Community Energy Plan

Norman Wells

2007

ARCTIC ENERGY ALLIANCE

Introduction and Acknowledgements

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

We thank the following people who helped create this community energy plan for our community:

- All members, past and present of the Community Energy Planning Committee
- Ian Freemantle, SAO Town of Norman Wells;
- Alec Simpson, Former SAO, Town of Norman Wells;
- Ron Raynor, Former Project Manager, Town of Norman Wells;
- Andrew Robinson, Arctic Energy Alliance;
- Pembina Institute; and
- All those who supported the efforts of this plan both directly and indirectly.

To learn more about energy planning in our community please contact:

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

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What is a community energy plan?

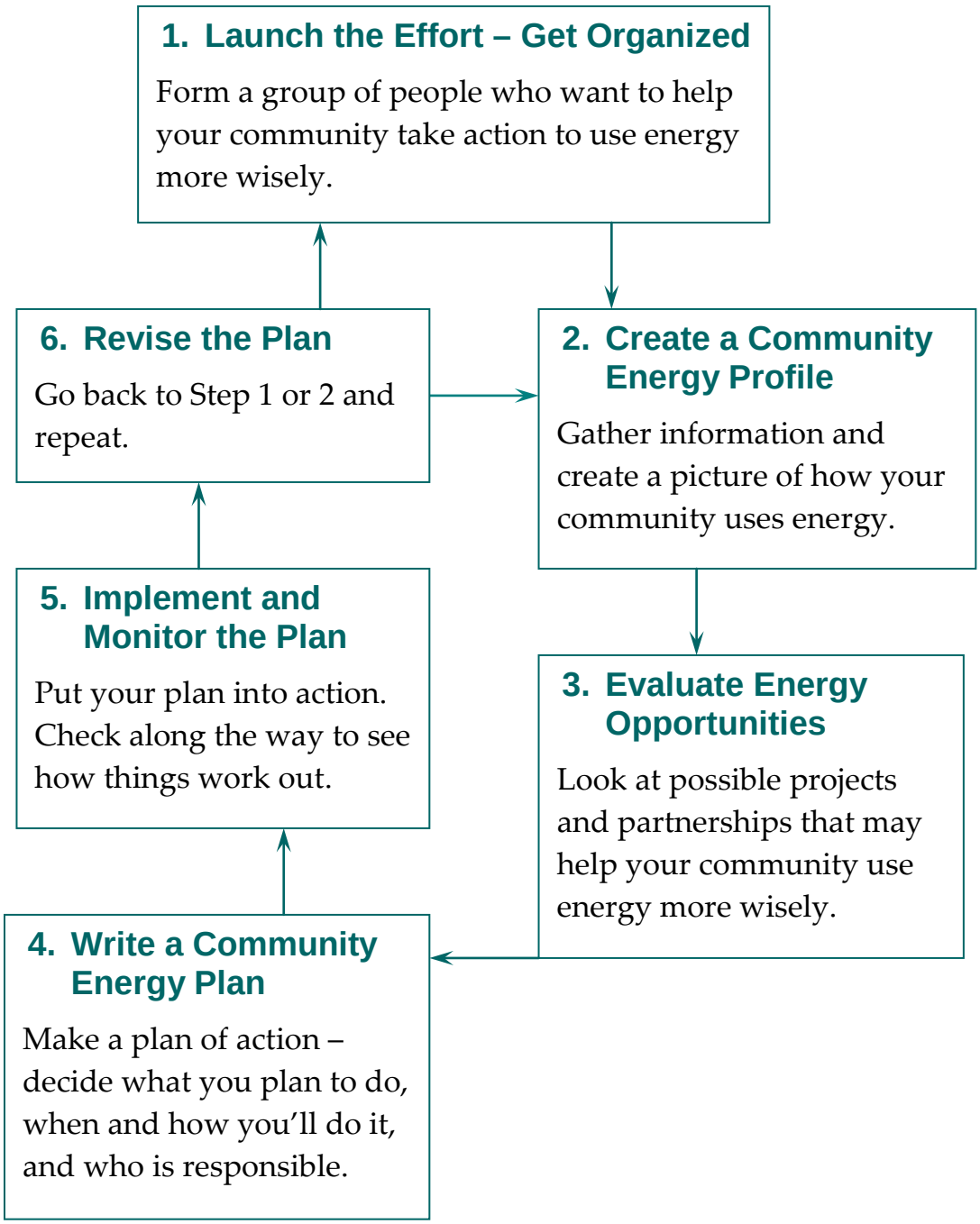
An energy plan shows what a community decides to do, over a certain period of time, to change how we use energy – to find better ways to make and use energy. We decide to do things today because we have a vision of a better, cleaner energy future.

The diagram on the next page shows a 6-step process a community can use to develop an energy plan. This Community Energy Plan includes some general and community-specific information for each step.

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.

6 Steps - Energy Planning Process



Energy planning is a cycle. The cycle might last for one, three, or five years. During each cycle a 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 better, 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.

Why is a community energy plan important?

Do you want your community to:

- Save money and create local jobs?
- Have less pollution and produce less greenhouse gases?
- Build healthy ways of living and help people learn new and creative skills?

A community energy plan helps a community do all these things, and more. People will always need and use energy. We live in the north. We need heat and light for our homes and other buildings in winter. Our modern world depends on electricity for many things besides light - things like appliances, machines, computers, TVs, radios, music, etc.

We get most of our energy from fossil fuels and we know fossil fuels won't last forever. They get more and more expensive as time goes by and we know burning them causes climate change. We also know that in many ways our modern society encourages people to waste energy.

A community energy plan can help our community save money and reduce greenhouse gas emissions. It can bring economic, environmental, and social benefits to a community.

What are the economic benefits of community energy planning?

The main economic benefits of community energy planning are to:

- Develop local jobs to increase energy efficiency and to produce and maintain more local sources of energy.
- Keep more of the money that we spend on energy in the community.
- Reduce energy costs and create economic development opportunities.
- Apply for and receive government funding for energy related projects. One example is Gas Tax funding.

Did you know?

- 93% of NWT energy supply is imported fossil fuel - 400 million litres per year.
- The NWT spends $230 million a year on energy – we spend more than half that outside the NWT.

In the NWT about 42,000 people live in 32 communities. We mostly use hydro and diesel generators to produce electricity. We pay a lot to bring fuel north to run the diesel generators, to heat our homes and other buildings, and to drive our cars and trucks. NWT energy costs can be up to 10 times higher than in other parts of Canada.

Energy efficiency and renewable energy projects provide local employment. Research shows that renewable energy projects create up to 12 jobs per million dollars spent, while energy efficiency improvement projects create even more

Projects that create local employment have a multiplier effect – they create more jobs than just the jobs related directly to the project. When people have jobs they spend money in their community and create jobs for other people.

Did you know?

If a community replaces imported, non-renewable fuel with local, renewable sources of energy, more money stays in the community.

The community can use that money to provide other community services. And the community has a sustainable, more independent, secure energy supply.

Local energy efficiency and renewable energy projects help the economy in other ways too. If people in the community spend less money on their energy bills, they have more money to spend on other things. This potentially leaves more money in the community.

What are the environmental benefits of community energy planning?

The main environmental benefits of community energy planning include:

- Use less diesel and gasoline fuel, and produce less toxic exhaust local air pollution.
- Have fewer fuel spills and reduce local pollution.
- Replace diesel power plants or use them less, and reduce noise pollution.
- Use less fossil fuel and produce less greenhouse gas emissions.

Did you know?

Diesel exhaust:

- Contains over 40 toxic air contaminants,
- Increases the risk of lung cancer, and
- Can cause coughs and aggravate asthma.

Human energy use affects the environment and human health. In the past, nature mostly absorbed these effects - the scale and intensity of human energy use did not overwhelm the natural balance. Today the global population keeps growing and people around the world use more and more fossil fuels such as diesel and gasoline, the main source of greenhouse gas emissions.

Burning fossil fuels the largest source of greenhouse gas emissions in the NWT. We produced 1,750,000 Tonnes of CO_2 in 2001.

Greenhouse gas emissions are the main cause of climate change. The effects of climate change are more severe in the north than in the southern parts of Canada. Right now most of the world depends on fossil fuels for energy, just as we do in the NWT. And although we have a small population, we're responsible to do our part.

Did you know?

- NWT greenhouse gas emissions increased more than 60% between 1996 and 2001.
- The Arctic Climate Impact Assessment states that the Arctic is warming at twice the rate of the rest of the world.

Overall the NWT produces a relatively small amount of greenhouse gas emissions. But per person, we produce more than many other parts of the world. We need to take responsibility and do our part to help reduce greenhouse gas emissions.

Sara Kuptana, Sachs Harbour, 1999

Sila (the weather and climate) has changed all right. It is a really late fall time now, and really fast and early springtime. Long ago the summer was short, but not anymore.

What are the social benefits of community energy planning?

The main social benefits of community energy planning are to:

- Create warmer, more comfortable buildings that last longer.
- Use local sources of energy so we don't have to depend on outside sources of energy.
- Create opportunities for people to get training and develop new skills.
- Make the community more sustainable.
- Get the whole community involved in making decisions, and build community spirit and pride.

Did you know?

An average northern house uses between 4 and 8 cords of wood per year for heat.

An efficient, well-insulated house uses only 2-3 cords per year and is more comfortable

Our community's vision

During Step 1 of the energy planning process, the community formed an energy planning committee. The committee developed a vision to guide the process.

A vision is a short statement of what the energy committee sees in the future – an ideal picture of how we'd like things to be. The vision helps the energy committee always see the big picture of what we're working for and what we care about, and encourages us to keep working, even when it's hard.

Energy Committee Members

The Norman Wells Energy Planning Committee has had numerous members over the past few years. The committee chairs were:

- Julie Ellison
- Joe Devereaux
- Tim Melnyk

Our Vision

In November, 2004, a community energy planning working group was formed to over-see the creation of a community energy plan in Norman Wells. The group has adopted the following as its "vision statement":

> "**To make substantial reductions to the community's energy consumption and investigate/promote alternate energy resources**"

On March 7, 2007 the Norman Wells Community Energy Planning (NW CEP) Committee confirmed this vision statement.

Goals & Targets

In March, 2007 the community energy planning committee modified the following goals and targets for the NW CEP to be:

> **"Our goal is to attain positive change by the end of the decade"**
>
> **"All targets are to reduce energy usage (GJ/person) by the end of the decade, based on the 2003/04 baseline period:**
>
> - **Municipal: 25%**
> - **Residential: 10%**
> - **Commercial/ Institutional: 10%**
> - **Transportation: 10%**
>
> **Norman Wells Over All: 10%"**

Our community's energy profile

This section of the community energy plan gives a brief summary of our community's energy profile that we produced during Step 2 of the energy planning process. For more details, look at the separate community energy profile report. Contact the community energy committee to get a copy.

What is a community energy profile?

A community energy profile describes energy supply and energy use in our community, for a year. It shows:

- The different fuels a community uses to produce energy
- How much money a community spends on energy
- How much greenhouse gases each fuel produces
- How much energy a community uses in homes, other community buildings, and for transport within the community
- Some basic ideas a community can explore to use less energy, produce less greenhouse gases, and save money

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.

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.

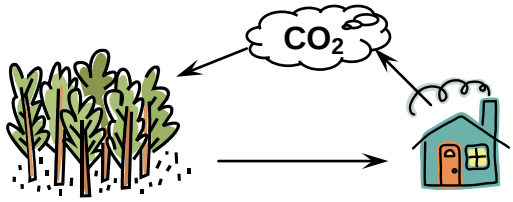
- One MJ equals the amount of energy it takes to boil 2 ½ litres of water.
- 1000 MJ = 1 GJ

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.

Insert community energy profile poster

See also energy profile report from February, 2005

Energy opportunities for our community

This section of the community energy plan talks about Step 3 of the energy planning process – evaluate energy opportunities. To complete this step of the process we did three main things:

- Raise awareness and collect ideas
- Identify potential projects
- Evaluate potential projects

Raise awareness and collect ideas

First we held different activities in the community to raise awareness about our community's energy use. During these activities we discussed the community's energy profile and learned about some different energy efficiency and renewable energy projects we might consider doing in our community.

Community meetings:

February 2005 – 2-day workshop with Pembina Institute
May 2005 – Community meeting
February 2006 – Sahtu Housing Conference
March 2006 – Workshop on weatherization with Arctic Energy Alliance
Fall 2006 – Community meeting on NWT Energy Strategy with ITI
October 2006 – Energy Audits conducted on residences
July 2007 – Public meeting to discuss future energy issues in the Town

We collected and discussed ideas at all these meetings and also informally.

Summary of what we did to evaluate energy opportunities for our community

This is a summary of the energy opportunities we looked at, how we evaluated energy opportunities, and the projects we decided to focus on.

During the two-day workshop with the Pembina Institute in February 2005, we put all the ideas on "sticky-notes" and located the idea on a chart with two axes – one showing how much effect the idea would have and one showing the level of effort required. We then gave each idea a score, based on where it was located on the chart. Next, we collected the ideas and their scores in a spreadsheet and grouped them together into similar categories.

We also evaluated some ideas by doing demonstration projects such as upgrading the lighting systems at the Community Hall and other buildings and also upgrading heating systems. Committee members also implemented energy retrofits on their facilities including the Legion and GNWT offices.

We are also investigating a propane-air system to supplement the Natural Gas that supplies the community from Imperial Oil's operations.

The result was the ten projects that are listed as our community's Energy Plan.

Scenarios of future energy use

Typically, this section of the community energy plan shows a picture of what is possible if our community implements certain energy efficiency and renewable energy projects.

It would compare total energy costs and greenhouse gas emissions under these scenarios:

- No energy saving projects – Our community keeps using energy the way we do right now.
- Energy efficiency scenario – Our community takes action on energy efficiency projects.
- Renewable energy scenario – Our community takes action on renewable energy projects.
- Energy efficiency and renewable energy scenarios combined.

Each scenario would be reviewed in four time periods: at five, 10, 15, and 20 years in the future.

Certain things would be assumed for all the scenarios:

- Each scenario accounts for population changes over 20 years, as defined by the NWT Bureau of Statistics.
- Fuel prices stay the same over time. Most people believe the prices will keep rising, so there may be more savings than we show.
- In the energy efficiency scenario, 'energy costs' is the amount people spend every year on energy bills. This does not include things such as the money a person pays to fix up an older building or the money they save when they buy a small vehicle instead of a big one.
- In the renewable energy scenario, total energy costs do not include the money a community pays to set up a hydro project or to buy efficient wood stoves.

The Town of Norman Wells is presently undergoing an important period of transition. Historically, the main portion of town has been heated using a natural gas system which was operated by the GNWT until 1996 when it was sold to the Town for $1. The Town has had a supply agreement with Imperial Oil Resources to provide gas for heating.

In March of 2007, Imperial Oil formally invoked its 365-day termination clause to supply gas to the Town. Because of the invocation of this clause, the Town must now find alternate methods by which to provide heat to the users previously supplied by gas.

As we have not determined the method by which this need will be filled, as of the date of publication of the Community Energy Plan, any efforts toward calculating future greenhouse gas emissions cannot be accurate.

As the decline of gas supply to Town has arisen with urgency since the February 2005 brainstorming session, the issue has been added as the 10th project in the Community Energy Plan.

Our community's energy plan

This section of the community energy plan lists the projects we plan to do. For each project we also provide a brief summary for each project that shows:

- Energy efficiency or renewable energy project
- Project name and description
- Outline of how we plan to carry out the project

List of projects in our community energy plan

	Energy Plan – Final Recommendation: The Town of Norman Wells should:	**Next Step – The Town/CEP committee should:**
1	Include community energy management as part of the Town's ongoing responsibilities	Hire an energy coordinator to help complete the community energy plan.
2	Apply for more funding to implement the Community Energy Plan	Write funding applications & coordinate with all partners.
3	Reduce the energy used by and GHG emissions from its buildings, facilities, operations and fleet of vehicles by 25% over the next 3 years.	Start an on-going process to implement the recommendations of past energy audits and look for future possible improvements. Document and use savings to finance future improvements.
4	Educate the public on climate change and energy issues and engage them in the	Create a long-term communications plan for the CEP.

	community energy plan.	
5	Investigate "micro-cogeneration" to provide heat and electricity.	Coordinate with AEA, the housing corporation & other partners to do a pre-feasibility study and look for funding.
6	Provide financial incentives for energy efficiency and renewable energy to home-owners and businesses.	Research how a Demand Side Management (DSM) program could be implemented in NW – for both electrical and gas consumption.
7	Establish guiding principles for sustainable communities and apply these principles to all planning activities	Research guiding principles for sustainable communities
8	Encourage that buildings in Norman Wells be upgraded to improve their energy efficiency	Coordinate with partners to promote the EnerGuide for houses program and CBIP for commercial buildings. Combine with #5
9	Encourage the use of renewable energy designs & technologies.	Partner with AEA, NRCan and others to do pre-feasibility studies on wind energy, "in-river" hydro and imported wood pellets for heating.
10	Install a Propane-Air mix system to provide extra capacity at times when there is not enough Natural Gas available from Imperial Oil. This system will eventually take over as the primary heating fuel source for most of the community tied to the natural gas distribution network.	The Town of Norman Wells has formed a Joint Planning Committee with the GNWT to investigate options. Once all options are considered, the final option will be agreed upon and implemented.

1 - Project work plan

Project description / results: Include community energy management as part of the Town's ongoing responsibilities

Tasks	Person responsible	Schedule	Budget
Hire an energy coordinator to help complete the community energy plan.	Town Council and Town Manager	September: CEP committee to review CEP; Early October: Council review for adoption and forward to MACA	$5000

2 - Project work plan

Project description / results: Apply for more funding to implement the Community Energy Plan

Tasks	Person responsible	Schedule	Budget
Write funding applications & coordinate with all partners.	Community Energy Planning Committee	Not seeking funding at this time. The committee will draw up funding proposals as new projects are investigated. Ongoing to 2010.	

3 - Project work plan

Project description / results: Reduce the energy used by and GHG emissions from its buildings, facilities, operations and fleet of vehicles by 25% over the next 3 years.

Tasks	Person responsible	Schedule	Budget
Start an on-going process to implement the recommendations of past energy audits and look for future possible improvements. Document and use savings to finance future improvements.	Town Manager	2010	Paid by existing staff wages.
Furnace retrofits, lighting retrofit at Community Hall, Arena, Curling Club, Town Shop, Town Office. Lighting retrofits done in Fire Hall, Community Hall, Area, Town Office. Furnace Retrofit – Fire Hall, Town Hall, WT Plant, Town Shop.	Town Manager	2010	Energy Fund Lighting $52,00.00 Furnaces $160,000.00

4 - Project work plan

Project description / results: Educate the public on climate change and energy issues and engage them in the community energy plan.

Tasks	Person responsible	Schedule	Budget
Create a short-term communications plan for the CEP. Create a long-term communications plan for the CEP.	Community Energy Planning Committee Community Energy Planning Committee	September 2007 September 2008	To be completed by the chairperson with input from the committee. To be completed by the chairperson with input from the committee.
Coordinate workshops and home energy audits for residents	Community Energy Planning Committee	Sept 2007	Home energy audits to be financed by individual homeowners. $500.00 for the workshop.

5 - Project work plan

Project description / results: Investigate "micro-cogeneration" to provide heat and electricity.

Tasks	Person responsible	Schedule	Budget
Coordinate with AEA, the housing corporation & other partners to do a pre-feasibility study and look for funding.	Town Manger/ Manager, Utilities	2010	Paid by existing staff wages.

6 - Project work plan

Project description / results: Provide financial incentives for energy efficiency and renewable energy to home-owners and businesses.

Tasks	Person responsible	Schedule	Budget
Research how a Demand Side Management (DSM) program could be implemented in NW – for electrical, water and gas consumption.	CEP Committee, and senior Town staff	August 2008	Unsure at this time, more research is required.
Implement DSM Program if feasible	Town Staff	September 2008 (ongoing)	Unsure at this time, more research is required.
Analyze effectiveness of DSM Program	CEP Committee with information from the Town	Fall 2009 (ongoing)	Unsure at this time, more research is required.

7 - Project work plan

Project description / results: Establish guiding principles for sustainable communities and apply these principles to all planning activities

Tasks	Person responsible	Schedule	Budget
Research guiding principles for sustainable communities. (see Yellowknife Energy Plan for study)	Public Works Manager and Utilities Manager	By March 2008	Paid by existing staff wages.
Amend zoning by-laws as required based on research findings.	Town Planning and Land Use Committee/ Town Council	Ongoing as research is completed on different topics.	None required.

8 - Project work plan

Project description / results: Encourage that buildings in Norman Wells be upgraded to improve their energy efficiency

Tasks	Person responsible	Schedule	Budget
Coordinate with partners to promote the EnerGuide for houses program and CBIP for commercial buildings. Combine with #5	Town Planning and Land Use Committee, CEP Committee	Ongoing, with issuing of building permits	Not required.

9 - Project work plan

Project description / results: Encourage the use of renewable energy designs & technologies.

Tasks	Person responsible	Schedule	Budget
Partner with AEA, NRCan and others to do pre-feasibility studies on wind energy	CEP Committee	Sept 2007 to Sept 2009	No cost to the town.
Partner with AEA, NRCan and others to do pre-feasibility studies on "in-river" hydro	CEP Committee	Prepare funding proposals for April 2008, hopefully implement by June 2008	50 k (Require a bathometric survey of area between NTCL dock and Island #1, a year round water flow meter installed in at least two locations and divers to inspect the potential areas.
Partner with AEA, NRCan and others to do pre-feasibility studies on solar heating	CEP Committee	Prepare funding proposals for April 2009, hopefully implement by June 2009	25 K (20 K for Band Office demonstration project in Jean Marie River.)
Partner with AEA, NRCan and others to do pre-feasibility studies on imported wood pellets for heating.	CEP Committee	Prepare funding proposals for April 2008, hopefully implement by August 2008	10 to 20k depending upon how many units and in which buildings they will go in.

10 - Project work plan

Project description / results: Install a Propane-Air mix system to provide extra capacity at times when there is not enough Natural Gas available from Imperial Oil. This system will eventually take over as the primary heating fuel source for most of the community tied to the natural gas distribution network.

Tasks	Person responsible	Schedule	Budget
Develop Tender documents for air-mix system	Town Manager/ Joint Planning Committee	August 2007	Paid by existing staff wages + Energy Fund.
Develop cost estimates on proposed solution	Joint Planning Committee	August 2007	Paid by existing staff wages + Energy Fund.
Prepare bid package for air-mix system	Town Manager/ Joint Planning Committee	September 2007	Paid by existing staff wages + Energy Fund.
Develop lot for Propane Tank Farm	Public Works Manager/ Utilities Manager	September 2007	100 K (Energy Fund)
Award contract to successful bidder on air-mix system	Town Council	November 2007	Paid by existing staff wages + Energy Fund.
Transport air-mix system to town on winter road	Public Works Manager/ Utilities Manager	February 2008	15 K Paid by Energy Fund
Begin construction for peak shaving system	Public Works Manager/ Utilities Manager	2010	Paid by Energy Fund
Implementation as fully operational system	Utilities Manager	2010	Taxpayers.

Next steps

Now we have a community energy plan we're ready for Step 5 of the planning process. During Step 5, our community takes action to carry out the plan. This happens over the period of time for this energy plan.

As we take action, we keep track of what happens to see how things work. We answer questions such as:

- 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 we complete this energy plan, we start the cycle again. During Step 6 of the planning process, our community does another energy profile, identifies new projects, and writes a new energy plan. We apply what we learned during the planning cycle and start the cycle again, to keep working toward our vision of a clean energy future.

The energy committee recommends that:

- Our community adopts this energy plan for the time period 2007 to 2012, and do the next energy profile in 2012.
- Our community form an implementation committee to oversee Step 5 of the planning process, to help carry out the plan.

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.