Community Energy Plan

Deline 2007

ARCTIC ENERGY ALLIANCE

Acknowledgements

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

- The community, who took the time and energy to participate
- The Northwest Territories Power Corporation and the Petroleum Products Division of the GNWT, who shared their data.
- Staff at the Charter Community of Deline
- The Arctic Energy Alliance who facilitated the process

To learn more about energy planning in Deline please contact:

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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

The Arctic Energy Alliance (AEA) in partnership with the Charter Community of Deline produced this Deline Community Energy plan.

This energy plan shows that Deline could reduce its use of fossil fuels and production of greenhouse gas emissions by 86% over the next 20 years. This could be done using existing technologies that would also save money after the changes were made.

The Charter Community of Deline has already done some successful energy projects:

- A survey of residential energy use
- 20 EnerGuide for Houses home evaluations

This community energy plan suggests what the Charter Community of Deline should do next:

1. Create a vision and adopt targets for energy use and greenhouse gas reductions.
2. Create a committee and hire a coordinator to put these recommendations into action.
3. Apply for more funding.
4. Develop Energy Efficient habits policy.
5. Use Energy Efficient equipment and appliances.
6. Use energy efficient vehicles.
7. Build new buildings that save energy.
8. Renovate older buildings so they save energy.
9. Look into solar hot water heating.
10. Look into run-of-river hydro.
11. Look into efficient wood heating.

The Deline community council should review this plan, make changes and then adopt it as the Deline community energy plan.

Introduction

This Community Energy Plan report explains what Deline did so far during the energy planning process, and suggest what the Deline community council should do next. There is also an Energy Profile report that gives more information on how energy is used now in Deline.

The idea of an energy plan for Deline started in the summer of 2005 when AEA received funding from the Government of Canada to do 4 energy plans in smaller NWT communities. AEA asked for letters of interest from communities and the community of Deline responded and was one of the communities chosen. Deline received $12,000 towards completing an energy plan.

Most of the $12,000 was budgeted to hire an energy coordinator and to pay for energy workshops in the community, but the community SAO was being replaced and no energy coordinator was hired. Instead, council chose to do a survey of resident's energy use, to pay for 20 EnerGuide for Houses assessments of private homes and asked the Arctic Energy Alliance to give suggestions about what could be in Deline's energy plan.

This community energy plan explains how energy is used in Deline today, what the community has done to improve the way energy is used and gives suggestions for future actions. The Deline community council should review this plan, make changes and then adopt it as the Deline community energy plan.

What is a community energy plan?

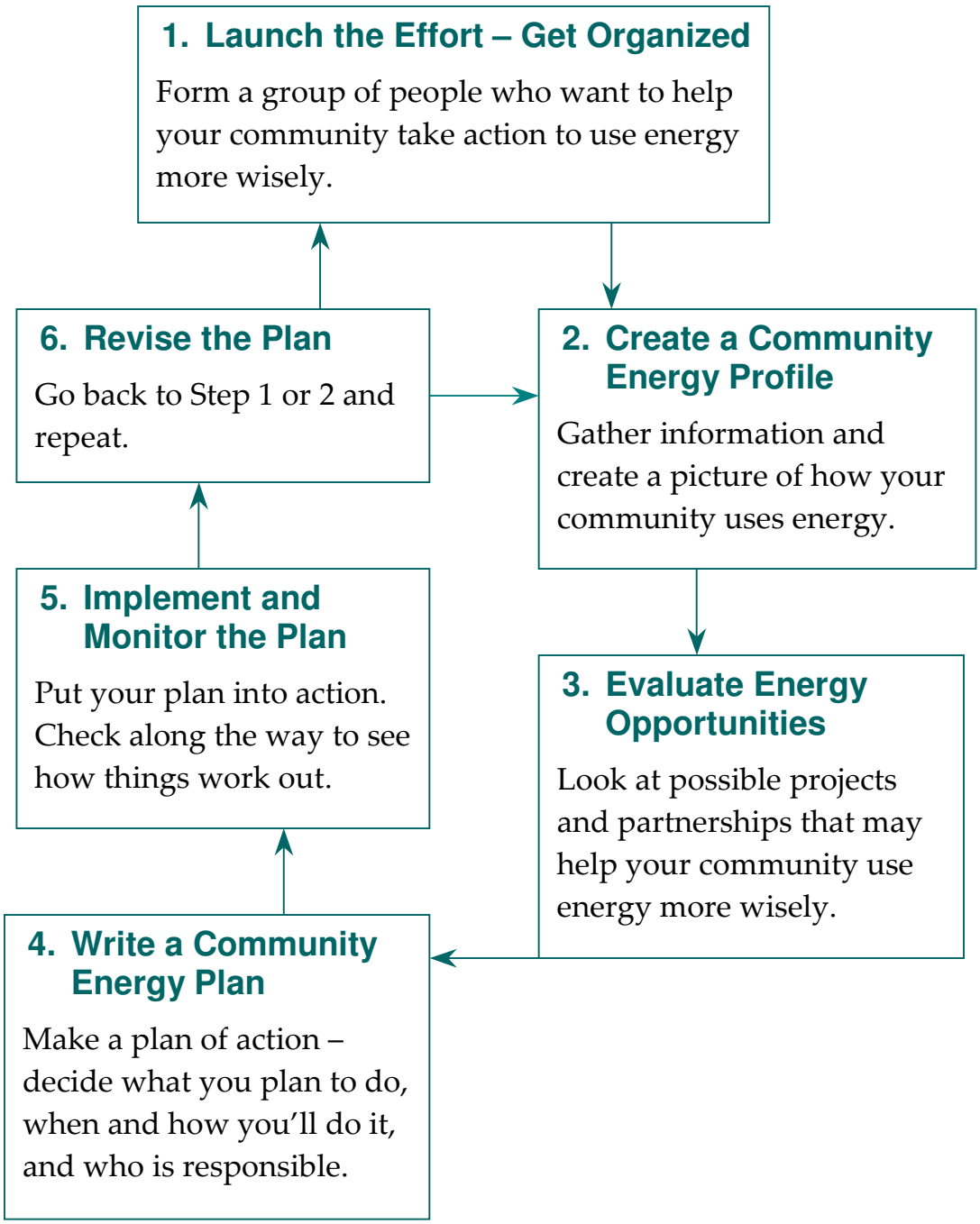
An energy plan shows what a community decides to do, over a certain period of time, to change how we use energy – to find better ways to make and use energy. We decide to do things today because we have a vision of a better, cleaner energy future.

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 your community save money and reduce greenhouse gas emissions. It can bring economic, environmental, and social benefits to a community.

Our community's vision

During Step 1 of the energy planning process, the community council often forms an energy planning committee. The committee develops a vision to guide the process.

A vision is a short statement of what the community 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.

History of Energy Planning in Deline

- In March 2005 the Arctic Energy Alliance created a Community Energy Profile of Deline.
- In July 2005, Deline First Nation expressed interest in creating a Community Energy Plan.
- Arctic Energy Alliance met with the Charter Community Council in September 2005 and February 2006 to discuss community energy planning. The Charter Community received $12,000 from the Arctic Energy Alliance towards creating an energy plan.
- In March 2006 a Community Energy Survey was created and 60 out of 180 houses answered the survey.
- In September 2006 the Charter Community of Deline set-up and subsidized the cost of 20 home energy assessments (EnerGuide for Houses evaluations) Arctic Energy Alliance did the evaluations.

Energy Committee Members

- Deline does not have an energy committee. This plan has was created with direction directly from the Charter Community Council.

Our Vision

- No vision has been created. The council should think about creating one.

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 charter community office 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.

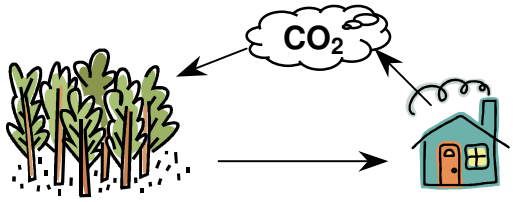
- One MJ equals the amount of energy it takes to boil 2 ½ litres of water (a mid-sized kettle).
- 1000 MJ = 1 GJ

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.



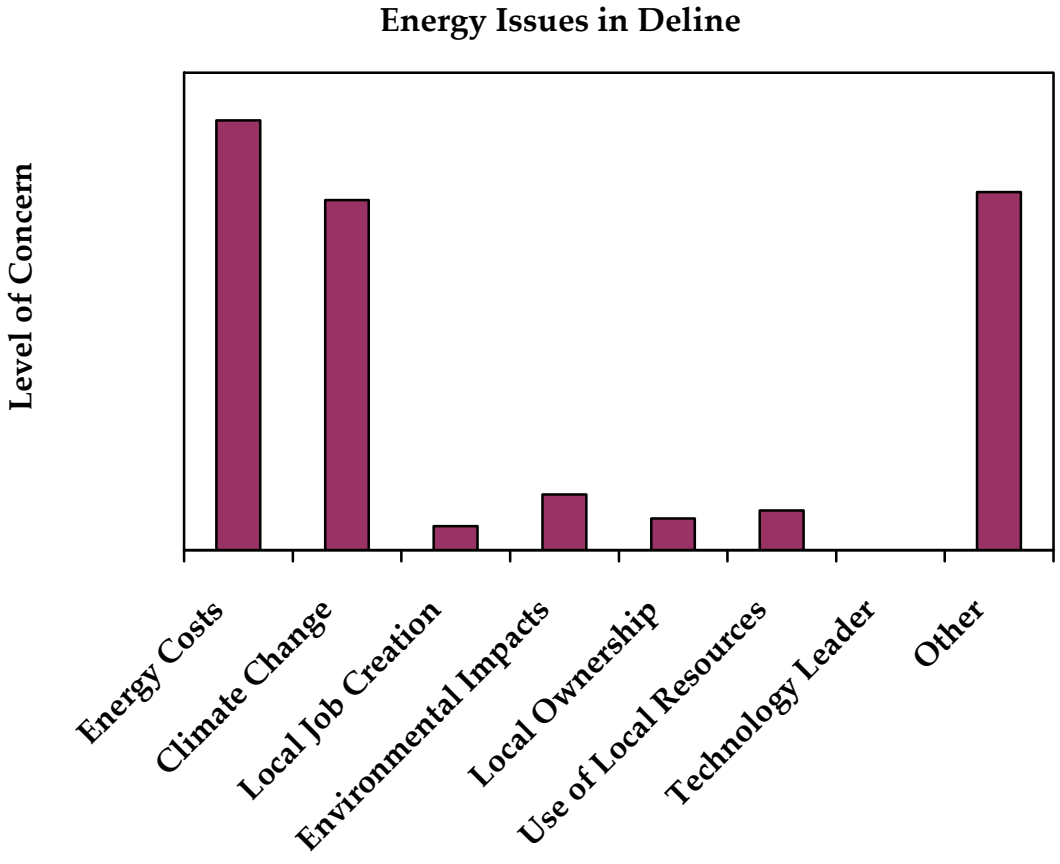
The energy profile shows that wood has no greenhouse gas emissions. We count no greenhouse gases from wood because trees absorb carbon dioxide when they grow. This balances the greenhouse gases that wood produces when it burns.

Deline Community Energy Survey

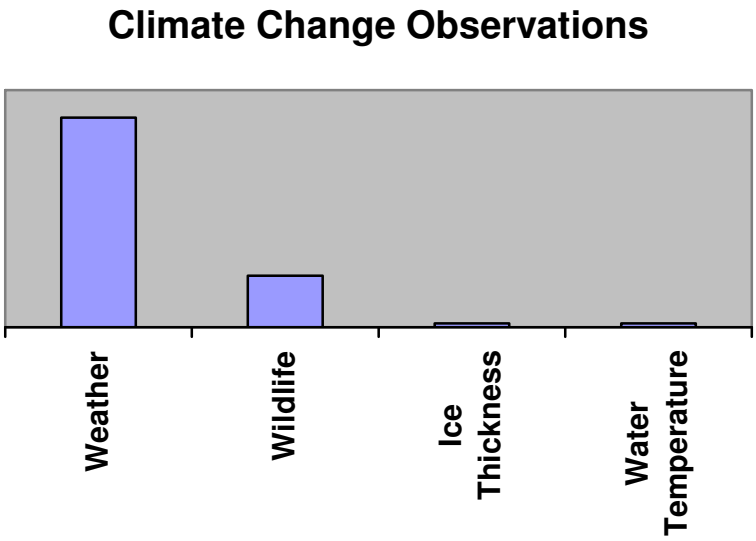
In March 2006, 60 out of 180 houses (30%) in Deline completed the Deline Community Energy Survey. The information from the survey was compared to the original Deline Energy Profile to see if there were any differences. The results from the survey are summarized in the next five pages.

Community Energy Concerns and Ideas

Community members were asked to rank their top three concerns regarding energy use:



Community members were asked to list specific changes they had noticed that could be caused by climate change:



Community members were asked if they had any ideas about what the community could be doing differently in terms of energy use.

36 out of 60 houses identified "Education" as an area the community could be doing differently in terms of energy use.

Other ideas listed:

- Provide Incentives for energy efficient behavior;
- Hold community workshops about energy conservation;
- Provide energy updates;
- Inform people of changes to energy costs;
- Find cheaper sources of energy;
- Use wind power;
- Use small scale hydro power;
- and obtain local ownership of energy.

Energy in the Home

Information From the Deline Energy Survey	Energy Tips
47% of homes in Deline have a wood stove for heating their home	*Using wood to heat your home is cheaper than oil. Wood heat is also better for the environment – as long as the trees are harvested sustainably.*
83% of homes in Deline turn down the heat at night.	*Turning down the heat at night saves energy and money. You can get a programmable thermostat that will automatically lower the heat at night and raise the heat before you get up in the morning.*
79% of homes have an electric hot water heater. 0% of homes have a gas/propane heater hot water heater. 15% of homes have an oil fired water heater.	*An oil or propane fired hot water heater is much cheaper to operate than an electric hot water heater because electricity is expensive.*
Average temperature of water heater: 65.6°C Highest temperature of water heater: 100 °C	*Your water heater should be set at 49°C (120 °F). This temperature is required to kill germs. If it is set to a higher temperature you are wasting energy and your water temperature may be dangerously hot.*
89% of homes that have an insulation blanket on their water heater. 85% of homes that have insulated hot water pipes.	*Having insulation on your water heater and pipes helps to keep the heat in. This lowers the cost of heating your water.*

98% of homes have an electric stove. 0% of homes have a gas/propane stove. 2% of homes have another type of stove (ie: wood stove).	*If propane is available, propane stoves are cheaper than electric stoves. Microwaves use less electricity than electric stoves.*

Transportation

100% of people surveyed said their vehicle used gasoline so it looks like no-body uses diesel for vehicles in the community.

Vehicle type	% of people who own	Average yearly fuel cost
Vehicle	45%	$4200
Second Vehicle	8%	$3700
Skidoo	56%	$1800
ATV	13%	$750
Boat	30%	$1900

Information From the Deline Energy Survey	Energy Tips
79% of vehicles in Deline have a block heater timer.	*Using a block heater allows the engine block and lubricants to warm up without idling your vehicle, but you don't need to use it all the time! A timer can turn it on when you need it. When it's colder than -20 °C, set the block heater timer to go on for 2 hours before you drive.*

Average minutes idling per day: 20. Maximum minutes idling per day: 90.	*Idling wastes gas and money. Idling pollutes the air with carbon dioxide, which contributes to climate change. Idling for over 10 seconds uses more fuel than restarting your engine.*
50% of boats in Deline have 4-stroke engines. 0 % of skidoos and ATVs have 4 stroke engines.	*4 stroke engines save gas and money! 4 stroke engines use less fuel, create less exhaust, are more reliable, and are quieter than 2 stroke engines.*

Updating the energy profile

People's answers on home energy use show that people estimate that they spend more on heating fuel than was shown in the energy profile. This is because the cost of heating fuel has gone up since 2004.

The survey also shows that people spend less on electricity than the profile shows. This may be because electricity is subsidized – people pay Yellowknife rates for the first 700kWh of electricity they use every month. No changes were made to the electrical portions of the profile.

The survey also showed that wood heat is used by almost half the homes in the community. The average home uses 8 cords per year. This was similar to what was in the profile, so the profile was not changed.

	Number of homes who responded	Assumed number of homes using fuel	Survey Housing Total	Original Profile Housing Total
Heating Oil	38/60	180/180	$610,000	$450,000
Electricity	56/60	180/180	$426,000	$720,000

NG/Propane	1/60	3/180	$3,600	No data
Wood	28/60	84/180	$202,000	$179,000

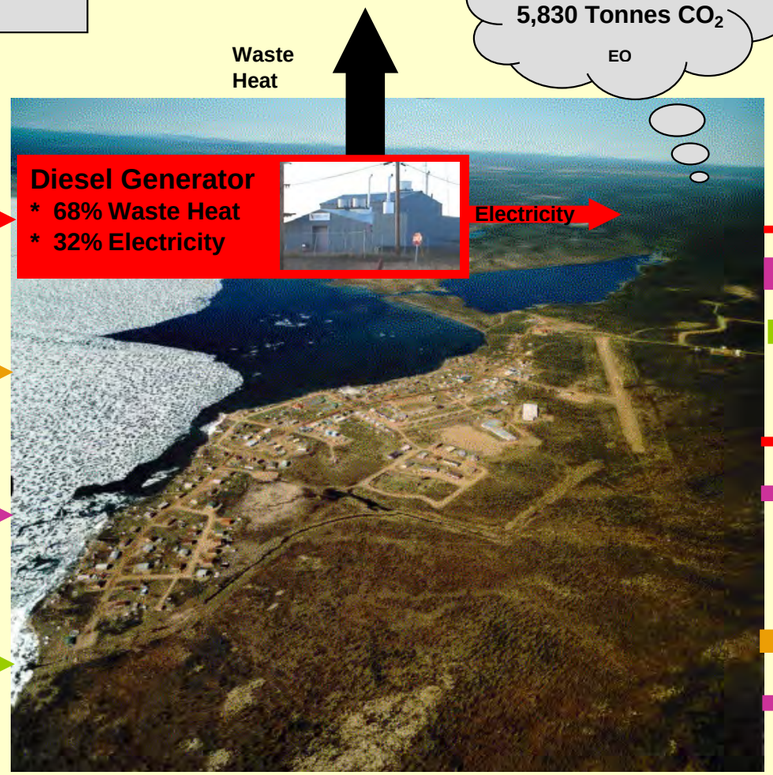
The Deline Community Energy Survey showed that residents think they are spending a lot more on gasoline than the original Community Energy Profile states. Since the original profile was based on information from the Petroleum Products Division, the profile on gasoline was kept the same.

	Deline Survey	**Original Profile**
Total spent on Gasoline	$500,000	$398,592

The only change made to the profile was that 25% of diesel was separated out for transportation at a price of $1.00 per litre. This increased the total amount spent on energy to just over $3 million.

Deline Energy Profile 2004 - 2004

Total cost: $3,000,000
Total energy: 90,000,000 mega joules



Diesel - Electricity
* 50% of Cost
* 37% of Greenhouse Gases

32% of Energy

Gasoline
* 13% of Cost
* 15% of Greenhouse Gases

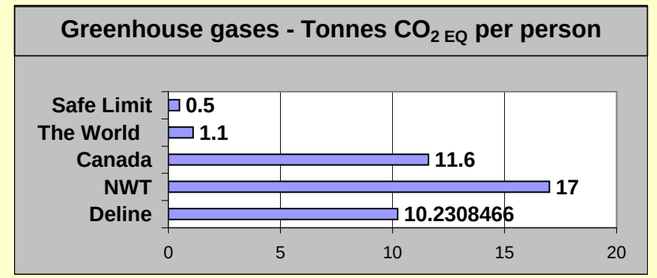
17% of Energy

Fuel Oil & Diesel
* 30% of Cost
* 47% of Greenhouse Gases

28% of Energy

Wood
* 6% of Cost
* 0% of Greenhouse Gases

12% of Energy



44% of Electricity

50% of Fuel Oil

100% of Wood

Homes

56% of Electricity

25% of Fuel Oil

Other buildings

100% of Gasoline

25% of Fuel Oil

Transport

Five alternative sources of energy

1) Solar energy can heat water and buildings, and make electricity
2) 'Run-of-river' hydro can make electricity without flooding the land
3) Wind energy can produce electricity
4) Wood can be a sustainable fuel if we manage the forest well
5) Waste heat from diesel generators can heat buildings

Top five ways to use less energy and save money

1) Develop everyday habits that save energy
2) Buy energy-saving appliances and other products
3) Buy a vehicle that uses less energy
4) Build energy-saving new buildings
5) Renovate older buildings so they use less energy

Energy opportunities for Deline

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 tried to do three main things:

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

Summary of what we did to raise awareness, collect ideas and evaluate energy opportunities for our community

The Arctic Energy Alliance made a short presentation to council in February 2005 about the energy profile and options that the community could look at. The council decided to do an energy survey of private homeowners and to buy 20 EnerGuide for houses evaluations for private homeowners. A workshop on how people could fix up their houses was also scheduled, but it was not well attended. More time should be spent on raising awareness and collecting ideas from the community in the future.

In November, 2006 the Charter Community of Deline asked the Arctic Energy Alliance to make some recommendations to go into this community energy plan. This plan is based on those recommendations. The Deline community council should review this plan, make changes and then adopt it as the Deline community energy plan.

Scenarios of future energy use

This section of the community energy plan shows a picture of what is possible if Deline implements certain energy efficiency and renewable energy projects.

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

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

We look at each scenario for four time periods: at five, 10, 15, and 20 years in the future.

We assume certain things for these scenarios:

- Each scenario accounts for population changes over 20 years, as defined by the NWT Bureau of Statistics. In Deline, the bureau of statistics predicts that the population will slowly decrease over the next 20 years because people are having less children than in the past.
- Over the next 20 years, all prices stay the same as in 2004. Many people believe that the price of fuel and other things will rise over time, so energy costs may go up more than we show.

Scenario Fuel Prices	
Electricity	$0.62 / kWh
Fuel oil for heating	$0.89 / litre
Wood - chopped	$300 / cord
Wood – pellets	$300 / tonne
Gasoline for vehicles	$1.05 / litre
Diesel for vehicles	$1.00 / litre

- The 'annual energy costs' is the amount people spend every year on energy bills. This does not include higher "capital costs" such as the money a person pays to fix up an older building or buy a wood pellet stove. It also does not include lower "capital costs" such as the money they save when they buy a small vehicle instead of a big one.

Our community's energy efficiency scenario

- All electric hot water heaters are replaced with oil-fired hot water heaters in the first 5 years.
- Many people upgrade their furnaces in the first 5 years
- Home owners fix up their homes
- Community fixes up community buildings
- Everyone has energy efficient habits
- People replace old appliances with energy star appliances
- People switch to more energy efficient vehicles

All the actions in the energy efficiency scenario save money in the long term, and the savings add up. Together they could reduce total annual energy costs by 44% and greenhouse gas emissions by 12% over 20 years.

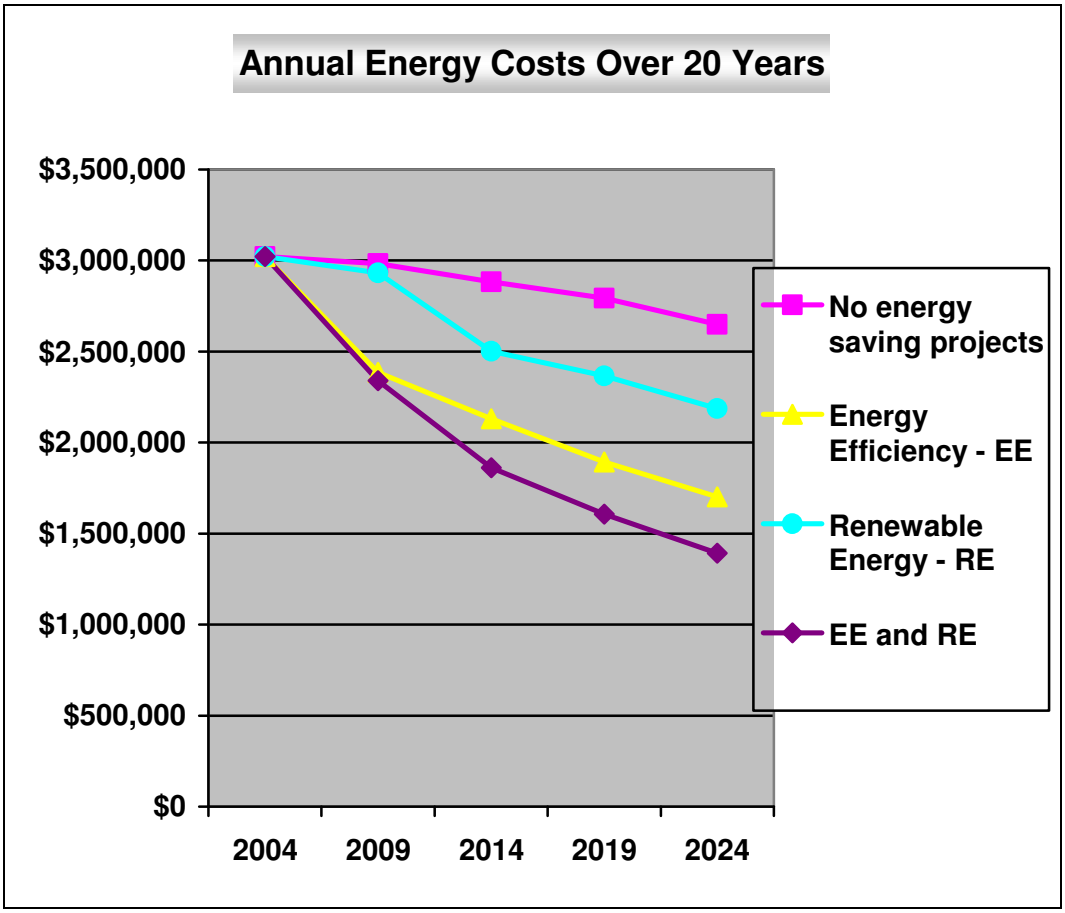
Our community's renewable energy scenario

- Provide all electricity from a small hydro project on the Great Bear River by 2014. Assume hydro electricity costs $0.50 per kilowatt hour.
- Replace oil heat with efficient wood heat from locally harvested wood and imported wood pellets. Increase local wood use by 20 cords per year and increase use of imported wood pellets by 50 tonnes per year until all heat comes from wood in 2019.

If Deline applies the renewable energy scenario, the community could decrease energy costs by 28% and greenhouse gas emissions by 76% over 20 years.

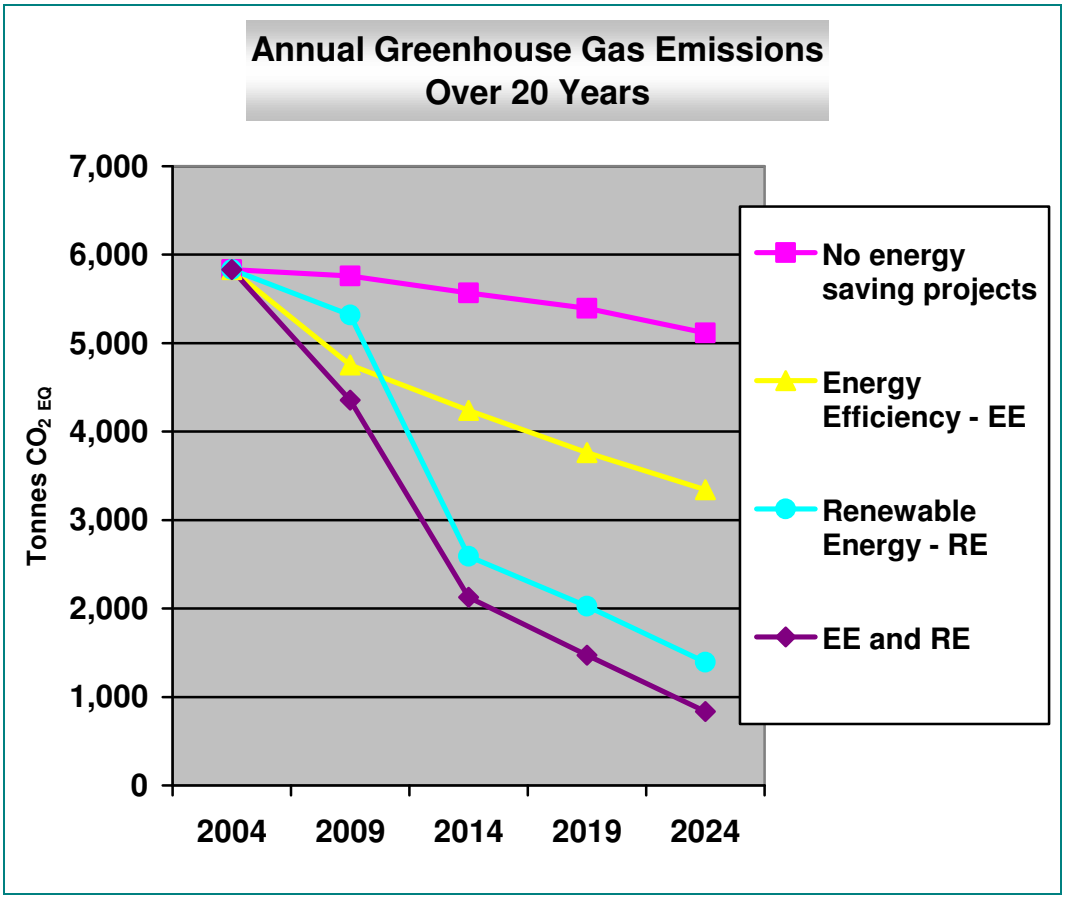
If Deline applies both the energy efficiency and the renewable energy scenarios, the community could decrease energy costs by 54% and greenhouse gas emissions by 86% over 20 years.

The charts on the next two pages show how the four scenarios could affect total energy costs and greenhouse gas emissions over 20 years. It is not easy to predict the future. These scenarios are an educated guess, not a promise. As we get more information we will be able to make better guesses.



This chart shows changes in energy operating costs every five years, for a total of 20 years, for four scenarios.

- No energy saving projects – Our community keeps using energy the way you use it right now.
- Energy Efficiency – EE – Our community applies the energy efficiency scenario described above.
- Renewable Energy – RE – Our community applies the renewable energy scenario.
- EE and RE – Our community applies both the energy efficiency and renewable energy scenarios.



This chart shows changes in total greenhouse gas emissions, every five years, for a total of 20 years, for four scenarios.

- No energy saving projects – Our community keeps using energy the way you use it right now.
- Energy Efficiency – EE – Our community applies the energy efficiency scenario described above.
- Renewable Energy – RE – Our community applies the renewable energy scenario.
- EE and RE – Our community applies both the energy efficiency and renewable energy scenarios.

Our community's energy plan

Deline Energy Plan - March 2006

The Deline action plan shows actions the council decided to take for 2006.

Summary

1. Do a community energy survey
2. Conduct an energy efficiency workshop for private homeowners
3. Do 20 EnerGuide for houses evaluations for private homeowners

What: Community Coordinator – (Community Energy Survey)

How:

1) Advertise and hire a Community Coordinator for 10 days to conduct a Community Energy Survey.
2) Conduct survey.
3) Collect survey information and send it to Arctic Energy Alliance.

Who:

1) The Charter Community of Deline
2) Community Coordinator
3) Community Coordinator

Status:

Completed – survey information is included in this plan

What: Community Workshop (Energy Efficiency)

How:

1) Select a date for the workshop.
2) Locate venue and advertise within community.
3) Deliver workshop.

Who:

1) The Charter Community of Deline and Arctic Energy Alliance
2) The Charter Community of Deline
3) Arctic Energy Alliance

Status:

Partly Completed – the workshop was held on September 13th 2006 but no-body attended.

What: Do Energy Assessments (EnerGuide for House Program) on 20 houses.

How:

1) Collect names and information from people who want to have an Energy Assessment done.
2) Contact Arctic Energy Alliance and give them the list of people who have signed up and their contact information.
3) Schedule Energy Assessments.
4) Hire translator to help with Energy Assessments.

Who:

1) The Charter Community of Deline.
2) The Charter Community of Deline.
3) Arctic Energy Alliance.
4) The Charter Community of Deline.

Status:

Completed – the Community Organized and the Arctic Energy Alliance completed EnerGuide for Houses (EGH) assessments of 19 homes in September 2006.

Deline Energy Plan #2 – 2007 and beyond

The community asked the Arctic Energy Alliance to recommend some ideas for Deline's energy plan for 2007 and beyond. These ideas are listed on the next few pages – it is up to the community council to adopt them or change them.

Summary

1. Create a vision and adopt targets for energy use and greenhouse gas reductions.
2. Create a committee and hire a coordinator to put these recommendations into action.
3. Apply for more funding.
4. Develop Energy Efficient habits policy.
5. Use Energy Efficient equipment and appliances.
6. Use energy efficient vehicles.
7. Build new buildings that save energy.
8. Renovate older buildings so they save energy.
9. Look into solar hot water heating.
10. Look into run-of-river hydro.
11. Look into efficient wood heating.

List of projects in our community energy plan

1: Create a vision and adopt targets for energy use and greenhouse gas reductions.

- Pass a council resolution that creates a vision statement for how the community will be using energy in 20 years from now.
- Pass a council resolution with the following targets:

- To reduce energy use and greenhouse gas emissions from the charter community government of Deline operations by 20% from 2004 to 2014.
- To reduce energy use and greenhouse gas emissions from the entire community of Deline by 6% from 2004 to 2014.

- Pass a council resolution to join the Federation of Municipalities "Partners for Climate Protection" program. See www.sustainablecommunities.fcm.ca/ for more info.

2: Create a committee and hire a coordinator to put these recommendations into action

- Create a Deline energy planning committee with representatives from all parts of the community.
- Hire a community energy coordinator to revise the plan and put it into action.
- Plan to use some of the Gas Tax funding to fund energy projects.

3: Apply for more funding

- Set aside some of the Gas Tax funding for energy projects.
- Get the energy coordinator to work with the Arctic Energy Alliance to apply for more funds. The GNWT's Environment and Natural Resources department has an Energy Conservation Program (ECP) that funds communities for energy projects. The Federation of Canadian Municipalities (FCM) has a Green Municipal Fund (GMF) that also funds energy projects in communities.

4: Develop Energy efficient habits policy

- Make a policy that people need to use energy efficient habits (like turning off the lights) in community buildings. Put up signs so people know about the policy and follow it.

5: Use Energy Efficient equipment and appliances

- Make a policy that the community must buy and use only "Energy Star" products and appliances for its own buildings and operations.
- Create a program to help homeowners and community buildings switch from electric hot water heaters to diesel/heating oil fired hot water heaters.

6: Use energy efficient vehicles

- Make a policy that the community must buy the most efficient vehicles available for its own use.

7: Build new buildings that save energy.

- Pass a zoning by-law amendment that all new homes must meet the following:
  - Designed to a minimum of EGH-80, using the EnerGuide for Houses program
  - Use Renewable Energy for heating
  - Use only EnergyStar appliances
  - Use low-flow water devices

  before they get a building permit.
- Pass a zoning by-law amendment that that all new buildings must meet the following:
  - Be designed to a minimum of 25% better than the Model National Energy Code for Buildings (MNECB)

- Use Renewable Energy for heating
- Use only EnergyStar appliances
- Use low-flow water devices

before they get a building permit.

- Require that all new buildings built by the Charter Community of Deline meet the same energy efficient standards.

8: Renovate older buildings so they save energy

- Train building maintenance people in the community about energy efficiency for older buildings. The School of Community Governance (MACA) offers a course.
- Ask the Arctic Energy Alliance help get energy audits to recommend things you can do that will pay back within 10 years, or the life of community buildings.
- Apply for 50% funding from the territorial government Energy Conservation program – a funding program for community owned buildings that is run by ENR.
- Use money from programs such as the 'New Deal', 'Northern Strategy', and 'Gas Tax Funding' to fix up community buildings and reduce operating costs.
- Create a program to help private homeowners get EnerGuide for Houses evaluations done. Also help them to implement the recommendations by fixing up the houses as a group – for example if someone is going to upgrade their furnace, they could order and install several furnaces at the same time as other people and save money.

9: Look into solar hot water heating

- Work with another agency and set up a solar water heating demonstration project on a community building - the health centre, the school, or the elders' home.

10: Look into run-of-river hydro

- Work with other agencies to do a feasibility study – to find out if a site on the Great Bear River can provide electricity for Deline.
- Work with other agencies to set up a run-of-river system, if possible.

11: Look into efficient wood heating

- Change heating systems in community buildings to efficient (EPA certified) wood stoves or switch to wood pellet boilers.
- Find out if the community has a good supply of wood for fuel. Develop a forest management plan so the community can harvest wood forever.

Next steps

The Deline community council should review this plan, make changes and then adopt it as the Deline community energy plan.

When the community council is ready to adopt the energy plan, they should think about how long it will take to do the projects in the plan and they should plan to do another energy profile in the future to see if the projects made any difference. The council resolution could look like this:

Be it resolved that:

- Our community adopt this energy plan for the time period 2007 to 2009, and do the next energy profile in 2009.

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.

To implement the plan, each project will need a work-plan like the one on the next page.

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.

Worksheet 4-2: Project work plan

Project name:	☐ Renewable energy project ☐ Energy efficiency project

Project description / results:

Tasks	Person responsible	Schedule	Budget

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.