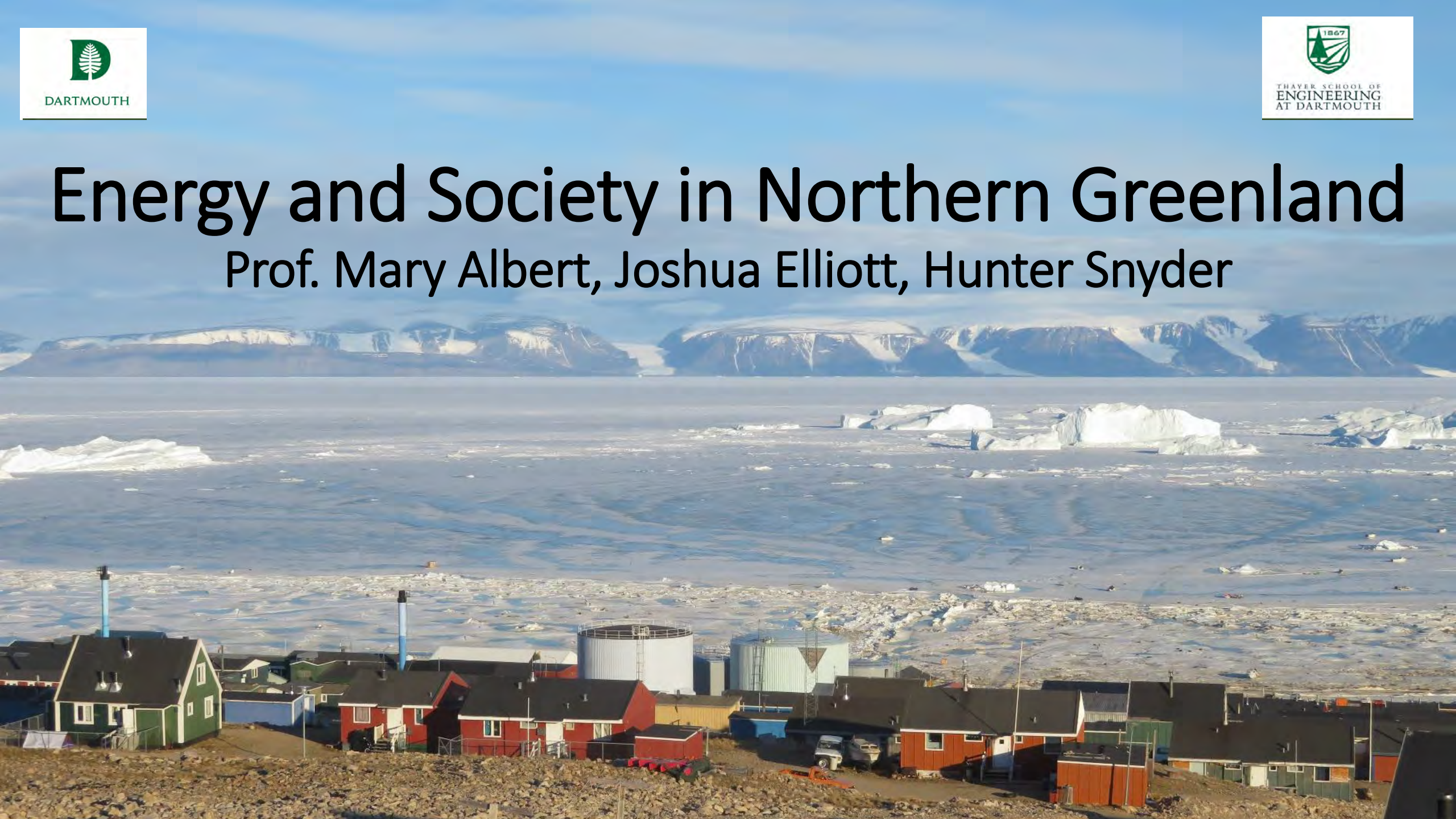
Energy and Society in Northern Greenland

Prof. Mary Albert, Joshua Elliott, Hunter Snyder



The beginning

Ilulissat Climate Days 2015

International workshops on

Changes of the Greenland Cryosphere

and

Stability and Variations of Arctic Land Ice

Ilulissat, Greenland

June 2-4 and 4-5, 2015

Organized by

Technical University of Denmark (DTU)
Geological Survey of Denmark and Greenland (GEUS)
Danish Meteorological Institute (DMI)
Niels Bohr Institute, Copenhagen University
Greenland Climate Research Centre
Greenland Survey – ASIAQ

in cooperation with

Nordforsk - SVALI (Stability and Variations of Arctic Land Ice)
European Space Agency Climate Initiative (ESA)

DTU Space National Space Institute · GEUS · dmi · ASIAQ · SVALI · esa

compiled by:
W.K. Dallmann, Norwegian Polar Institute
P. Schweitzer, University of Alaska Fairbanks

Arctic peoples subdivided according to language families

Indo-European family
- Germanic branch

Uralic family
- Finno-Ugric branch
- Samoyedic branch

Altaic family
- Turkic branch
- Tungusic branch

Chukotko-Kamchatkan fam.

Isolated languages
(Ketic and Yukagir)

Eskimo-Aleut family
- Inuit group (of Eskimo br.)
- Yupik group (of Eskimo br.)
- Aleut branch

Na-Dene family
- Athabaskan branch
- Eyak branch
- Tlingit branch


Bergans

2016-27-09

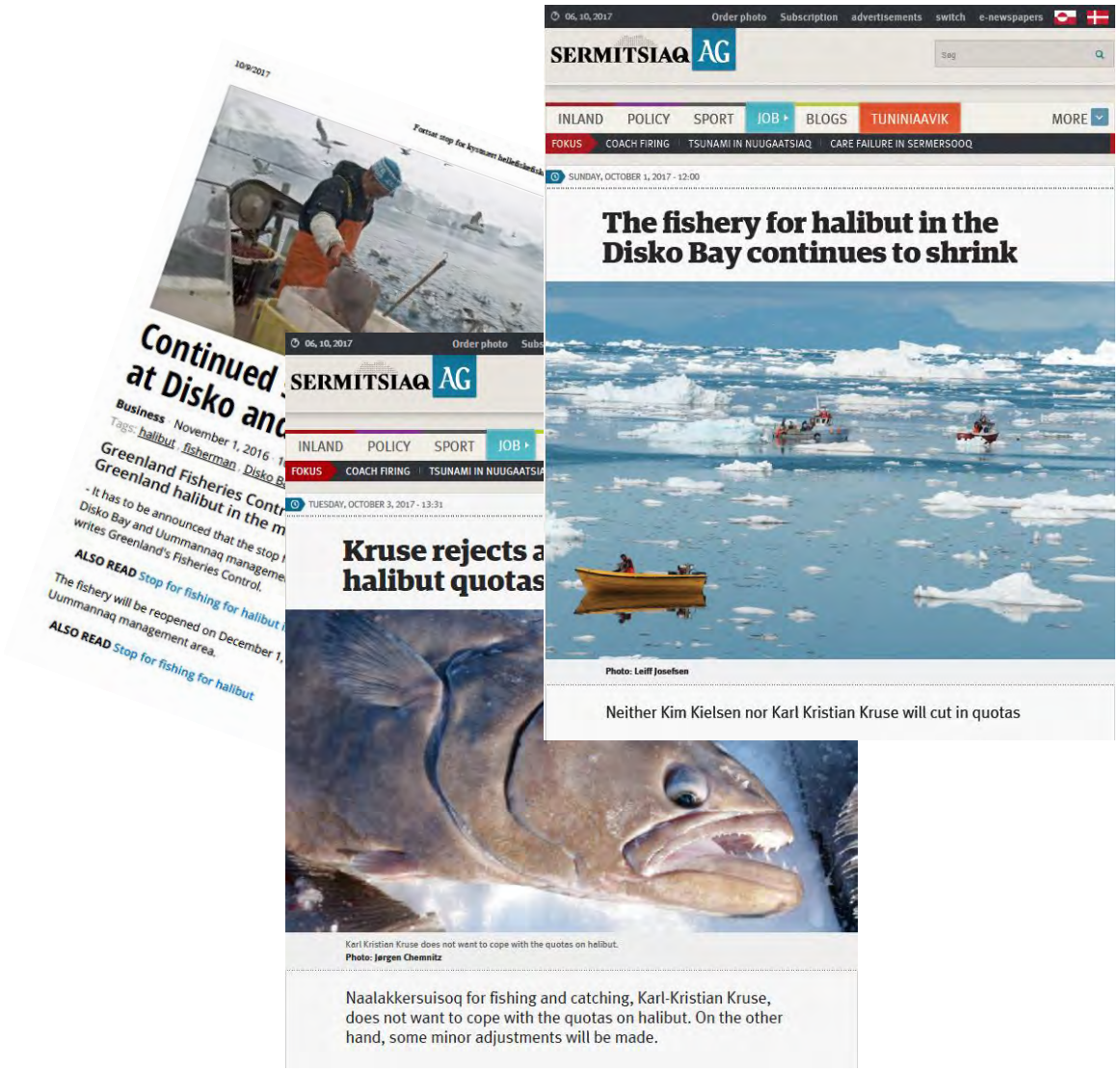
Hunter T. Snyder

Qaanaaq
(Greenlandic pronunciation: [qaːnɑːq̆])

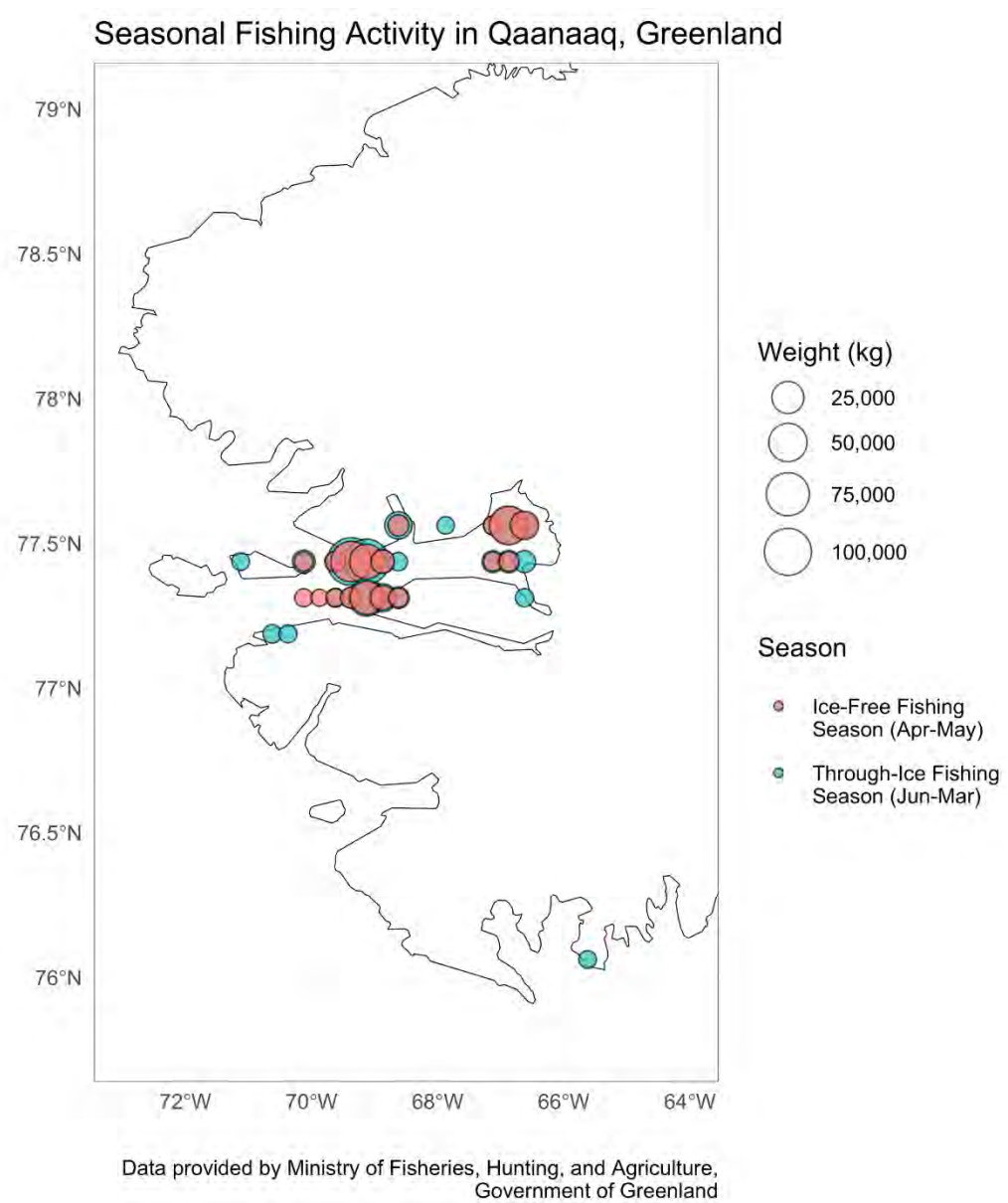
Energy
central to Qaanaaq’s many challenges

Fishing & Hunting

Nascent,
rapidly changing,
and fossil-fuel based



Greenland:
An Export Economy Based on Fishing


Seasonal Fishing Activity in Qaanaaq, Greenland
79°N
78.5°N
78°N
77.5°N
77°N
76.5°N
76°N
72°W
70°W
68°W
66°W
64°W
Weight (kg)
25,000
50,000
75,000
100,000
Season
Ice-Free Fishing Season (Apr-May)
Through-Ice Fishing Season (Jun-Mar)
Data provided by Ministry of Fisheries, Hunting, and Agriculture, Government of Greenland

Fresh Water

Little water in summer,
none in winter,
and fossil-fuel based


NUKISSIORFIIT









NUKISSIORFIIT

IIES grant: June 2019 trip to Qaanaaq

Goal: learn about the citizens' energy needs and their hopes for their future

Joshua Elliott, Lene Kielsen-Holm, Kim Peterson, Toku Oshima, Mary Albert, Hunter Snyder

Houses in Qaanaaq

Most were built from kits produced in Denmark. The designs are not practical for life in the harsh climate of northern Greenland.

Houses in Qaanaaq

Many of the homes are old, have inadequate insulation, are in poor shape, and should be replaced

Housing and Energy

Qaanaaq's housing troubles are not unique among villages in Greenland, but is exacerbated by the more extreme climate, 1.5 times the heating load as Nuuk, twice the heating load as Hanover, NH

Housing and Energy

The constant thaw and refreeze of the permafrost under buildings exacerbates the lack of maintenance

Housing and Energy

People’s homes are not only ill suited to the climate, but also to their lifestyles

Housing and Energy

Solving Qaanaaq's housing problems don't generally need high-tech solutions, the main challenge is being affordable and appropriate

Resilient attitudes

Needs involve short-term and long-term projects

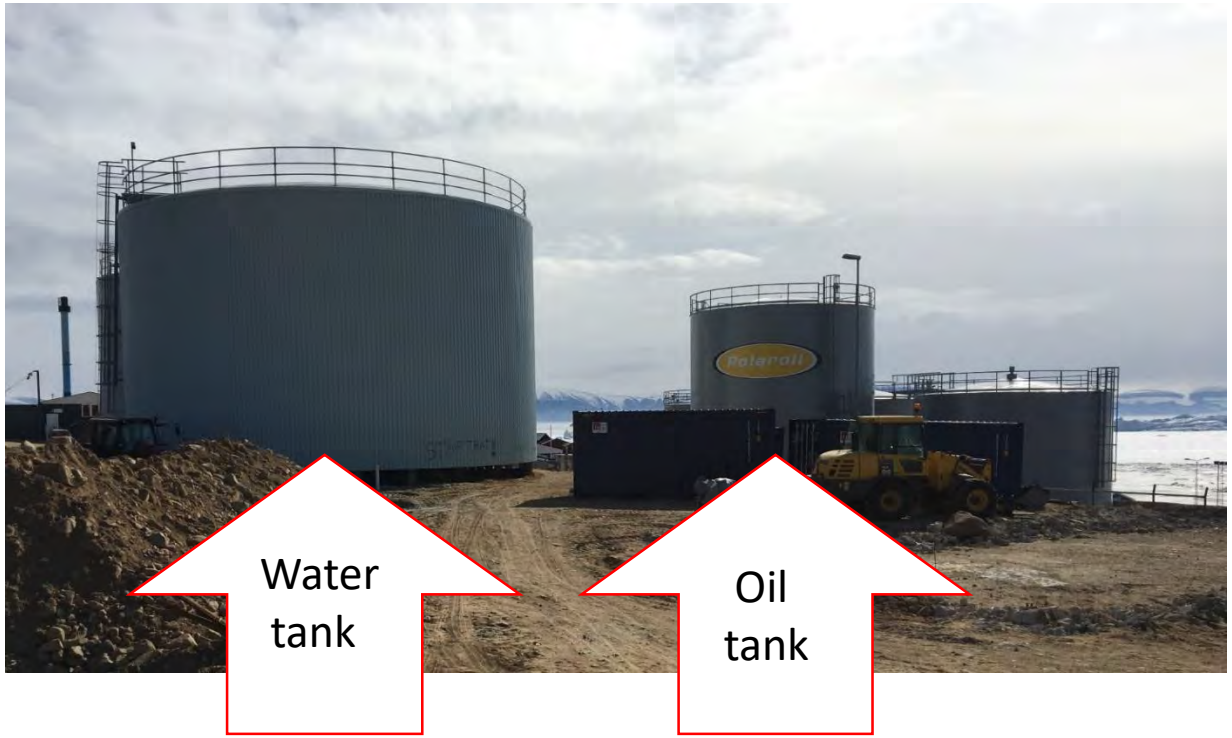
Energy

All power and heat comes from diesel.

Abundant sun in the summer, heat pumps, and some wind may reduce dependence on diesel.

Water

How long will their glacial-fed stream last?



Solar powered meat caves

Cold weather batteries

Sanitation

Grey water from sinks drains outside onto the yard.

Black water is collected in plastic bags that are transported to the town dump.

Policy

Big picture research challenge

Solve system of engineering-environment-policy problems to empower the people for their sustainable future.

Next steps:

Energy, Environment, and Empowerment in Northern Greenland

New NSF-funded project, 4 years starting April 2020

Dartmouth faculty: M. Albert, C. Polashenski, W. Li, S. Doig

Dartmouth post-doc: H. Snyder

3 Dartmouth grad students

2 Dartmouth undergrads

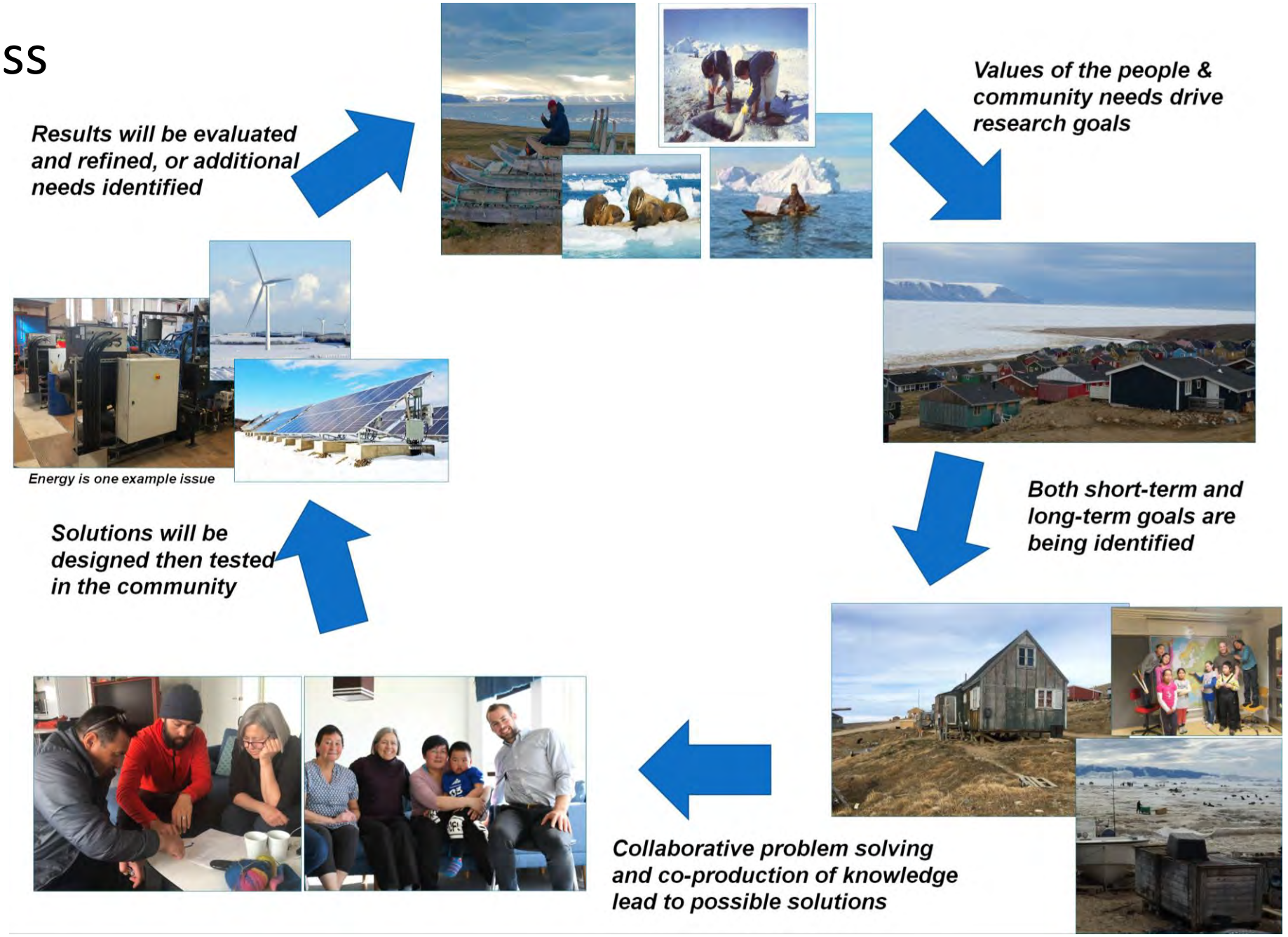
Practitioner: T. McBride (Norwich Tech solar)

Translators & local experts (from Greenland)

Stakeholder-driven engineering & science:
Values and needs of the people drive research goals

Collaborative problem-solving and co-production of knowledge may lead to solutions that will be planned, tested, and improved.

An iterative process



This IIES project provided helpful travel funding

- We found ways we can help in the near-term, and ways that will take longer-term work, both in infrastructure and in policy.
- The people were very welcoming; we made many friends and we look forward to long-term relationships.
- New four-year NSF project funding for research in Qaanaaq will start in April.

Thank you for your attention!
Questions?