Aboriginal Energy Alternatives

BACKGROUNDER

SUMMARY OF OPPORTUNITIES AND OPTIONS

Renewable Energy and Energy Efficiency Options

The Pembina Institute has been involved in assisting communities pursue alternative energy solutions for over a decade. There is a growing interest in Aboriginal and Northern communities to pursue alternative energy projects as a means of creating local economic development, reducing fossil fuel use, retaining energy dollars in the community and planning for long-term local sustainability.

This guide illustrates some of the technologies that are available, and the important steps needed to pursue these technologies. Other important aspects that communities need to bare in mind are ensuring buildings are designed for energy efficiency, efficient design and operation of a diesel plants in off-grid communities and looking for ways to avoid subsidizing wasteful behavior and rewarding conservation. Energy efficiency technologies and policies have equal merit to the issues discussed in more detail in this document, and in many cases can be more cost effective and return quicker results and therefore ought to be considered seriously before time and money is invested in a renewable project.

Aboriginal communities are increasingly looking to renewables and energy efficiency as opportunities to create jobs, reduce costs and increase long-term community sustainability by taking advantage of local resources.

Steps in developing electricity alternatives

1. Develop a community energy plan that examines current energy uses, costs and assess future needs and opportunities for alternatives.
2. It is always cheaper to use less energy than it is to build more! Look for ways to reduce wasted energy and improve the efficiency of the energy that is used.
3. Ensure that new buildings—both homes and community infrastructure—will be built as energy efficient as possible.
4. Complete a pre-feasibility study to lay the economic ground-work for pursuing an alternative. If it is positive, consult with the community about the opportunity.
5. Monitor the quality of the local resource in question and ensure that it is possible to access it for a long-term period.
6. Make sure that you can access the local electricity system and set up a business structure for buyers of the electricity, and how to finance/capitalize the project.
7. Obtain necessary permits, including environmental impact studies.
8. Construction and commissioning.
9. Operation, monitoring and maintenance. Planning for this step well in advance is key to success.

▲ There are currently over 2,000 kW of wind energy operating in remote Alaskan communities.

Photo: John Carr, Arctic Energy Alliance

Key Issues When Developing Renewable Energy

1 **Local leadership and engagement.** One of the key factors in successful energy projects is that the local community is engaged early and often on its development, and that the goals of the project match the needs of the community.

2 **Monitor and understand your local resource.** Renewable energy resources are dependent on the amount that is available at your site. It may sound obvious, but wind turbines need lots of wind and small hydro systems need consistent flows of water. These can vary with the time of day, the season and from year to year and will impact your economic return. Getting high quality and long-term data is essential before making decisions to invest.

3 **Explore alternatives.** In every community there are many different opportunities for energy alternatives that will save money and reduce energy consumption. Often the best project may not be the one you initially pursue.

4 **Use only proven and cost effective technologies and partners.** There are many proven, reliable technologies for renewable and efficiency upgrades. Be wary of projects that do not have a long track records.

5 **Be patient**. Energy projects involve many jurisdictions and involve many people, and will therefore frequently span several years between when they are envisioned and when they are implemented. The goal is to develop long-term solutions, so it is key not to rush decisions on projects that will be in the ground for several decades.

6 **Look for creative funding approaches**. There are many Federal and Provincial programs that can lend support, or be used to leverage other money.

7 **Be persistent**. Pursing alternatives may require some "outside of the box" thinking by yourself, your partners and your funders as it is a break from business as usual. Doing things differently than they have been done in the past can take some convincing—don't give up!

Supply options

◄ Beaver Lake First Nation installed a solar air heater on their new recreation centre in Northern Alberta. It is expected to save over $7,000 per year in natural gas heating costs.

Photo: Donna Lewis, Astravan Distributors

Combined Heat and Power Cogeneration

Description	Using a supply of wasted heat to either generate power locally, or distribute the heat to community
Features	20-30 year lifespan Can more than double existing system's efficiency Captures energy already in the community
Challenges	Capital costs Location of heat source is often not close to potential loads Systems are still dependent on fossil fuels albeit much more efficient users Sale of heat can be more difficult administratively and/or legally in some jurisdictions Heat is only useful for part of the year

Run of River Hydro Power

Description	Diversion of part of a river's natural flow through turbines to generate power and returning the water to the river downstream.
Minimum Flows	0.5-12 m^3/s (for off-grid) 12 m^3/s (on-grid)
Electricity Costs	~ 5-20 ¢/kWh
Features	30-50+ year lifespan Stabilizes long-term electricity costs On-grid sites can often be cost competitive with grid prices and can thus be successful business ventures even without subsidies
Challenges	Reliability of year-round flows Potential fish habitat impacts

Wind Power

Description	The large blades on a wind turbine collect energy from the wind to generate power.
Minimum Wind Speeds	6.5 m/s @ 80 m (on-grid) and 5.5 m/s @ 30 m (off-grid)
Electricity Costs	~ 6-9 ¢/kWh (on-grid) and ~ 20-60 ¢/kWh (off-grid)
Features	Modular – can be built in phases 30-40% capacity factors typical Visual representation of commitment to sustainable energy
Challenges	Local wind quality Waiting period up to 2 years for a turbine Visual impacts

Biomass

Description	Burning waste wood or other wasted organic material to generate electricity
Biomass Resource	6,500-9,000 tonnes per year per MW installed
Electricity Costs	~ 5-9 ¢/kWh
Features	Takes advantage of otherwise wasted materials Can be combined to also produce useful heat Operates predictably, thus facilitating power purchase/grid access
Challenges	Secure long-term feedstock (biomass) supply Operations and maintenance is critical Disposal of waste ash

Adding up the savings

Prepared by:

the PEMBINA institute
Sustainable Energy Solutions

Free—Action That Costs Nothing But Saves Money

- Hang your clothes to dry.
- Turn down water heater thermostat to 120°F (49°C).
- Set thermostats to 68°F (20°C) in the winter and down to 55°F (13°C) at night.
- Use energy-saving settings on washing machines, dishwashers and refrigerators.
- Vacuum the dust off of your refrigerator's coils once a year.
- Repair leaky faucets and toilets, and don't waste water by taking shorter showers.
- Close drapes after sunset in the winter.

Quick and Easy —Action That Pays For Itself In Less Than A Year and Doesn't Cost Much

- Install a low-flow (water-savers start at 2.5-gallon/minute or less) showerhead (~$20).
- Buy low-flow faucets for the kitchen and bathroom sinks ($5 each).
- Plug air leaks around windows, doors and other holes (~$10 each).
- Regularly clean or replace the air filter in your furnace and air conditioner ($0-$5).
- Install compact fluorescent light bulbs (~$3/bulb).
- Insulate the first three feet of hot and inlet cold water pipes ($6).

Getting Serious—Cost Up to $500 and Have Paybacks of One to Three Years

- Get an energy audit for your home to find air leaks and other possible upgrades.
- Upgrade any or all of your clothes washer, dishwasher, and/or refrigerator with "Energy Star" machines. They cost more, but will pay for themselves in energy savings.
- Seal and insulate warm-air heating ducts.
- Have heating and cooling systems tuned up every year or two.

Going Big—Measures That Will Save a Lot of Energy , But Will Take Three to Fifteen Years to Pay for Themselves

- Insulate the ceiling above crawlspaces or unheated basements to at least R-11.
- Insulate heated basement walls to R-19 or more.
- Increase attic insulation to R-38 in milder climates, and R-50 in colder climates.
- Wall insulation is more expensive, but may be cost-effective if your house is uncomfortable.
- Switch your hot water heater to an "instantaneous" or a "tankless" system.
- Upgrade your furnace and air conditioner (if you need one) to more efficient models. Upgrading is often cost-effective, and definitely so if you need to replace failing units anyway.
- Upgrade to double- or triple-paned low-emissivity windows, if replacement is needed.
- Replace toilets with modern water-efficient toilets that use 50–80 percent less water.
- Plant trees around your house. Trees that lose their leaves let the sun in to warm your house in the winter, and the leaves help keep it cool in the summer.
- Add solar water heating to either a conventional or a tankless hot water system.

Going All The Way—Decisions That Clean Your Energy Supply, But Won't Save Money

- Switch to "Green Power" electricity provider, or program with your utility.
- Solar photovoltaics and small wind turbines can allow you to generate your own clean power.

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