



## Thermal Energy systems resilience in cold/arctic climates





# Trine Bramsen

## NEW MINISTER



### FOCUS AREAS:

- Cyber
- Arctic
- Veterans and personel
- Green solutions
- Neighbourliness



## Arctic missions and responsibilities

- The Arctic mission of the MoD includes exercise of sovereignty, search and rescue operations, marine environmental protection, and support to the civilian authorities. To a varying degree, the tasks related to search and rescue, marine environment and support to the civilian society have been assumed by Greenland and the Faroe Islands, respectively, whereas defence and security policy issues remain the exclusive responsibility of the Kingdom of Denmark and cannot be assumed by Greenland or the Faroe Islands. Consequently, the Danish Armed Forces are responsible for the exercise of sovereignty for the entire Kingdom of Denmark.



## Arctic Command

- The Arctic Command is a territorial command with an area of responsibility that extends from the waters around the Faroe Islands in the east, the Greenland Sea and the Arctic Sea in the north, across the Strait of Denmark and the Irminger Sea to the Strait of Davis and the Baffin Bay between Canada and Greenland.
  - The main tasks of the Arctic Command are the following:
    - The military defense of Greenland and the Faroe Islands
    - Surveillance and sovereignty claims
    - Fisheries Inspection
    - Search and rescue service
    - Environmental monitoring
    - Pollution control
    - Surveying
    - Various support tasks for civil society

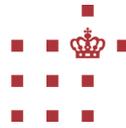


## Facts

- The sovereignty of the Danish Realm in the Arctic and the North Atlantic is enforced and monitored by Arctic Command.

The Danish Defence has about 200 persons stationed in Greenland including 5 persons on the Faroe Islands. In addition to this are the sailors on board the inspection vessels and ships that patrol the North Atlantic and Arctic waters 365 days a year.

- The Arctic Command has five stations in Greenland:
  - Station Grønnedal
  - Station Kangerlussauq
  - Station North
  - Daneborg Station (home of the SIRIUS Sled Patrol)
  - Station Mestersvig



# Establishments on Greenland



J. FE godkendt af © GSTSDFE



## Station North:



An annual consumption of 600,000 liters of aviation fuel has been reported, which is used to generate electricity for heating buildings, operating vehicles, machines and refueling aircraft.

How much of the 600,000 liters of aviation fuel used for the operation of vehicles, machines and refueling of aircraft is unknown.

The total number of buildings is 51 units.

Of the total building mass of 3,816.9 m<sup>2</sup>, 785 m<sup>2</sup> buildings are no longer used, corresponding to approx. 21% of the total building stock.



## Station North:





## Station North:





## Station North:





## Meter structure.

It is recommended that a meter structure be established in the near future for one or more establishment elements on selected buildings in the Arctic

Electricity for heating, heating of hot water, light indoors and outdoors is recorded separately at the building level on an hourly basis.

A log of the outdoor temperature will also be useful data. Metering data may help to indicate how much heat loss the individual buildings have.

A kilowatt heat meter at the flue gas exchanger at Station Nord could also be of interest, enabling the overall system efficiency of the generator operation to be calculated.



## Economy.

In order to be able to continue to work on the individual possibilities for energy optimization and the economics associated with it, the following must be clarified.

How much does it cost to transport goods by plane to Station Nord per tons or kg?

What exactly does fuel cost exactly delivered at Station Nord?

A systematic record of how much of the 600,000 liters of aviation fuel used for the operation of vehicles, machinery and refueling of aircraft should be implemented as soon as possible.



## Opportunities for energy optimization

Systematic replacement of building stock over a period of time.

Conversion from heating with electricity to water-based systems.

Oil fire/burner installation.

Installation of battery (s) in connection with generators.

Installation of photovoltaic systems

Wind turbine installation.

Hydrolysis and fuel cell plant installation.



Questions ?

