Off-Grid Communities Initiative

ecoENERGY for Aboriginal and Northern Communities

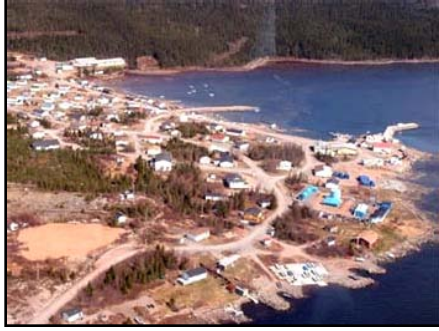
Nahanni Butte, NWT

Projects from Coast to Coast to Coast

Daniel Van Vliet

2009 Wind-Diesel Workshop
June 1-2, 2009 - Ottawa, ON

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada



Rigolet, NL

Presentation Overview

- ecoENERGY for Aboriginal & Northern Communities
- Aboriginal and Northern Off-Grid Communities
  - Demographics, Energy, Initiative
- Aboriginal & Northern Off-Grid Communities
  - Renewable Energy Projects
    - North of 60 Wind Projects
    - South of 60 Wind Projects
    - Pre-feasibility & Monitoring Wind/ Wind Diesel Projects
    - Complete Wind/ Wind Diesel Projects
- Project Barriers
- Successful Projects
- Contact Information

ecoENERGY for Aboriginal and Northern Communities

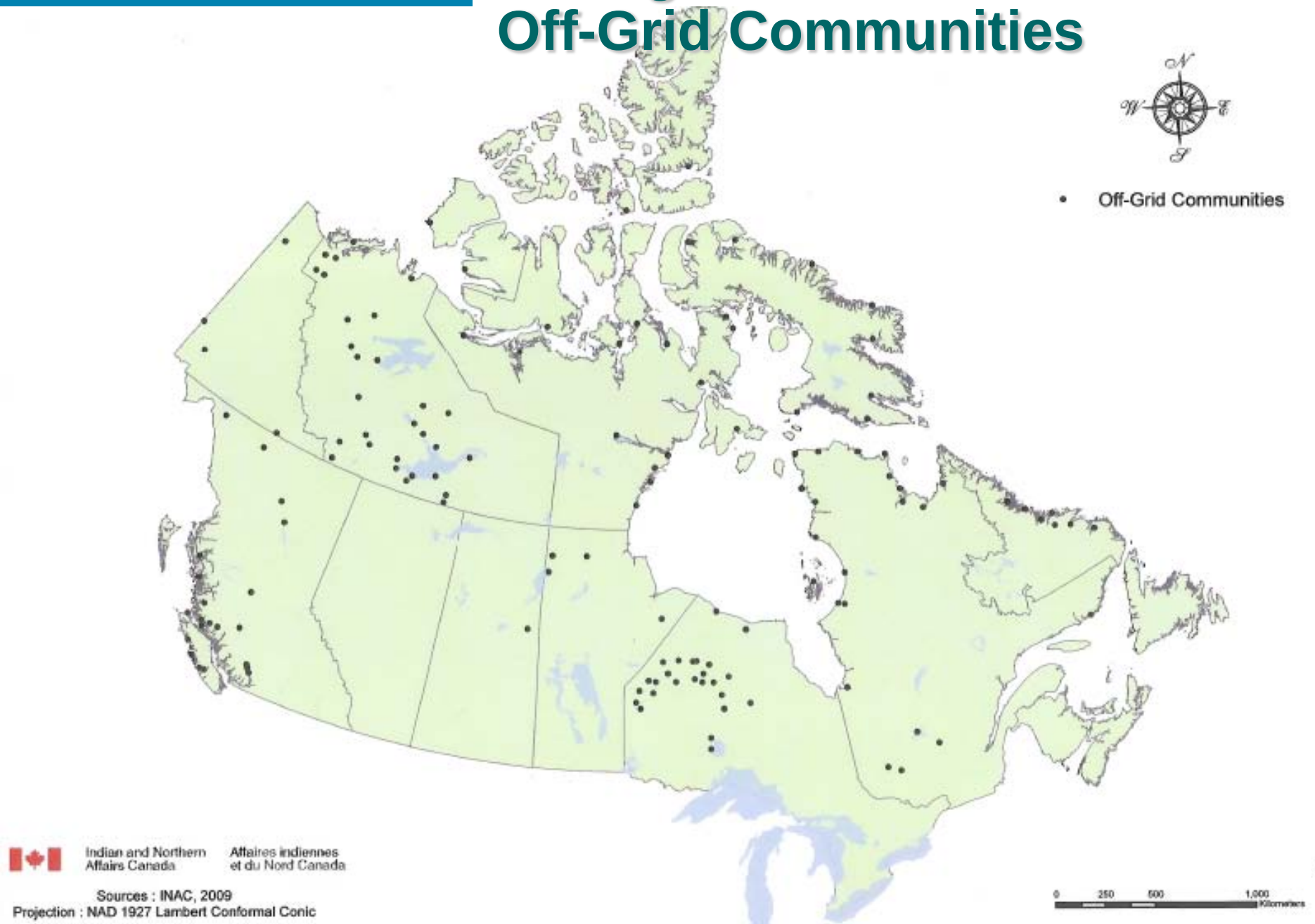
- **ecoENERGY Funding: $15 M over four years**
- **Funds clean energy projects in Aboriginal and Northern communities, including the off-grid communities that rely on diesel for power generation**
- **Program Objectives:**
  - **Reduce greenhouse gas emissions (GHGs) and criteria air contaminants (CACs) emissions**
  - **Identify current energy demand in communities**
  - **Identify economically and environmentally sustainable energy resources for Aboriginal and Northern Communities**
  - **Build community capacity to develop and implement renewable energy resources**

Aboriginal and Northern Off-Grid Communities

Arctic Bay, NU

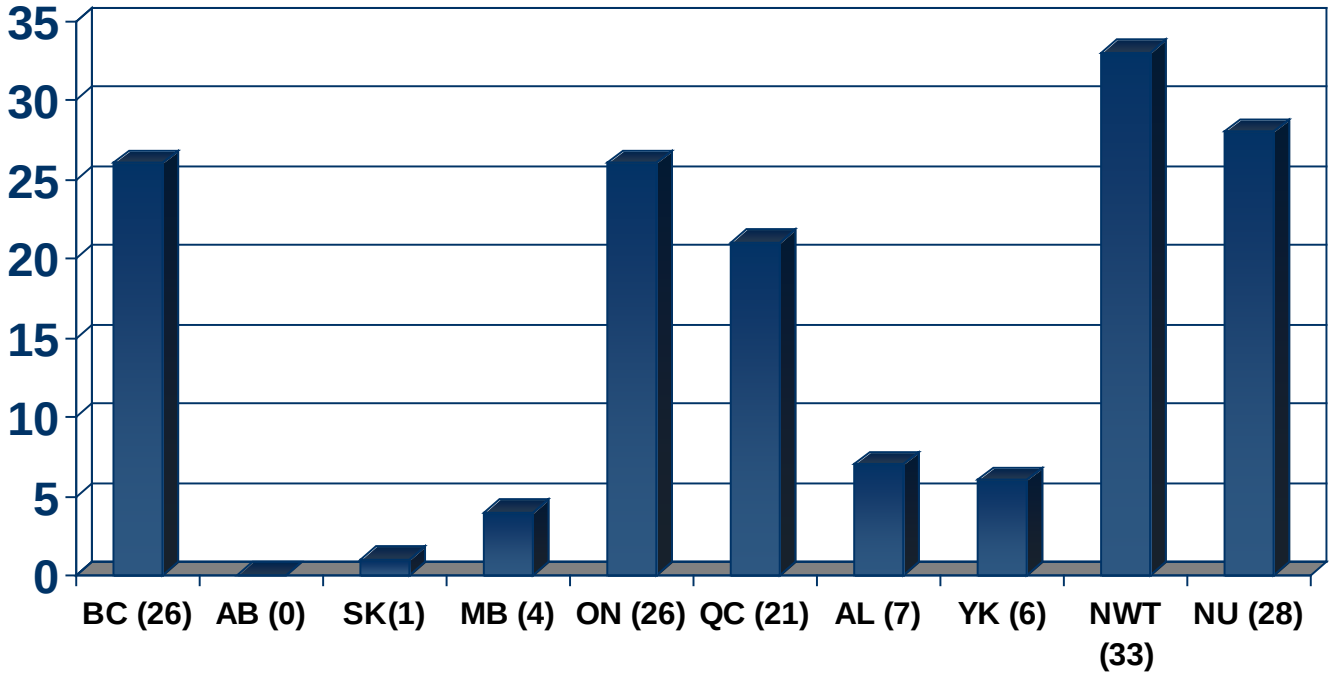
- There are approximately 150 off-grid Aboriginal communities in Canada
- Off-grid communities are those not connected to the North American power grid
- Most are located in the Territories and the northern parts of the provinces
- Communities do not all have viable wind resources

Aboriginal and Northern Off-Grid Communities



Number of Off-Grid Communities: By Region

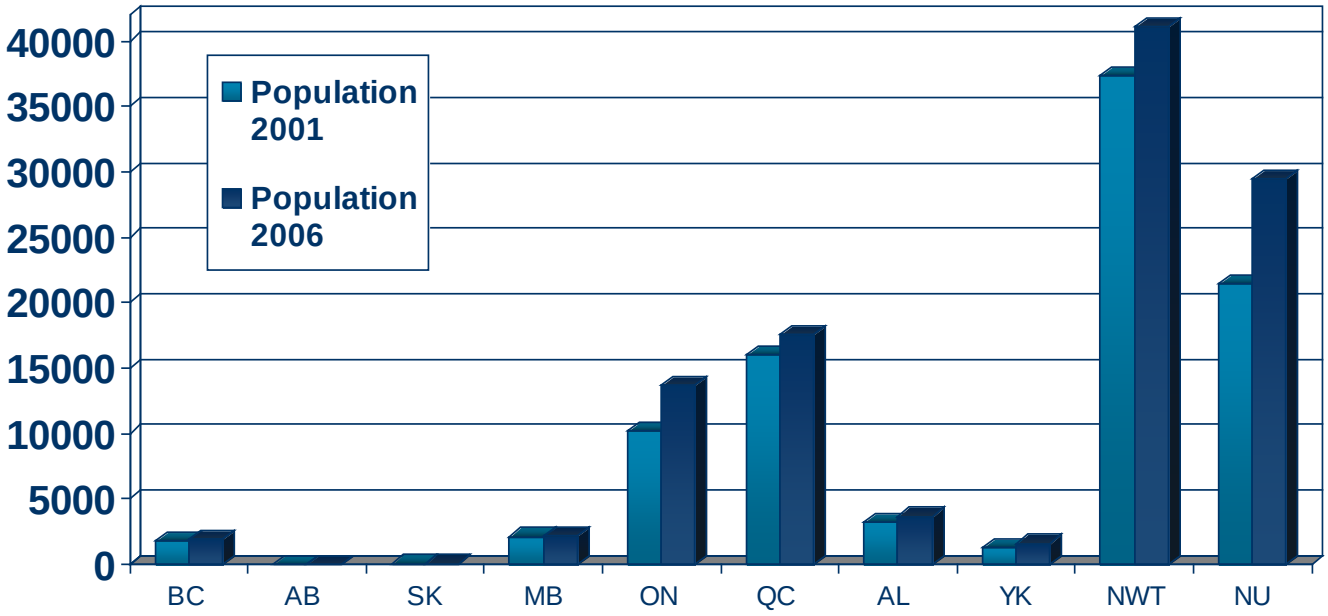
Kuujjuaq, QC



Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Aboriginal and Northern Off-Grid Communities: Population

Shamattawa First Nation, MB



Region	Population		
	2006	2001	% change
Canada	31,612,897	30,007,094	5.4
Off-Grid Communities	138,690	130,176	6.5

Energy Challenges

Power Station
Fort Liard, NWT

- The vast majority of these communities are reliant on diesel generation for their electricity
- Communities must import diesel fuel long distances
- Recent fluctuations in fuel prices, operating costs, and fuel surcharges are of concern
- Current levels of fossil fuel use are unsustainable
- The use of fossil fuels in these communities produces large amounts of GHGs

INAC's Off-Grid Communities Initiative

Sachigo Lake, ON

- Focus is on energy planning in order to facilitate energy efficiency and conservation
- Working with regions and utilities to assist off-grid communities in reducing diesel consumption and greenhouse gas emissions
- Collecting data on renewable energy projects in off-grid communities and providing support for those projects
- Goal is to build on the success of projects and replicate them across Canada

Wind Projects North of 60: Considerations

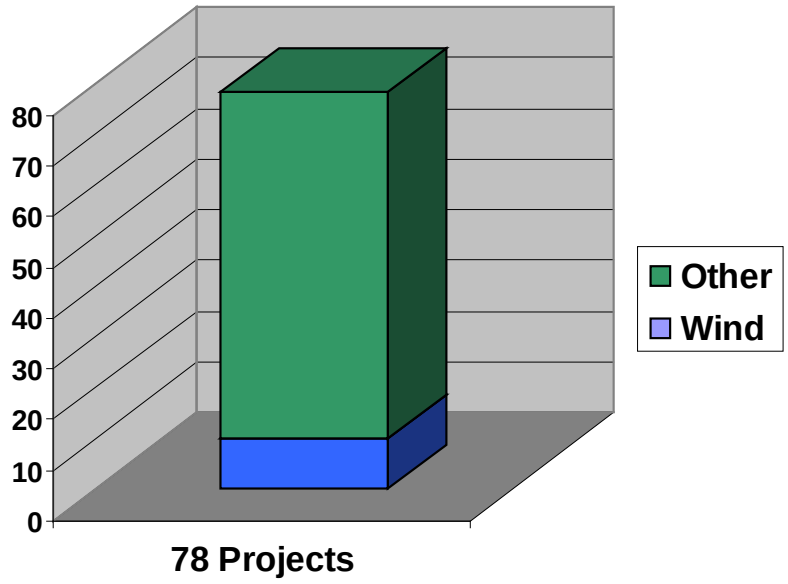
Fort Severn, ON

- Wind technology is non-dispatchable
  - i.e. It is undependable power that can only be generated when sufficient wind is blowing, regardless of what community demand is.
- For this reason, wind always requires a base load backup (diesel generator system) to provide dependable power when it is required
- Frequent wind fluctuations can cause wide swings in voltage and current on a small grid, unless these are stabilized by a diesel generator or more expensive control systems
- Since wind cannot replace diesel generation completely, utilities will generally only pay the replaced diesel fuel cost as a wind energy purchase price
- For these reasons, off-grid community wind systems have difficulty being economically feasible

Proposed Wind or Wind-Diesel Projects: North of 60

Grise Fiord, NU

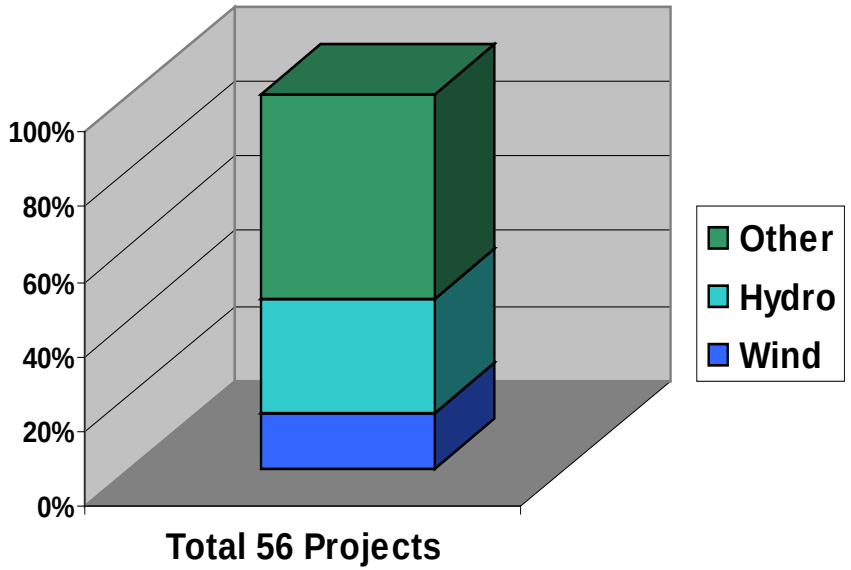
- There are 78 proposed energy projects in 42 communities North of 60
  - 10 of those are wind energy projects
- 3 are too early in development to know their potential
- 2 have the ability to reduce diesel use



Proposed Wind or Wind-Diesel Projects: South of 60

Tuktoyaktuk, NWT

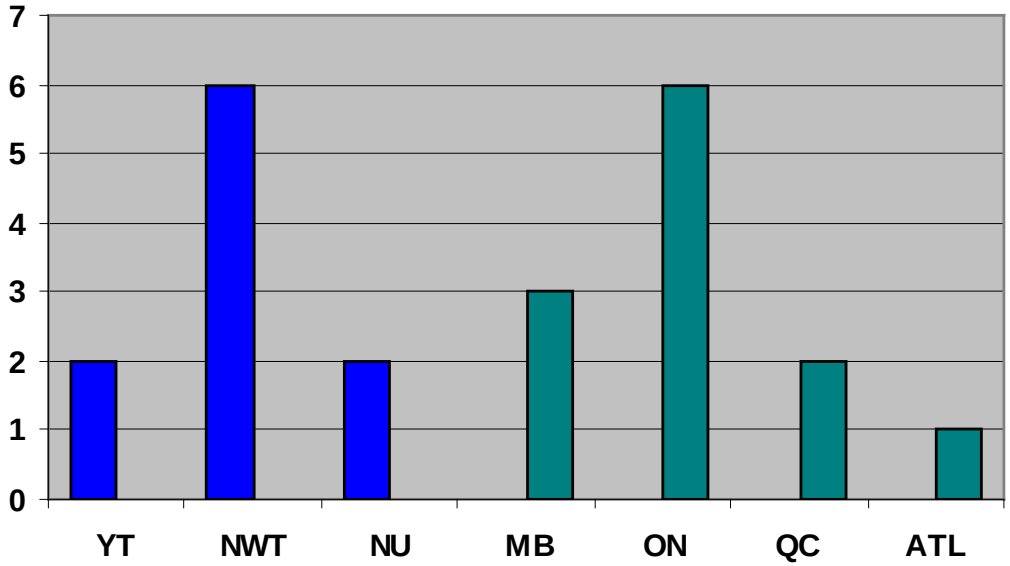
- There are 56 proposed energy projects in 40 communities across Quebec, Ontario, Manitoba and BC
  - 10 of those are wind energy projects
- All wind projects are at an early stage of development. Many simply monitor wind resources.



Pre-feasibility/ Wind Monitoring or Wind-Diesel Projects

Poplar Hill, ON

- **North of 60**
  - Yukon: 2
  - NWT: 6
  - Nunavut: 2
- **South of 60**
  - Manitoba: 3
  - Ontario: 6
  - Quebec: 2
  - Atlantic: 1
  - BC/SK: 0



Completed Wind or Wind-Diesel Projects

Atlin, BC

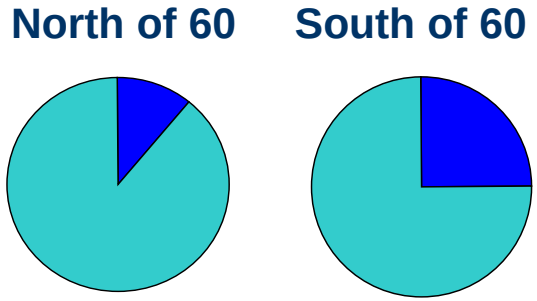
Complete & Operational Wind/ Wind Diesel Projects

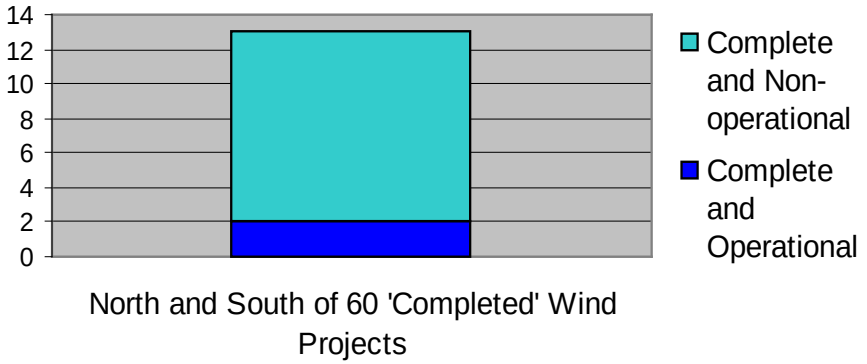
- There is 1 project North of 60 in Nunavut
- There is 1 project South of 60 in Ontario

Complete & Non-operational Wind/ Wind Diesel Projects

- There are 8 projects North of 60 in Nunavut
- There are 3 projects South of 60 in Ontario

- There is a history of failed wind projects





North and South of 60 'Completed' Wind Projects

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Off-Grid Communities: Project Barriers

Cambridge Bay, NU

- Institutional, energy market, cultural and technological barriers
- Isolated geographic locations
- Limited resources with high transportation costs → high project costs, high servicing costs
- Implementing renewable projects require changes to longstanding business arrangements & funding formulas
- Cannot sell surplus energy to the power utility
- Difficult to fund off-grid renewable energy projects
- Varied capacity for project development by community
- The market for off-grid renewable energy is small and dispersed limiting interest from the renewable energy industry
- Hidden subsidization by the governments supplying diesel-electric generation (Pricing/charging structures)
- Lack of policy direction

Off-Grid Communities: Opportunities

Deline, NWT

- Role of Demand Side Management is better integrated with projects
- Business Models are being proven
- Wind Resource Monitoring is ongoing in a number of communities
- Community interest continues to grow
- Fuel Price uncertainty continues to drive utilities and communities towards renewable energy.

Atlin, BC
Project Installation

Successful Projects to Build On

Community/Band Name/ First Nation	Project
Taku River Tlingit First Nation, Atlin BC	Run-of-the-river Hydro
Barren Lands First Nation, Brochet MB	Heat Recovery & Met Towers
Northlands First Nation, Lac Brochet MB	Heat Recovery & Met Towers
Saysi Dene First Nation, Churchill Indian Reserve No.1 MB	Heat Recovery & Met Towers
Shamattawa First Nation, Shamattawa No. 1 MB	Heat Recovery & Met Towers
Kasabonika Lake First Nation, Kasabonika Lake ON	Wind-Diesel
Ramea Island (isolated, non-Aboriginal), NL	Wind-Diesel (& soon Hydrogen)
Rankin Inlet, NU	Wind & Residual Heat Recovery
Arviat, NU	Residual Heat Recovery
Iqaluit, NU	Residual Heat Recovery

For More Information

- **Contact Information:**

ecoENERGIE-ecoENERGY@ainc-inac.gc.ca

Daniel Van Vliet, Manager

(819) 953-8107

Daniel.VanVliet@ainc-inac.gc.ca

- **ecoENERGY Website:**

http://www.ainc-inac.gc.ca/enr/clc/pra/ovr-eng.asp