ARCTIC CONTAMINANTS ACTION PROGRAM

THE TUNDRA PROJECT

ARCTIC COUNCIL

acap.arctic-council.org

@ACAP_Arctic

The Tundra Project

Energy security is an ongoing issue for remote, off-grid communities in the Arctic, and maintaining systems that provide reliable and uninterrupted sources of energy can be difficult and expensive. Communities often rely on diesel generators to produce electricity, and – while these generators fill an important need – they are increasingly old, inefficient, and polluting, and they depend upon costly transport of fuel through harsh conditions. This project aimed to test alternative clean and reliable energy solutions in a remote Arctic community.

The project was co-led by the United States and the Nordic Environment Finance Corporation (NEFCO) and implemented at the Tundra Agriculture Production Cooperative (Tundra), a Sami site in a remote part of the Murmansk region.

Moving from diesel to efficient wind-diesel power

The Tundra Project site is located 70 km from Lovozero village (population 3,150 people, the Sami capital of Russia) situated in the central part of the Murmansk Tundra Region, 90 km from Olenegorsk city. Electricity on-site was produced by a ChA-4 10.4 kW diesel generator and was primarily used for lighting during counting and culling of reindeers. Culling is mostly done during the winter, polar night season, from December to March, and takes approximately 12 hours a day. The counting is done in autumn, September to November, 10 hours a day. Hence, all the work requires bright outdoor lighting. The pre-project diesel generator was very old and non-functional for critical periods during most weeks. The main environmental pollutants from the generator were CO2, NO2, NO, SO2, formaldehyde, black carbon, benzo-a-pyrene (PAH), and oil aerosol. Diesel fuel is stored near the bunkhouses in 30-40 barrels, each with a capacity of 200 liters.

The alternative option chosen to replace the outdated system was a mobile power generation unit housed in a container with equipment for independent electricity supply to the reindeer herding farm. The replacement equipment included (1) Wind power installation of 5 kW with a 12-meter mast; (2) a diesel generator 10.8 kW units; (3) an accumulator invertor system; and (4) a container module with a mounting structure for installation of a windmill power unit. The project further

included implementation of a complex set of energy efficiency measures to reduce electricity and diesel consumption at the reindeer farm.

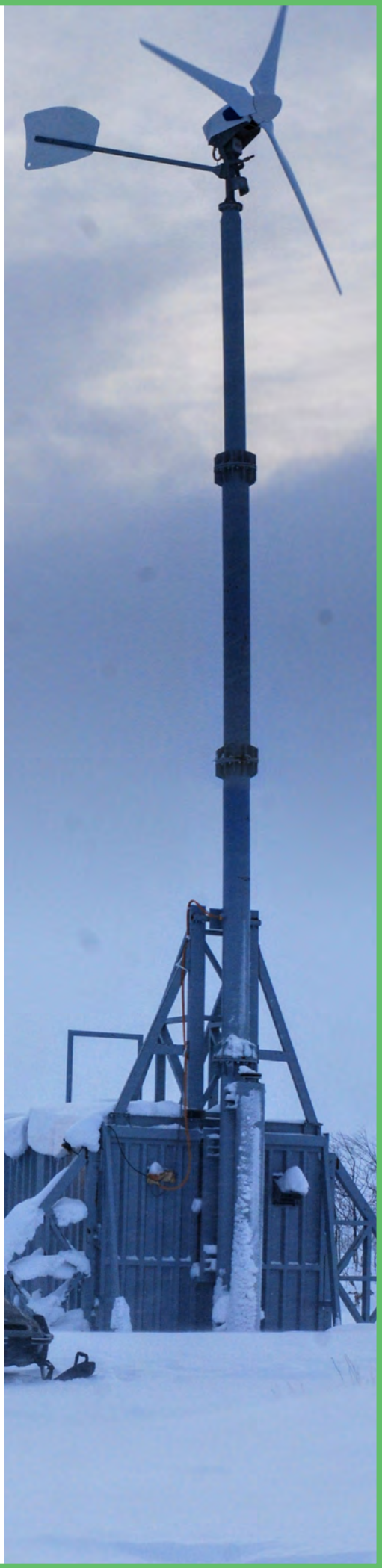
The integrated system has dramatically improved living and working conditions at Polmos, providing an uninterrupted and reliable supply of energy to meet the demands.

Recommendations and next steps

The results of this project suggest tremendous potential to successfully scale up energy infrastructure investments in the Arctic that are cost-effective, reliable, and better for the environment. The Tundra community was so pleased with the integrated wind-diesel system that they are in the process of implementing a self-funded photovoltaic system at a second herding post on the Kola Peninsula.

The project implementers have identified recommendations and next steps for this project and for other communities interested in implementing off-grid renewables.

- Baseline consumption models should always consider projected usage that is based on reliable, uninterrupted supply in determining an accurate projection of demand.
- Battery systems must be appropriate to operating in Arctic conditions. Systems that require ambient temperatures may lead to significant energy used to maintain battery integrity.
- Beneficiaries need consistent routines and methods in recording fuel consumption and energy demand information to improve system optimization and benefits reporting.
- Beneficiary communities should continually seek opportunities to optimize system performance, closely monitoring key factors such as fuel consumption and demand cycles.
- Additional benefits can be achieved through simple retrofits, like replacing inefficient lighting with LED.
- For wind energy projects, a telescopic or masts higher than 18 meters are recommended to maximize potential wind load.
- Produce annual monitoring reports to highlight key reductions and benefits and to promote greater uptake across the Arctic.



Contact

ACAP secretariat
acap@arctic-council.org