

Renewable Energy Microgrid Integration for Remote, Off-grid Cabins in Nunavut

D **A** **N** **C**: Chercheuse principale : Heather Shilton Affiliation : Corporation Nunavut NukkiksautiitLa Corporation Nunavut Nukkiksautiit entreprend un projet de recherche avec les domaines de travail proposés suivants : Faisabilité hydrocinétique : Cette activité vise à étudier la faisabilité de l'énergie hydrocinétique pour soutenir les demandes énergétiques des structures hors réseau ou des petites communautés dans l'Inuit Nunangat. L'équipe effectuera une étude de bureau pour évaluer les ressources micro-hydrocinétiques disponibles dans la région. Ensuite, elle mènera une campagne de collecte de données, qui comprendra deux visites à Resolute Bay et à Iqaluit. Lors de la première visite, 2 à 3 chercheurs effectueront une reconnaissance initiale pour trouver des sites appropriés pour la collecte de données et rencontrer des membres de la communauté intéressés. La deuxième visite sera l'enquête sur le terrain, et 2 à 3 chercheurs recueilleront la bathymétrie, les niveaux d'eau et les vitesses d'écoulement à trois débits de rivière de la rivière Sylvia Grinnell, de la rivière Apex et de la rivière Resolute. Les sites finaux de collecte de données seront sélectionnés. Toutes les visites seront effectuées par des vols réguliers commercialement disponibles, et les chercheurs séjourneront dans des hôtels locaux. Aucun vol privé ni camp ne sera mis en place dans le cadre de cette activité. Faisabilité solaire avancée : Cette activité implique une analyse de bureau de la ressource solaire disponible dans la région. De plus, 1 à 2 chercheurs se rendront à Iqaluit et installeront des panneaux solaires sur une cabine préexistante située au site de communication de données pan-arctique à Iqaluit. Les panneaux solaires seront installés pendant une période d'un an pour effectuer des évaluations de performance. Tout l'équipement sera expédié à Iqaluit via le transport maritime et sera expédié à Montréal à la fin de la période d'évaluation. Les chercheurs voyageront par des vols réguliers et séjourneront dans des hôtels locaux. Aucun vol privé ni camp ne sera mis en place dans le cadre de cette activité. Optimisation du stockage d'énergie et évaluation des performances : Cette activité implique l'installation d'une batterie d'eau salée de 1 kW au centre

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Total Person days: 20

Operations Phase: from 2022-05-09 to 2025-03-25

$\Lambda \subset \mathbb{N} \triangleleft \mathbb{N} \hookrightarrow \Sigma \triangleleft {}^{\mathfrak{b}}\mathbb{N} \supset \mathbb{C}$

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Panarctic Communications Datacenter - Privately Owned Building	Equipment installation	Private	No known site history	There is no known archeological/paleontological value	Panarctic Communications Datacenter is located 3.5 KMs from Iqaluit and 1.7 KMs from Apex.
Sylvia Grinnell River	Marine Based Activities	Crown	No known site history - specific locations are not yet identified but known historical sites will be avoided for data collection activities.	There is no known archeological/paleontological value - specific sites are not yet identified but known areas of value will be avoided.	Specific locations are not yet identified but all protected areas will be avoided and all data will be collected using non-invasive equipment & techniques.
Niaqunguk (Apex) River	Marine Based Activities	Crown	No known site history - specific locations are not yet identified but known historical sites will be avoided for data collection activities.	There is no known archeological/paleontological value - specific sites are not yet identified but known areas of value will be avoided.	Specific locations are not yet identified but all protected areas will be avoided and all data will be collected using non-invasive equipment & techniques.
Resolute River	Marine Based Activities	Crown	No known site history - specific locations are not yet identified but known historical sites will be avoided for data collection activities.	There is no known archeological/paleontological value - specific sites are not yet identified but known areas of value will be avoided.	Specific locations are not yet identified but all protected areas will be avoided and all data will be collected using non-invasive equipment & techniques.

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Δ ^a ᐅΔ ^c	Jordan Okalik-Musgrove	Nunavut Nukkiksautiit Corporation	2022-05-09
b ^a r ^a c ^a σ ^a	Jackson Lindell	Hamlet	2023-02-09

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Survey Boat (Locally Rented)	1	N/A	To carry out data collection in rivers
Acoustic Doppler Current Profiler (ADCP)	1	0.3 m x 0.2 m x 0.2 m	To measure water velocity and depth of rivers
Real time kinematic global positioning system (RTK-GPS)	1	1 m x 0.5 m x 0.5 m	To access location services
Vehicle (To be rented locally)	1	N/A	To get to project locations
Solar PV Panels	20	1.6 m x 1 m x 0.1 m	For Solar PV Installations
1 kW Battery Stack and Auxiliary Equipment	1	1.5m x 1m x 1m	To study battery storage performance
Water Tanks	4	1.6m x 1m x 0.8m	To store salt water electrolyte used in the battery
Forklift (to be rented locally)	1	N/A	To install battery and electrolyte tanks

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Gasoline	fuel	1	100	100	Liters	For use in the survey boat and rental vehicle
H2SO4	hazardous	1	3	3	Liters	For use in the battery electrolyte
NaOH	hazardous	1	4	4	Kg	For use in battery electrolyte
Na2SO4	hazardous	1	150	150	Kg	For use in battery electrolyte
Non-volatile, biodegradable alcohol based solvent	hazardous	1	300	300	Liters	For use in battery electrolyte

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$\Delta^C \rightarrow C \dot{I}^{\text{fb}} \rightarrow \Delta \text{fb} C \Delta \sigma \Delta^{\text{fb}} \text{fb}$	$\text{fb} \rightarrow \text{fb} \Delta \Gamma^{\text{fb}} C^{\text{fb}} C^{\text{fb}} \sigma \Delta^{\text{fb}} <^C$	$a P^C \Delta \Gamma^{\text{fb}} C^{\text{fb}} C^{\text{fb}} \sigma \Delta^{\text{fb}} <^C$
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Equipment installation	ᐃᑲᑕᑭᑦ ᐃᑲᑕᑭᑦ	303 Litres of Liquid and 154 Kg solid	All the hazardous materials including H2SO4, NaOH, Na2SO4 and Non- volatile, biodegradable alcohol-based solvent form the electrolyte that is to be used in the battery storage system. At the end of the battery operation cycle i.e., 1 year, the battery electrolyte solutions will be shipped back in the battery tanks and will be re-used, or disposed of locally in Ontario.	As all hazardous material is to be shipped back to be re-used or disposed of locally in Ontario, there are no additional treatment procedures required.
Equipment installation	ᐃᑲᑕᑭᑦ ᐃᑲᑕᑭᑦ ᐃᑲᑕᑭᑦ	Details given below	•Packing material•Wire scraps < 10 m. •Sheet metal ducting scraps < 1m. •Building envelope hole saw scrap, approximately 6” diameter (gypsum board, insulation, plywood, metal roofing).Non- combustible waste will be disposed of using the communities current waste disposal methods.	No additional treatment procedures are anticipated at this time.
Equipment installation	Other, End of lifecycle Project Materials	N/A	All the equipment that is being brought into the community including the survey equipment, solar PV panels and battery equipment, and any other auxiliary equipment listed in the material use section, will be	No additional treatment procedures are anticipated at this time.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

There are no envisioned environmental impacts from this project. The equipment installed for the research project is non-intrusive, temporary equipment and will be shipped back after the end of the project.

Impacts

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Physical																
Designated environmental areas																
Ground stability																
Permafrost																
Hydrology / Limnology																
Water quality																
Climate conditions																
Eskers and other unique or fragile landscapes																
Surface and bedrock geology																
Sediment and soil quality																
Tidal processes and bathymetry																
Air quality																
Noise levels																
Biological																
Vegetation																
Wildlife, including habitat and migration patterns																
Birds, including habitat and migration patterns																
Aquatic species, incl. habitat and migration/spawning																
Wildlife protected areas																
Socio - Economic																
Archaeological and cultural historic sites																
Employment																
Community wellness																
Community infrastructure																
Human health																

$$(P = \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B, N = \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B, M = \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B, U = \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B \times_{\mathbb{A}^1_B} \mathbb{A}^1_B)$$

1 point	Panarctic Communications Datacenter - Privately Owned Building
2 point	Sylvia Grinnell River
3 point	Niaqunguk (Apex) River
4 point	Resolute River

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|---------|----------------------------------------------------------------|
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