EXECUTIVE SUMMARY

DIVERGING FROM DIESEL

Most Northern and remote communities, primarily Indigenous, in Nunatsiavut, Nunavik, Nunavut, Northwest Territories and Yukon, as well as in remote regions in Labrador, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and BC, rely on diesel fuel for the production of electricity. These communities also rely on diesel fuel as a prime source of heating for buildings and homes. Transportation and operating costs in these generally remote areas are significantly higher than in areas where there are established regional power grids and as a result community residents are faced with significantly higher electricity and heating costs.

A study was commissioned by **Gwich'in Council International (GCI)**, carried out by **InterGroup Consultants of Winnipeg** with support from **Lumos Energy,** and through the sponsorship of **Indigenous and Northern Affairs Canada**. The study was undertaken to segment and measure the costs related to diesel electricity generation in these non-grid areas.

These costs included: current utility costs; costs arising from the emission of Greenhouse Gas (GHG) emissions; and external social impact costs resulting from a reliance on diesel fuel.

Gwich'in Council INTERNATIONAL

Gwich'in Council International (GCI) represents 9,000 Gwich'in in the Northwest Territories (NWT), Yukon, and Alaska as a Permanent Participant in the Arctic Council; the only international organization to give Indigenous peoples a seat at the decision-making table alongside national governments.

Focusing on a transparent analysis of the full costs of diesel generated electricity in northern off-grid communities, the study utilizes: utility-supplied rate filing documentation provided to governments and energy regulators by utilities; government carbon tax costs; and research related to the direct and indirect social costs associated with the use of diesel for electricity generation and building heating purposes. Information was gathered on 9 northern, off-grid communities in the Northwest Territories (3), Yukon (2), and Nunavut (4).

These costs are summarised as follows:

Table 1: Summary of Fossil Fuel Generation Costs in Northern Communities

			Currrent Utility Costs[1]			Potential GHG Tax Cost[2]	
Territory	Community	Fossil Fuel Generation (MWh)	Fuel ($/kW.h)	Other Costs ($/kW.h)	Total Costs ($/kWh)	Based on $10/tonne ($/kWh)	Based on $50/tonne ($/kWh)
NWT	Inuvik-Diesel	16,996	0.33	0.31	0.64	0.01	0.05
	Inuvik-Natural gas	11,330	0.27	0.31	0.58	0.01	0.04
	Tuktoyaktuk-Diesel	4,142	0.29	0.31	0.61	0.01	0.05
	Fort McPherson-Diesel	3,424	0.34	0.31	0.66	0.01	0.05
Nunavut	Iqaluit-Diesel	60,741	0.29	0.21	0.50	0.01	0.05
	Cambridge Bay-Diesel	10,267	0.29	0.21	0.50	0.01	0.05
	Rankin Inlet-Diesel	17,625	0.28	0.21	0.49	0.01	0.05
	Baker Lake-Diesel	9,518	0.27	0.21	0.48	0.01	0.05
Yukon	Old Crow-Diesel	2,264	0.54	0.22	0.76	0.01	0.05
	Destruction Bay-Diesel	1,789	0.19	0.22	0.41	0.01	0.05

NOTE: THE STUDY MEASURED THE PER KWH VALUE ASSOCIATED WITH REDUCING GHG EMISSIONS AT A VALUE OF $10/TONNE AND $50/TONNE ($/KWH) AS SUGGESTED BY THE FEDERAL GOVERNMENT.

While direct and indirect social costs are not included in this chart, **it has been known for some time that reliance on diesel fuel has social impacts,** notably arising from:

1. Health and environmental risks associated with diesel fuel transportation;

2. Health and environmental risks associated with diesel fuel storage; and

3. Health and environmental risks associated with diesel fuel consumption for electrical power generation and home heating.

Related studies undertaken in the United States and by the National Research Council of Canada make a range of conclusions regarding the human health and ecological effects of diesel fuel reliance, however, it is possible from these studies to reach the overarching conclusion that the human and ecological health costs of oil (ie: diesel) fuel was $0.191/kWh. This cost can be applied to both northern off-grid communities and southern centres utilizing diesel as a source of power generation.

While separate in description, a reduction in energy demand and the identification of alternatives to diesel energy generation are inextricably linked in, that reduced energy demand will have a significant impact on the types, scale, operating costs, and in turn economic viability of alternative energy systems. These two elements of energy production go hand in hand.

Although far from an exhaustive listing, to achieve the overriding goal of economically affordable and sustainable, environmentally responsible and socially beneficial energy production, the necessary components should include:

1. More energy efficient homes, community facilities and infrastructure,

2. Demand-side management of community energy systems to reduce peak load capacity requirements,

3. Renewable energy generation supplying electricity,

4. District or community energy generation, primarily for heating,

5. Bio-Energy resources for heating, and potentially for Combined Heat Power (CHP) systems.

6. Enhanced local off-grid systems management including more efficient transmission infrastructure and 'smart' microgrid control system, including real time meters, and

All the above components will require investment and infrastructure.

Although increased energy efficiency is an equally important element, this study was focused towards the determination of which alternatives to diesel energy are viable in a given community. In this, three critical questions must be addressed:

1. Are diesel alternatives technically viable, reliable and durable, especially given the harsh climatic and remote access conditions that are a reality in off-grid Northern and remote communities?

   Technologies and systems alternatives to diesel energy should not be tested in Northern and remote communities. Rather, the technical viability of alternatives to diesel energy should be proven at full operating scale in smaller, southern communities, or industrial operations first, as introducing untested or unproven energy efficient, energy systems management or renewable energy alternatives, including Bio-Energy, carries substantive risks that northern communities are not in a position to absorb.

2. Can diesel energy alternatives be effectively integrated into Northern and remote communities and energy systems?

   Energy supply and demand should be planned and managed systemically. Alternatives to diesel energy should be considered through a Comprehensive Community Energy Planning (C-CEP) process that greatly increases the likelihood that new energy innovations are robust, resilient, and economically responsible, thus promoting community buy-in and support.

3. Are energy systems and energy source alternatives economically positive relative to conventional diesel power/heating fuel?

   When territorial/provincial governments and energy authorities, and/or utilities, study whether diesel energy alternatives are economically viable, they have tended to base their answer on the question, "are diesel alternatives less expensive than the 'avoided cost' of diesel fuel?"

   This measurement is logical, but problematic as there is no validated or empirically-grounded basis for what "Avoided Cost" to diesel energy means. In addition, different Canadian jurisdictions have interpreted "Avoided Cost" in a variety of ways, making comparisons between them difficult.

   "Avoided Cost" has historically been determined by utilities and disclosed in

presentations to territorial/provincial governments and energy authorities, often disclosed in rate filing documentation. Usually when measuring the "Avoided Costs" of diesel power, they only take into consideration the cost of diesel fuel. In some instances, they take into account fuel plus delivery costs, including some of all of transport and storage costs.

A major cost consideration not included in such measurements is the cost of environmental remediation, particularly at the closure of diesel powered electricity generation facilities. There are many and increasing examples of the large financial implications following such closures.

In recognizing and accepting the direct linkage between energy demand and alternative energy production, efforts to identify and advance alternative energy production must be undertaken in parallel with measures to identify and consider the means whereby energy demand can be reduced in these off-grid and northern communities.

RECOMMENDATIONS

There is broad-based interest in reducing diesel fuel for power generation and heating in remote communities. Catalyzing community planning, energy efficiency, energy systems management and renewable energy generation alternatives which reduce demand on diesel systems requires that the full and transparent economic value of these alternatives be clearly understood.

In itself, this study indicates that there is substantive value to diesel power alternatives, because three kinds of costs are avoided: i) Current Utility Costs, ii) Costs related to GHG emissions, and iii) Human and ecological health social costs. Based on our research, the next steps governments, energy regulators, utilities and Indigenous communities, and solution-providers of alternatives to diesel energy should consider include the following:

1. **Initiate a National Dialogue** on full costing of diesel energy in Northern and remote communities to promote cleaner and more sustainable energy alternatives,

2. **Establish a Pan-Canadian Avoided Diesel Energy Value Methodology/Formula;** which would be tailored to each jurisdiction and community in terms of metrics and actual costs,

3. **Implement Proactive Procurement Processes** managed by regulators and utilities whereby Indigenous communities and project/technology partners can propose diesel fuel alternatives funded through revenue equivalency to the full avoided cost of diesel energy.

4. **Promote Collaboration on Off-Grid Innovations** through a national platform that would profile project experiences, including the net economic impact of diesel alternatives introduced.

5. **Establish a parallel initiative to identify measures that would reduce energy demand** in northern non-grid communities and support the identification and implementation of diesel energy alternatives.