

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

**DĀĀŊC:** Chercheuse principale: Heather ShiltonAffiliation: Nunavut Nukkiqsautiit CorporationPour répondre aux besoins accrus en infrastructure et en énergie tout au long du 20e siècle, des génératrices diesels ont été installées dans toutes les collectivités de l'Inuit Nunangat. Cela continue aujourd'hui, où des centrales électriques nouvelles sont installées et mises à niveau avec des générateurs de carburant diesel supplémentaires. Alors que les combustibles fossiles supportent presque toutes les charges de chaleur et d'électricité dans l'Inuit Nunangat, il existe un désir fort de développer des sources d'énergie renouvelables pour atténuer les impacts du changement climatique et améliorer la résilience. Des crises difficiles, comme la récente contamination de l'eau potable d'Iqaluit par du carburant, rappelle le nous la vulnérabilité et le risque dans l'Inuit Nunangat de dépendre d'une seule source pour les besoins en infrastructures essentielles.Pour aider à relever ces défis, le projet ici propose trois domaines de travail clés:1.Évaluations de faisabilité et technologiques pour trois types principaux des systèmes d'énergie renouvelable à l'échelle de la maison qui sont bien adaptés à l'Inuit Nunangat;2.Intégration et évaluation du rendement des systèmes d'énergie renouvelable et de stockage d'énergie avec une maison de démonstration à l'échelle à Iqaluit, au Nunavut; et3.Élaboration de solutions pour éliminer les obstacles à l'adoption des énergies renouvelables dans l'Inuit Nunangat et faire progresser le développement socioéconomique.Ce projet intégrera les valeurs, les besoins et les intérêts des Inuits aux évaluations et au déploiement des technologies d'énergie renouvelable dans l'Inuit Nunangat. Des solutions pour éliminer les obstacles à l'adoption des énergies renouvelables seront élaborées conformément à l'Inuit Quajimajatuqangit en coordination avec le département Inuit Qaujimajatuqangit de la Qikiqtani Inuit Association, l'organisation inuite mère du promoteur du projet, la Nunavut Nukkiqsautiit Corporation. La représentation Inuite est intégrée à ce projet par la définition du projet, la conduite du projet, les étudiants qui contribueront et feront progresser leur formation, et les membres de la communauté

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Personnel on site: 4

Days on site: 5  
Total Person days: 20  
Operations Phase: from 2022-05-09 to 2025-03-25

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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.

မေတ္တဉာဏ် အလှူဒါနများကို မေတ္တဉာဏ် အလှူဒါနများကို

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Δ <sup>c</sup> bΔ <sup>c</sup>	Jordan Okalik-Musgrove	Nunavut Nukkiksautiit Corporation	2022-05-09
b <sup>a</sup> r <sup>a</sup> c <sup>a</sup> s <sup>a</sup>	Jackson Lindell	Hamlet	2023-02-09



$\epsilon \Delta t^{\alpha} \dot{r}^{\beta} \wedge J^{\gamma} e^{\delta} D\dot{n}^{\epsilon} \nabla^{\zeta} r^{\eta} C D^{\iota} L^{\kappa} \dot{r}^{\lambda}$

$a^{\dagger}r^4\omega^a\sigma^b \wedge c_n d n^e \delta D\sigma^4\tau^b\rho^c$   $\cap\cap\eta^9\gamma^f:$

## North Baffin

South Baffin

$\epsilon \Delta h^{\alpha} j^{c} \wedge J_{\omega} e D N$

[illegible]

## Project transportation types

Transportation Type	Transportation Method	Length of Use
Water	A small boat to be used to carry out field surveys for river flow data.	
Land	Vehicles will be rented locally from rental companies or community members to be used to get to project locations. Forklift rented from local contractors to be used for equipment installation.	

## Project accomodation types

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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 electrolye
NaOH	hazardous	1	4	4	Kg	For use in battery electrolye
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 electrolye

ΔL<sup>9b</sup> ΔD<sup>9b</sup> CD<sup>9b</sup> ΔL<sup>9b</sup> ΔD<sup>9b</sup>

$\mathcal{D}^c \rightarrow \mathcal{C} \dot{\mathcal{I}}^{\mathfrak{f}_b} \mathcal{A} \mathcal{D}^{\mathfrak{f}_b} \mathcal{C} \mathcal{D}^{\mathfrak{f}_b} \mathcal{A}^{\mathfrak{f}_b} \mathcal{D}^{\mathfrak{f}_b}$	$\mathfrak{f}_b \rightarrow \mathfrak{f}_b \Delta \Gamma^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b} \mathcal{D}^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b}$	$\mathfrak{a} \mathcal{P}^c \Delta \Gamma^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b} \mathcal{D}^{\mathfrak{f}_b} \mathcal{C}^{\mathfrak{f}_b}$
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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	<ul style="list-style-type: none"> <li>•Packing material</li> <li>•Wire scraps &lt; 10 m.</li> <li>•Sheet metal ducting scraps &lt; 1m.</li> <li>•Building envelope hole saw scrap, approximately 6" diameter (gypsum board, insulation, plywood, metal roofing).</li> </ul> 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**

## SECTION G2: Onland Exploration

## SECTION G3: Offshore Exploration

### SECTION G4: Rig

## SECTION H1: Vessel Use

A small boat will be used to collect data in the rivers during the site surveys to collect data using vessel mounted equipment. There are no impacts or waste associated with these activities.

## SECTION H2: Disposal At Sea

There will be no disposal at sea as part of the project.

## SECTION 11: Municipal Development

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### Miscellaneous Project Information

$a \rightarrow e \Delta^{fb} CD\sigma^{\circ fC} \quad d^{b)} \Delta^{fb} CDPL\downarrow^C \quad {}^{fb}\Delta^{c)}\sigma^{\circ fC} \quad <CD\Gamma'\downarrow P^{fb}CD\sigma\downarrow^f\sigma^{\circ fC}$

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.

## Cumulative Effects

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

$\alpha\omega\Delta^{\epsilon_b}CD\sigma^{-\epsilon_b}\Gamma^C \quad \Delta^0\cap\Gamma D C\dot{\sigma}^+C^C \quad \Delta^b\omega^{\epsilon_b}CD\gamma L\downarrow^C$

[illegible][illegible]

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

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

