Community Energy Plan

Behdzi Ahda First Nation (Colville Lake) 2010

ARCTIC ENERGY ALLIANCE

Introduction and Acknowledgements

This Community Energy Plan explains what we did so far during the energy planning process, and outlines a work plan for what we need to do next.

We thank the following people who helped create this community energy plan for Behdzi Ahda First Nation (Colville Lake):

- Representatives of Behdzi Ahda First Nation (Colville Lake) who took the time and energy to participate in meetings in the community and participate in the Sahtu Regional ICSP workshop in November 2009
- Northlands Utilities Ltd, the Petroleum Products Division of the GNWT, and Environment and Natural Resources, who shared their data
- The Arctic Energy Alliance who facilitated the process

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The Arctic Energy Alliance developed the template for the community energy plan, with help from Mary McCreadie, NWT Literacy Council.

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Executive Summary

Behdzi Ahda First Nation (Colville Lake) respects its traditional values, culture, knowledge, and language. The community values honesty, commitment, teamwork, its Elders and youth, the land and the water.

A principle of Behdzi Ahda First Nation is that people have lived in a respectful, sustainable way with their environment for thousands of years. They have not harmed the environment. Behdzi Ahda First Nation expect that any new activities on the land to be done in the same manner.

The mission of the First Nation is to ensure a safe, sustainable, active and advancing community for present and future community members. This mission is achieved through transparent leadership, innovation and partnerships, as well as the development of core infrastructure and a safe environment for all community members.

Behdzi Ahda First Nation has high quality renewable and non renewable resources. The community depends mostly on infrastructure activity at the present time for local wage employment. This includes seasonal road construction, new airport, and new community buildings. There is minor seasonal tourism, and in recent years, there has been oil and gas exploration activity. All these activities are done in an environmentally friendly way.

Community Elders advised the community government to create opportunities for the youth but also to make sure the youth learn their traditional land skills and knowledge about how to live well

with the land. The Elders refer to this as "being stingy for our way of life". This will allow the transition from a traditional lifestyle to a modern lifestyle which upholds Behdzi Ahda principles of self reliance and sustainability.

Community representatives participated in a Sahtu regional ICSP workshop held in November 2009. Representatives of Behdzi Ahda First Nation worked with a representative of Arctic Energy Alliance (AEA) and a contractor to develop a Community Energy Plan (CEP) that reflects the energy sources, energy needs and the traditional principles held by Behdzi Ahda First Nation community.

This initial CEP groundwork is incorporated into the Behdzi Ahda First Nation Integrated Community Sustainability Plan (ICSP).

The CEP process will continue after March 31, 2010 to further develop and implement the goals and strategies of the Behdzi Ahda First Nation.

The following goal and strategies form the Community Energy Plan of the Behdzi Ahda First Nation.

Community Energy Planning Goal:

- **Develop the capacity to provide for current and future energy needs from within the community and the Sahtu region.**

The Community Energy Planning goal reflects the values, principles and mission expressed by Behdzi Ahda First Nations to ensure a sustainable and safe community while respecting traditional values and practices as advised by their Elders. It also recognizes the potential for large scale projects within the Sahtu region.

Strategies to Achieve the Community Energy Planning Goals:

- Apply for funding to implement the community energy plan.
- Seek funding for a study to research and evaluate the potential to convert to local natural gas or oil supplies.
- Educate community members on climate change and energy issues and encourage their participation in the community energy plan.
- Research the use of renewable energy designs, and technologies that would work in Behdzi Ahda.
- Complete Energuide for houses audit.
- Include community energy management as part of the community's ongoing responsibilities.

Behdzi Ahda First Nation wishes to evaluate the possibility of converting to local natural gas or oil. This is one of the community's local resources. Solar energy is currently in place at the water treatment plant although there is a need for ongoing maintenance training and stocking mechanical supplies. The community also completed a pre-feasibility study on wind energy which was seen to be uneconomical at the present time.

Behdzi Ahda First Nations wants to raise awareness about energy efficiency and conservation with community members. The First Nation also wants to take good care of its buildings and make sure future buildings are energy efficient. Due to pollution concerns, the community wants to reduce their reliance on diesel fuel for electrical power and also to look at alternative ways to heat buildings and generate electrical power.

These strategies describe the direction to focus future actions. From here, we can move forward.

Introduction

Behdzi Ahda First Nations (Colville Lake) is located on the southern shore of Colville Lake. This is the traditional land of K'asho Got'ine Dene. Behdzi Ahda First Nations is a member of the Sahtu Dene Council.

The community has a gravel runway and is accessible year round by scheduled small aircraft service from Norman Wells. There is winter road access to Norman Wells and to the south via Wrigley for a 6 – 8 week period each year, depending on weather conditions.

The community's economy is based on hunting, fishing and trapping. The community also depends on infrastructure activity at the present time. Tourism plays a minor role. Oil and gas exploration and development has resulted in several discoveries in the area. These are undeveloped at this time pending the Mackenzie Valley pipeline.

Behdzi Ahda First Nations is a Petroleum Products Division (PPD), non-hydro community, relying on a diesel generator for electrical power. There is discussion about replacing the current generator with a larger one in the fairly near future. The water treatment plant utilizes solar power with diesel and line backup.

There is one governing body in the community – the Behdzi Ahda First Nation. The community recently dissolved their settlement corporation to shift community governance and infrastructure responsibility to the First Nation.

What is a community energy plan?

An energy plan shows what a community decides to do, over a certain period of time, to change how energy is used – to find better ways to make and use energy.

Behdzi Ahda First Nation decided to create an energy plan to gather information about how energy use can be improved. This Community Energy Plan (CEP) report explains the energy planning process up till now, describes how energy is currently used, and outlines strategies for next steps.

Most NWT communities use energy planning to find ways to:

- Replace imported, non-renewable sources of energy such as fossil fuels with more local, renewable sources of energy such as wind, water, or sunlight.
- Reduce negative environmental impacts from energy use, such as greenhouse gas emissions, noise, or fuel spills.
- Keep money related to energy use in the community, rather than spending this money outside the community.
- Use energy more efficiently.

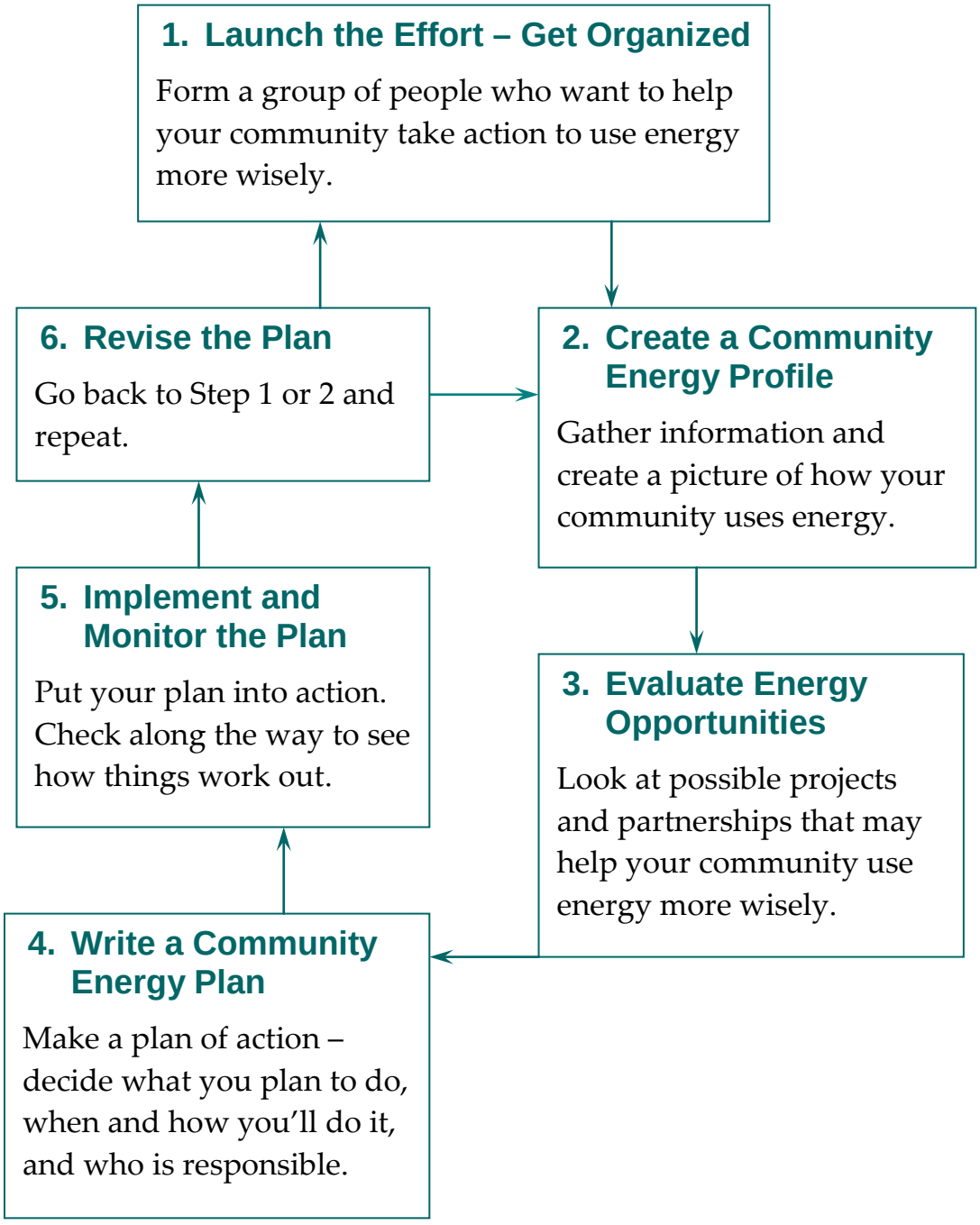
Energy planning is a cycle. The cycle might last for one, three, or five years. During each cycle, the community develops and carries out certain projects that make up the energy plan for that time period. At the end of the time period, a community reviews the energy plan, decides what other projects they can do, and continues to work towards their vision of a healthier, cleaner energy future.

Many people dream that things could be different – that we can use less energy, save money, produce less greenhouse gases, use more renewable sources of energy, and live with respect for the land.

A community energy plan helps to realize this dream. A community energy plan helps you take more responsibility and have more control over what energy you use and how you use it.

The diagram shown on the next page is a 6-step Community Energy Planning process a community can use to develop an energy plan. A modified process was followed in order to meet the ICSP deadline.

6 Steps - Energy Planning Process



Our community's energy profile

This section of the community energy plan gives a visual summary of our community energy profile.

What is a community energy profile?

A community energy profile describes energy sources and energy use in our community, for a year.

The energy profile does **not** usually include energy related to air and truck transport that bring goods into the community.

A community energy profile contains basic information that is easy to find and easy to find again in the future. We can update the profile and keep track of how our community's energy use changes over time, and if and how it improves.

Notes on Behdzi Ahda First Nation Energy Profile 2007-08

Use of Diesel to Generate Electricity – Annual Financial Cost to Community

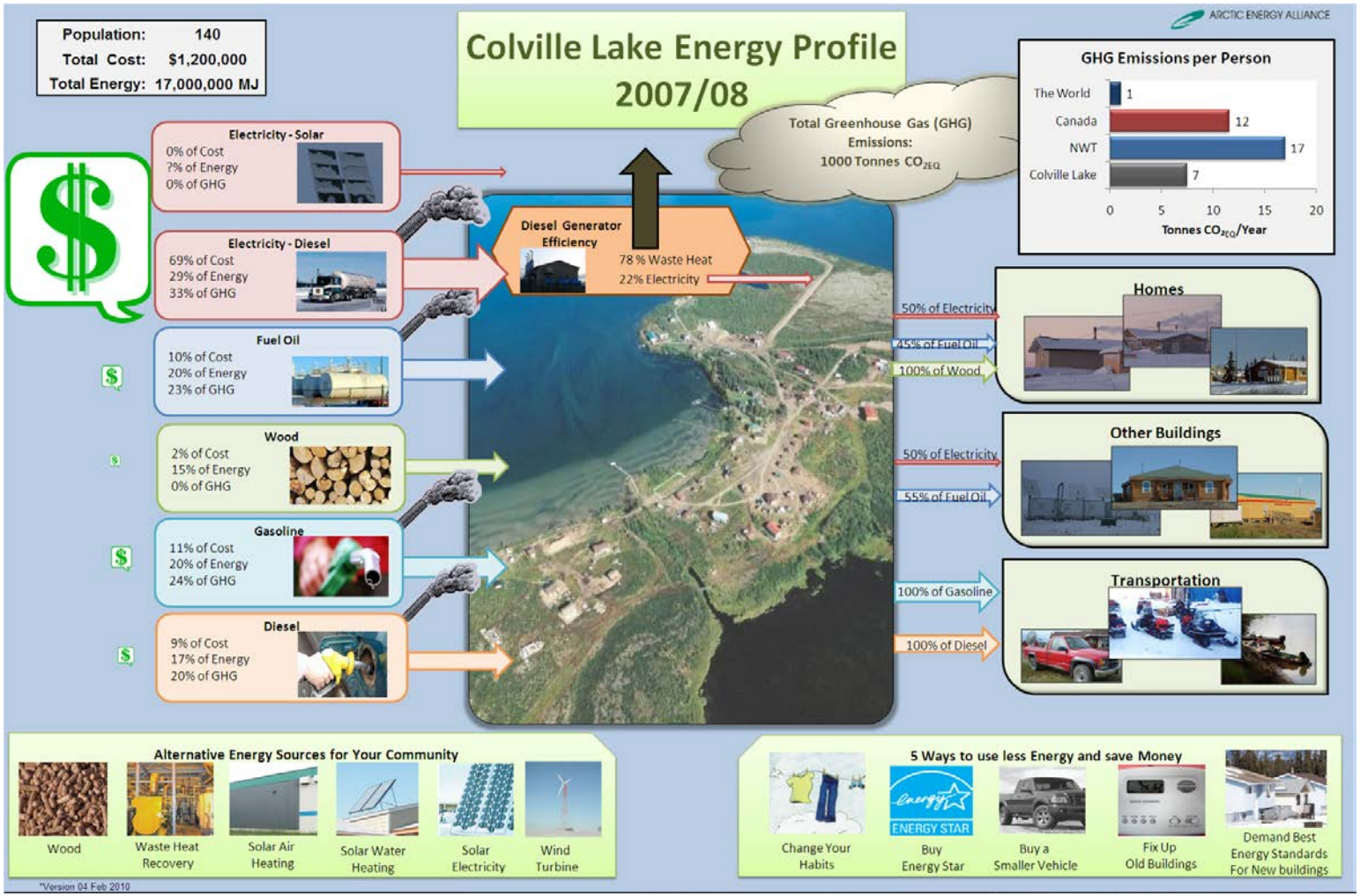
The 2007-08 data collected by Arctic Energy Alliance which is presented in the Colville Lake (Behdzi Ahda First Nation) Energy Profile shows the community spends approximately $1.2 million dollars annually on its energy use.

Most of this money - $828,000 (69%) - is spent to provide electricity to homes and other buildings in the community using a diesel powered generator. The diesel generator efficiency is at 22% which means 22% of the energy (fuel) used by the generator is converted

into electrical power. The rest of the energy (fuel) produces waste heat. The waste heat represents about $645,840.00 per year going up the chimney.

There are ways to trap the waste heat and pipe it to heat buildings in the community. This is called co-generation. Fort McPherson is a community that is successfully using co-generation.

Co-generation, investigating solar electrical technology, and considering using a central wood pellet boiler to heat the larger community buildings are outlined in the Potential Future Strategies section of this document. (pg. 20-22)


Population: 140
Total Cost: $1,200,000
Total Energy: 17,000,000 MJ
Colville Lake Energy Profile 2007/08
ARCTIC ENERGY ALLIANCE
Total Greenhouse Gas (GHG) Emissions: 1000 Tonnes CO_{2EQ}
GHG Emissions per Person
The World 1
Canada 12
NWT 17
Colville Lake 7
0 5 10 15 20
Tonnes $CO_{2(Q)}$/Year
Electricity - Solar
0% of Cost
7% of Energy
0% of GHG
Electricity - Diesel
69% of Cost
29% of Energy
33% of GHG
Fuel Oil
10% of Cost
20% of Energy
23% of GHG
Wood
2% of Cost
15% of Energy
0% of GHG
Gasoline
11% of Cost
20% of Energy
24% of GHG
Diesel
9% of Cost
17% of Energy
20% of GHG
Diesel Generator Efficiency
78 % Waste Heat
22% Electricity
50% of Electricity
45% of Fuel Oil
100% of Wood
Homes
50% of Electricity
55% of Fuel Oil
Other Buildings
100% of Gasoline
100% of Diesel
Transportation
Alternative Energy Sources for Your Community
Wood
Waste Heat Recovery
Solar Air Heating
Solar Water Heating
Solar Electricity
Wind Turbine
5 Ways to use less Energy and save Money
Change Your Habits
Buy Energy Star
Buy a Smaller Vehicle
Fix Up Old Buildings
Demand Best Energy Standards For New buildings
*Version 04 Feb 2010

How does an energy profile measure energy?

The community energy profile measures energy with units called mega joules or MJ and giga joules or GJ.

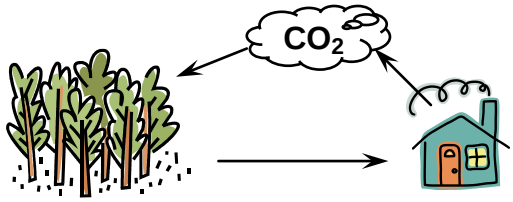
- One MJ equals the amount of energy it takes to boil 2 ½ litres of water.
- 1000 MJ = 1 GJ

To create an energy profile, we convert all units of energy into MJ so we can add up all the sources of energy and compare them. Other examples of units of energy supply include things such as litres for gasoline or diesel, cords for firewood, and kilowatt hours for electricity.

How does an energy profile measure greenhouse gases?

The community energy profile measures greenhouse gas emissions as carbon dioxide equivalent ($CO_{2\ EQ}$). Carbon dioxide is the most common greenhouse gas and we use it to show overall greenhouse gas emissions.

Each fuel has a standard formula to calculate greenhouse gases as $CO_{2\ EQ}$. We use this formula to calculate greenhouse gases for each fuel or energy.



The energy profile shows that wood has no greenhouse gas emissions. We count no greenhouse gases from wood because trees absorb carbon dioxide when they grow. This balances the greenhouse gases that wood produces when it burns.

Our community's Energy Goal

A goal is a short statement which describes where you want to get to and how you want things to be. It is realistic and achievable.

Our Energy Goal

- **Develop the capacity to provide for current and future energy needs from within the community and the Sahtu region.**

The community has taken a number of steps already to meet this goal. Most homes in Behdzi Ahda First Nation heat with wood. The community did a swap out of older wood stoves for new energy efficient wood stoves for their Elders. This resulted in the wood going further and the appreciation of the Elders.

The water treatment plant has a solar power unit. The unit functions well. The batteries were replaced and the community is waiting for the supplier to return to train local staff in ongoing maintenance of the unit. In the meantime the plant operates on backup diesel system.

In an effort to assess wind energy potential, a pre-feasibility study was conducted. Results within the area of study were not as positive as hoped for. There are some sites at higher elevation further from town that are uneconomic at present time but may warrant future study.

Our community's energy plan

This section of the community energy plan lists recommended strategies that can be adopted by Behdzi Ahda First Nation as a Community Energy Plan. A list of potential future strategies is also included.

These strategies are based on two sources:

- information about Behdzi Ahda First Nation energy use in the Community Energy Profile;
- participation by Behdzi Ahda First Nation representatives in the Community Energy Plan during the Sahtu regional ICSP workshop in November 2009.

The Community Energy Plan is a part of the ICSP process because energy planning has implications for community infrastructure planning, strategic planning and human resource planning.

The strategies relate to:

- Energy efficiency recommendations *(how to use energy differently)*
- Renewable energy project recommendations *(how to get energy from a different source)*

The strategies are grouped under:

- Recommended strategies (doable in the next little while)
- Potential future strategies (for future consideration)

Recommended Strategies

- **Apply for funding to implement the community energy plan**.

Behzi Ahda First Nation has limited community resources to implement the strategies identified in the community energy plan. Securing funding to implement the plan will increase the potential for success because those scarce community resources can be used to focus on, research, support and implement energy related actions.

- **Seek funding for a study to research and evaluate the potential to convert to local natural gas or oil supplies**.

Behdzi Ahda First Nation wishes to evaluate the possibility of converting to local natural gas or oil. This is one of the community's local resources. Oil and gas exploration has resulted in several discoveries in the area. Similar to the pre-feasibility study the community had completed on wind energy, the community wants to assess the potential for, and the cost effectiveness of using this resource in the community.

- **Educate community members on climate change and energy issues and encourage their participation in the community energy plan**.

Raising community awareness about energy issues and seeing energy as a community resource that everyone is responsible for, goes a long way towards achieving a community energy plan that benefits everyone.

Community awareness, participation and support can generate enthusiasm and interest. It also shares responsibility. This strategy could provide ideas, continuity and get-up-and-go to realize the Community Energy Plan. Any plan of action has a greater chance for success if community members, leaders and groups are behind it. Energy sources, their use and costs affect everyone in the community.

- **Research the use of renewable energy designs and technologies that would work in Behdzi Ahda First Nation**.

In addition to research already done on wind energy potential and the use of solar power at the water treatment plant, the First Nation wants to evaluate other renewable energy technologies that may reduce their reliance on outside energy sources.

The Sahtu region is discussing hydro electric potential and how that could benefit member communities. This is also an area of interest for Behdzi Adha First Nation. It is possible to also expand the use of solar technology and train community members in using and maintaining this technology.

- **Complete Energuide for houses audit**.

Arctic Energy Alliance does Energuide evaluations on homes to assess what needs to be done to raise the insulation value of the building and reduce energy consumption. There is a cost of $150 + gst for the initial evaluation and $150 + gst for the final evaluation after repairs and retrofits are completed. Energuide rebates, including the $300 paid for the evaluations, are paid after the final evaluation. Common retrofitting actions that can be taken to reduce energy consumption are adding insulation, replacing windows and doors.

- **Include community energy management as part of the community's ongoing responsibilities**.

There are a number of ways the community can incorporate energy management into its ongoing responsibilities. One example is adopting Energy Standards and applying them to any new building contracts. Arctic Energy Alliance has a ***Toolkit for Building Standards*** which can be used as a reference. The toolkit sets out building standards that can be included in a Request for Proposal and would require a contractor to build according to current energy efficiency standards.

Another example is to track energy use (heat and power bills) for a minimum of 2 years and use this information to have a yardstick energy audit of the building(s). A yardstick energy audit can provide baseline information about energy related deficiencies in existing buildings. The first step is to collect fuel and electricity bills for the last two years. These are compared against fuel and electricity costs for an average, equivalent size building in the NWT. Based on this information, informed decisions can be made about whether to upgrade an existing building or to build a new energy efficient building.

Potential Future Strategies

- **Evaluate the potential and costs for using co-generation technology at the diesel powered electrical generating plant**

A significant amount of heat escapes the plant through the chimney. There is potential to trap this heat and use it to heat other buildings through a piping system. This is called co-generation. The initial cost to set up a co-generation system would likely be offset by the reduced heating costs for the buildings that are tied into the co-generation system.

Fort McPherson is an example of a community that uses the waste heat from their power plant to heat other buildings. Behdzi Adha First Nations could discuss with NTPC the potential to capture this heat and direct it to other buildings in the community. The timing may be ideal for this, as there is talk of replacing the current power plant.

- **In partnership with NTPC, evaluate the potential and cost for a scrubber to be used at the diesel powered electrical generating plant.**

There are concerns about the amount of pollution that may be coming out of the plant. There is technology available that can be used to reduce significant amounts of pollutants. Again, this discussion could take place between Behdzi Ahda First Nation and NTPC as part of discussions about replacing the current power plant.

- **Investigate the potential for using a centralized wood pellet boiler to heat larger community buildings that are currently heated with fuel oil**

Behdzi Ahda could research and investigate the use of centralized wood pellet boiler to heat larger community buildings that are currently heated with fuel oil. A number of NWT community buildings are using wood pellet boilers to heat their community buildings.

Centralized heating systems use heating pipes (ducts or thermidors) to connect a number of buildings to one central boiler. The one boiler heats all the buildings. These are common in many places and are being used in the north.

An annual barge shipment of wood pellets to Fort Good Hope and trucking the load into the community, similar to how diesel fuel is currently transported is an option that would offset fuel oil heating costs for larger community buildings.

The ***NWT Community Wood Pellet Study, September 2009***, completed by Arctic Energy Alliance, takes into account the cost of barging bulk wood pellets to Fort Good Hope and moving bulk wood pellets via winter road from Fort Good Hope to Colville Lake, similar to how oil and gas are currently transported. The study calculates that switching from fuel oil heating to wood pellet boilers can significantly reduce heating costs by approximately 50%. (***NWT Community Wood Pellet Study, September 2009, Arctic Energy Alliance, pgs. 20,21)***, (study attached)

- **Research the potential to use solar electrical panels in the community**

Investigate the potential to use solar electricity panels to generate part of the community electrical energy needs. In order for this work well, it is important to make sure the knowledge of how to maintain these panels in good working order is in the community. Using solar energy as a source of electrical power would provide more energy independence for Behdzi Ahda First Nation.

- **Upgrade Existing Buildings**

Upgrading existing buildings makes sense where the cost of upgrading is less than the cost of replacing a structure. This can be determined by monitoring energy use and doing a yardstick energy audit on the structure. There may be government rebate funding for some upgrading and equipment replacement.

Monitor Energy Use

Keeping track of energy use as a matter of course does a number of things. Unexpected surges or drops will give an early warning sign when there are problems. It also helps identify possible future plans for upgrading structures and is the information required to do a yardstick audit. This will direct where upgrades can be made.

- **Adopt a Low/No idle policy for community vehicles**

Some communities in the NWT have chosen this as a way to reduce greenhouse gas emissions from idling vehicles, including ski-doos and 4-wheelers and to take a leadership role in changing community attitudes and beliefs.

- **Hold Winterization and Home Maintenance workshops**

This strategy is a very practical and hands on way to build community awareness and practical skills. The goal of a Winterization Workshop is to provide basic knowledge and skills to winterize a house – weather stripping, stopping leaks, covering windows with plastic, etc. and have the participants practice these skills. There are a number of winterization techniques such as weather stripping, plastic over windows and caulking that can reduce heat leakage.

Arctic Energy Alliance offers the Winterization Workshop, a short term workshop for high school students. It is intended to provide students with the basic knowledge and skills to winterize a house – stopping leaks, covering windows with plastic, etc. As part of their training, the students assist community Elders by winterizing their homes. The students earn school credit for their work and the Elders homes are winterized. This is provided free of charge.

Home Maintenance Workshops have a similar goal – to provide basic knowledge and skills to maintain a home in good condition and identify ways to increase energy efficiency. This could include cleaning and/or replacing furnace filters, lightbulbs, caulking, etc. and learning about ways to increase energy efficiency.

- **Replace Appliances**

Replacing older appliances with new, Energy Star models is another way to reduce power consumption. There are rebates available for these purchases, provided the appliance(s) purchased are on the approved list. A copy of the proof of purchase and a completed form may be faxed to Arctic Energy Alliance for payment. Payment generally takes 4 – 6 weeks.

Promote replacing appliances with energy efficient, Energy Star appliances. Provide people with information about the brands and models that qualify for rebates and the forms used to apply for the rebates.

- **Community Evaluation and Decision Making for Large Scale Alternative Energy Projects**

Make a plan for evaluating future large scale energy projects – develop criteria for evaluating projects and outline the community decision making process.

Develop a protocol and process to work with community members and technical advisors to evaluate large scale alternative energy projects such as solar and hydro.

Next steps

Now that a list of strategies has been identified, the next step is to develop an implementation plan for each strategy. An implementation plan describes how each strategy will be carried out.

It is helpful to keep track of what happens to see you things work.

The following questions can be asked:

- Did we complete all our projects?
- How do we know the projects are done?
- What things went well as we did our work?
- What things do we need to change in the future?

When the energy plan is complete, the cycle starts again. A new community energy profile can be created and new projects can be identified. The learning from one cycle is applied to the next.

Key words

We encourage you to understand and learn to use some key words about energy planning.

Capacity

Capacity is the knowledge, skills, people power, time, energy, money, and other resources that a person, group, or community has. We can increase capacity any time we increase any of these resources.

$CO_{2\ EQ}$ - Carbon dioxide equivalent

$CO_{2\ EQ}$ measures greenhouse gas emissions. Carbon dioxide is the most common greenhouse gas and we use it to show overall greenhouse gas emissions.

We measure greenhouse gas emissions as Tonnes $CO_{2\ EQ.}$

One Tonne = 1000 kilograms.

Cogeneration

Cogeneration is a system and technology that takes waste heat from a diesel generator and pipes it to a nearby building, to heat that building.

Community energy plan

A community energy plan shows how a community changes how they use energy today, to meet their vision of how they want to use energy more wisely in the future. It shows the process and information the community uses to decide what they want to do, how they want to do it, and who will do the work.

Energy audit

An energy audit measures how a building uses energy and what you can change in the building, to save energy.

Energy efficiency

Energy efficiency means to use less energy and still do the same amount of work. An energy efficient vehicle uses less gas to go the same distance. An energy efficient refrigerator uses less electricity to keep things cold. Energy efficient habits are things people do that use less energy – such as turning off lights when you don't use them, walking instead of driving, using a clothesline instead of a dryer.

Demonstration project

A demonstration project is something we decide to do once, to show that it works. For example, to do a demonstration project for solar water heating we could install a system in a building like the nursing station. We'd keep track of things like how much money we save over one year, compared with when we didn't have the solar water heating system.

Feasibility / Pre-feasibility study

A feasibility study is when we learn things to find out if something is possible. For example, to do a feasibility study for a run-of-river hydro project, we'd pick one or more sites we think might be good. We'd measure things such as water flow and the height of a waterfall over a year or more.

A pre-feasibility study is when we learn things to help decide if we want to do a feasibility study. In the example above, we'd learn general things about run-of-river hydro and we'd decide which sites might be good to look at more closely.

Fossil fuels

Fossil fuels include things like gasoline, diesel oil, and natural gas. Fossil fuels come from deep in the ground and they are a nonrenewable resource. Once we use them up, they are all gone.

Greenhouse gases and climate change

Greenhouse gases are part of the earth's atmosphere - gases such as carbon dioxide, methane, nitrous oxide, and others. Sunlight comes through the atmosphere and hits the earth's surface. Some light energy bounces back into the atmosphere as heat energy. Greenhouse gases trap the heat and keep it in the atmosphere.

Many greenhouse gases come from nature. Human activity also creates lots of greenhouse gases – especially burning fossil fuels.

Over time, the earth's temperature should stay about the same if amount of energy coming in from the sun is the same as the energy going back into space. Right now we burn too much fossil fuels and produce much greenhouse gases – we've upset the balance. This causes climate change.

Renewable energy

Renewable energy is energy that comes from things that can last forever. Renewable energy is never all gone. Examples of renewable energy sources include the sun, wind, moving water, and wood.