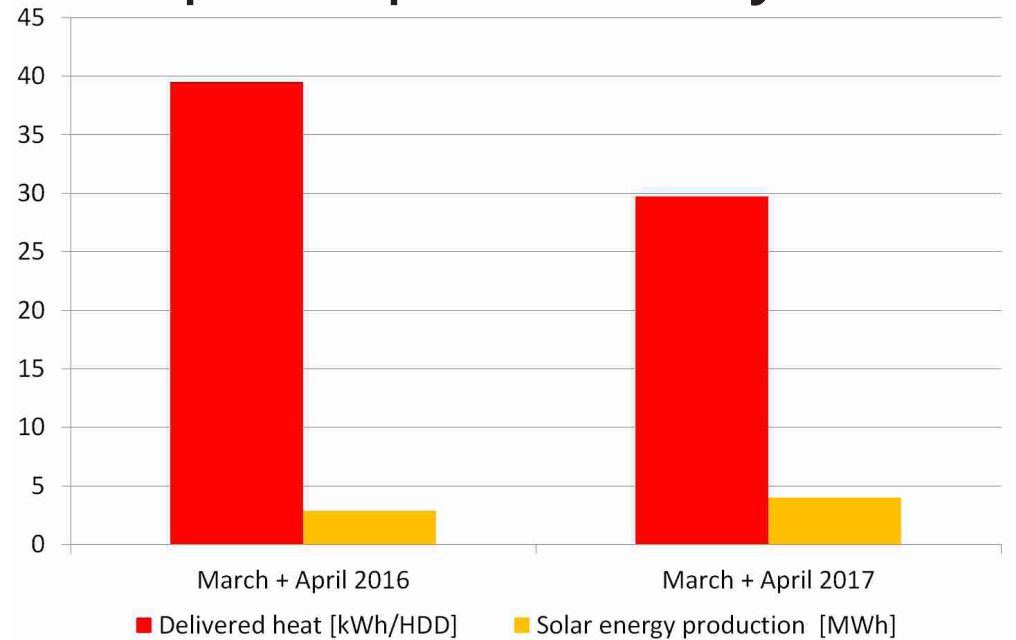
Relevant work package: T1.1, T1.3, T1.4, T2.5
of affected units: 37

Brief project description:

Apisseq Dormitory was built by local contractors in 2010. The dormitory is comprised of 3 floors and has 37 apartments, a common room, laundry, and glazed atrium. It was built to showcase state-of-the-art technologies in the area of energy efficiency and renewable energy heating potential in Greenland. However, due to the experimental nature of the design, unforeseen commissioning challenges, and a lack of maintenance experience with new technologies, the building has been unable to fulfil its potential as a model green building for the region as intended. The community of Sisimiut still holds a desire to bring the building up to its full potential as a model of energy efficiency and renewable energy systems for the entire region.



Apisseq Dormitory



Energy Use Comparison before and after eLighthouse Project Work

Activities involved:

- Interviews of selected number of stakeholders
- Assessment of the ventilation system
- Assessment and reconfiguration of the existing solar hot water system
- Assessment of the heating system
- Development of a comprehensive maintenance program
- Establishment of a program of building tours for education

Monitoring and evaluation

Actual measurement of energy use in the building, measurement, and monitoring of other relevant parameters such as indoor climate, i.e. temperature, relative humidity and carbon dioxide concentration of indoor air.

Duration of study: April 2016 - March 2018



Analysis and Recommendations for Retirement Home, Sisimiut, Greenland

Relevant work package: T1.1, T1.2, T1.4, T2.1, T2.2

of affected units: 42

Brief project description:

The retirement home in Sisimiut is a group of four structures, three built in 2000 and one built in 2013 with a total of 42 apartments for senior citizens in the community. The apartments are individually metered. Preliminary evaluation of energy use data shows a very large range of energy usage for identical apartments. Some residents pay up to 100% more than their neighbours for the same sized apartment with identical occupancy. The Municipality wishes to investigate both behavioural and physical factors that may influence this discrepancy, with the goal of decreasing the overall energy usage of the building and the financial strain on the residents without sacrificing occupant comfort.

Activities planned:

- Evaluation of energy use data collected for the building with an aim of identifying usage patterns and energy costs for occupants.
- Inspection of the building with an emphasis on the physical state and operational efficiency of the building and its systems
- Interviews of selected number of users of the building with a focus on those with the highest and lowest energy consumption with the emphasis on behavioural patterns that influence differences in energy consumption.
- Interviews of selected members of the Municipality to understand their experience with the building
- Establishment of a service program that both educates occupants on how to lower their energy bills in their home and trains maintenance staff and managers to optimize overall building performance.
- Establishment of a voluntary program where residents can make changes to their energy settings for short trial periods, with direct feedback from monitoring staff on how their trial period affected their energy use and bill.



Retirement Home

Monitoring and evaluation:

Actual measurement of energy use in the building, measurement, and monitoring of other relevant parameters such as indoor climate, i.e. temperature, relative humidity and carbon dioxide concentration of indoor air. A financial analysis will also be included in the project.

Duration of study

May 2017 - March 2018

Energy Efficient Envelope and Climatic Systems Guide for Small Residential Construction, Sisimiut, Greenland

Relevant work packages: T2.3, T2.4

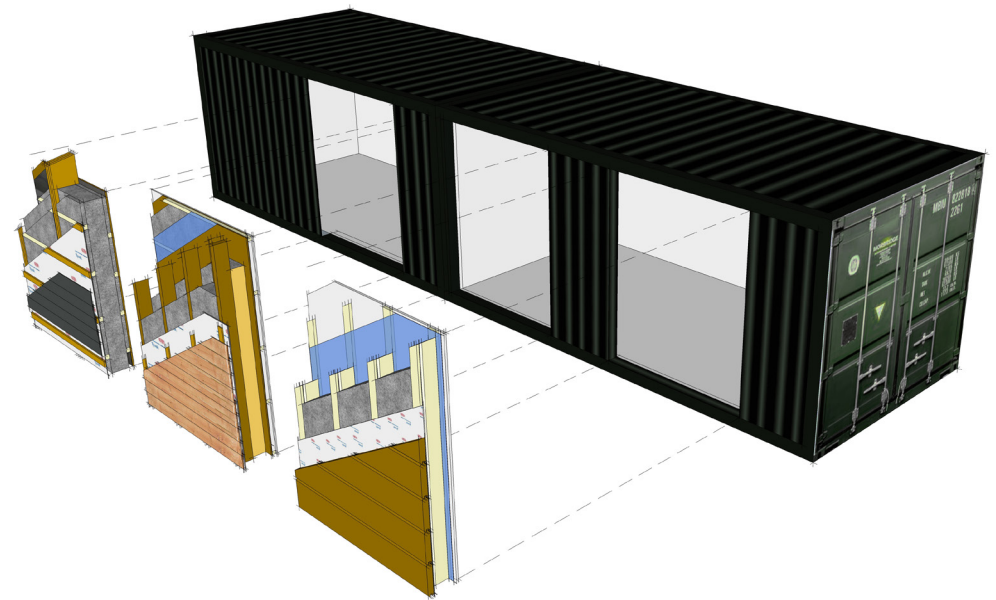
of professional organizations consulted: 8

Brief project description:

The purpose of the project is to establish a better and more energy-efficient Arctic building practice in Greenland through experimentation with promising techniques in a controlled experimental setting. Even new buildings typically provide their occupants with poor indoor environment and yet use large amounts of energy for heating in comparison to other northern European regions. Additionally, construction is often damaged by moisture in form of rot and mold growth. Local professionals and trade schools will collaborate on the design, construction, and monitoring of a set of walls systems and climatic systems to judge their applicability to the Arctic environment. This project will partner with an existing ARTEK and local Trade School programs that teach young engineers and carpenters techniques for constructing energy efficient buildings in the region.

Activities involved:

- Provide guidelines for local builders, designers, and government bodies regarding highly-insulated envelope construction options in new residential construction
- Create a guide local entities can use to weigh construction cost, energy usage, embodied energy, shipping cost, material cost, labor costs, and maintenance concerns when selecting building envelope typologies for new construction in different regions of Greenland
- Work with local trade schools to document full-scale mockup constructions of energy-efficient wall types
- Provide consultation and data-sharing programs for builders, designers, and government bodies



Test Module to be constructed in Sisimiut

Monitoring and evaluation:

A test module will be constructed and evaluated with the goal of directly comparing different energy-efficient envelope and climatic systems. The envelope systems selected for testing will correspond directly to input from experienced professionals in architecture, engineering, and construction management in Greenland. The test module will be monitored for actual versus theoretical U-Value, permeability, cost, and labor time.

Duration of study

January 2017 - March 2018

Analysis and Recommendations for Municipal Buildings, Sisimiut, Greenland

Relevant work packages: T2.3, T2.4

Total Area: Approximately 1500 m²

Brief project description:

The Technical and Environmental Department Building and the Naja Aleqa Day Care are maintained by the Municipal Government. Both buildings have recently received new boiler systems. Although there has been some anecdotal savings observed since the implementation of the new boilers, it is not clear if the systems' savings potential has been realized. The Municipality will monitor the operation of the heating system, review strategies for optimization, and conduct a test period of modified settings with the goal of optimizing energy usage in the new system.

Activities planned:

- Assessment of Boiler replacement with consultation on maintenance and operations optimization
- Establishment of Baseline energy consumption of the building and goals for energy use reduction
- Focus on methods of reducing energy usage with limited funding for physical hardware: i.e., monitoring, regulating, and controlling heating system
- Energy comparison of the building baseline usage and a one-week test period of focused strategies for energy use reduction
- Interviews of selected number of users of the building to understand their views on the building
- Interviews of Maintenance Staff to understand their experience with the building

Monitoring and evaluation

Heating oil consumption on a daily and hourly basis will be monitored and compared to occupancy schedules for the building. Baseline monitoring data will be compared to data gathered during a trial period of system adjustments.

Duration of study:

January 2017 - January 2018



Municipal Technical and Environmental Department, Qeqqata Komunia



Naja Aleqa Day Care, Qeqqata Komunia