



FUELING THE CHANGE IN THE ARCTIC



More than 170 remote Indigenous communities in Canada rely almost completely on diesel power plants for electricity.

Most of these communities rely on small, local micro-grids and are served by publicly owned utilities, as mandated under provincial or territorial legislation. While these laws ensure these communities have reliable power, they also establish status quo costs, subsidies and investments for diesel power plants. Reliance on these plants comes with harmful economic, social and environmental impacts that do not reflect traditional ways of northern Indigenous life.

As Canada and the world make the transition away from fossil fuel to clean power, remote Indigenous communities are often left out of the development journey. This exclusion is tied to limited local capacity, sense of urgency, and the lack of directed policy and program support. Add to this the complexities of providing power in remote Arctic regions.

As part of its Arctic Renewable Energy program, WWF-Canada, along with its project partner, Waterloo Institute for Sustainable Energy (WISE), performed pre-feasibility and feasibility studies to predict the costs and economic benefits of renewable energy in northern communities. Our research revealed that an initial investment in a mix of renewable energy in remote northern communities can lead to immense carbon dioxide (CO₂) emissions reductions, with renewable energy penetration averages reaching 80 per cent in some communities, and far greater than expected operations and maintenance (O&M) savings over the next 20 years, to the tune of \$30 million in the community of Iqaluit alone.

Optimal renewable energy (RE) - diesel hybrid system characteristics for communities in Nunavut from the WISE study

	Optimum RE combination	Optimum RE penetration	Greenhouse Gas (GHG) emissions reduction
Baker Lake	Diesel-wind-battery	82%	74%
Sanikiluaq	Diesel-wind-solar-battery	82%	70%
Arviat	Diesel-wind-solar-battery	67%	55%
Rankin Inlet	Diesel-wind-battery	53%	47%
Iqaluit	Diesel-wind-solar-battery	29%	26%

EVEN HIGHER DIESEL CONSUMPTION REDUCTION IS ACHIEVABLE

A new WISE study commissioned by a Variable Speed Generator (VSG) manufacturer concluded that using VSGs in communities could allow greater renewable energy penetration without the need for energy storage. This greatly reduces diesel consumption while at the

same time increasing savings since batteries are no longer required. For instance, modeling shows a VSG-wind-solar hybrid system in Arviat allows up to 98 per cent renewable energy penetration and up to \$16 million dollars in savings:

Comparison of net present value (NPV) of full diesel and RE-diesel hybrid systems in Arviat, NU

	Business as usual	WWF - WISE Study		Innovus- WISE Study	
	Net Present Cost (NPC) – Diesel only	RE Penetration	NPC – RE-Battery-Diesel hybrid	RE Penetration	NPC – RE-VSG hybrid
Arviat	\$38.7M	66.5%	\$29.3M	98%	\$22.9M



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CHALLENGES AND BARRIERS TO DEPLOYMENT OF RENEWABLE ENERGY

There are two types of barriers: policy and legislative barriers and cost and financing barriers.

Policy and legislative

Occasionally, legislation confines power generation to a single public utility. As is the case in Nunavut, where the Qulliq Energy Corporation Act legislates a monopoly for the namesake government-owned utility — disallowing Independent Power Producers (IPPs) from producing their own power and distributing it to utility customers.

Cost and financing

In almost every example of a power purchase agreement between a utility and an independent power producer for a remote community, the utility places a value on the renewable energy source based on what it would have cost to purchase the diesel fuel and generate the equivalent amount of electricity (this is also known as avoided cost

of diesel). This approach doesn't take into account the fact that using an alternate renewable source of fuel may reduce operating hours of diesel generators, thereby extending their life span, or reduce capital costs by replacing old equipment with smaller alternatives. It also fails to take into account the societal costs of carbon pollution, including on health, factored into the decision making process. Given the lack of information available around levels of government subsidy for delivery and combustion of diesel fuel (not to mention embedded subsidies for fuel production), and lack of pricing of the externalized cost of carbon pollution, utilities are not considering the full, actual cost of diesel.



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RECOMMENDATIONS

Guaranteed and sufficient revenue from renewable energy power purchase agreements isn't the complete solution. A catalyst is needed to get community-scale projects off the ground, to help transition ownership, further develop local capabilities, and drive economic growth in these communities.

Excellent examples of programs that kick start these initiatives include the Alaska Renewable Energy Fund, the B.C. Remote Community Electrification and the Northwest Territories' Community Renewable Energy Program. Governments can support this by mandating targets for clean power production, as legislated in B.C. and supported by policies in Alberta, Ontario, Quebec and the Yukon, which also requires that at least 50 per cent of projects incorporate a share of Indigenous ownership. To advance renewable energy projects in remote communities, we also need to level the playing field by revealing the real cost of diesel, and the true cost advantage of clean technology. This means accounting

for subsidies for diesel fuel and generator procurement, as well as the social costs of carbon. Money isn't always the only factor. Impact on the environment, reliance on the South, and energy security can all be worth an added investment.

Additionally, we have a unique opportunity to get this right with communities from the start. The proper engagement with local communities, building local capacity, studying the potential environmental impacts of new installations and taking into account Traditional Knowledge ensure a sustainable future for the communities.

DRIVERS OF SUCCESS

- Provincial and territorial legislation with clear targets for remote Indigenous community clean power to guide decision making and funding commitments by government bureaucracy.
- Utility companies building genuine relationships with remote Indigenous communities, helping build energy literacy and local capacity.
- Knowledge of the environmental and cost risks associated with continued fossil fuel use, including GHG emissions, local air quality deterioration from particulate matter, rampant fuel spills and cleanup costs.
- Policy perspective that closely follows technological advances and experience, underpinned by the knowledge that renewable energy technology offers a safe and reliable source of energy.
- Awareness that community-owned clean power creates more jobs and economic development opportunities than connecting communities to an integrated power grid.

WHAT'S WWF DOING?

Making it Real; WWF-Canada is supporting candidate communities in Nunavut to lead the transition to clean energy in their communities

WWF-Canada, in partnership with Alaska Centre for Energy and Power (ACEP) supports selected communities and local stakeholders in Nunavut to develop a community energy plan and create a resource assessment plan to support future wind or solar project development for each community. This will result in the creation of a technical specification for the installation of a meteorological tower in each community that will be used to collect high-resolution data on solar irradiance, temperature and wind speed/direction and will serve as the basis for a formal Request for Proposal (RFP) to complete a more comprehensive resource assessment in the future.

Research on cost and financing challenges of RE generation projects in Nunavut:

WWF-Canada hired a top-tier consultant to research into the barriers and opportunities of renewable energy deployment in the arctic, work with stakeholders and identify clear and cost effective financing strategies that are essential to change the status quo.

Provide recommendations to the Government of Canada on the most effective strategies for reducing diesel reliance in remote northern communities:

WWF-Canada is working with Renewable Energy Alaska Project (REAP) to craft recommendations to the Government of Canada on the most effective strategies of allocating public money to reduce diesel consumption in northern remote communities.



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