Community Energy Plan Update

Hamlet of Fort Providence 2017

Introduction and Acknowledgements

This Updated 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 Fort Providence:

- Community members, Deh Gah Got'ie First Nations, Metis and Hamlet Councillors, who took the time and energy to participate
- Staff at the Hamlet of Fort Providence office
- NRCan for providing funding for this project
- The Arctic Energy Alliance who facilitated the process

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

Hamlet of Fort Providence
BOX 290
Fort Providence NT X0E 0L0
Phone: 867-699-3441
Fax: 867-699-3360

Arctic Energy Alliance
#101 5102 51st St
Yellowknife NT X1A 1S7
Phone: 867-920-3333
Fax: 867-873-0303
www.aea.nt.ca
info@aea.nt.ca

Table of Contents

Background:

Council representatives and community members worked with the Arctic Energy Alliance (AEA) to review and update the Community Energy Plan (CEP) so that it reflects the local energy sources, current energy needs and the principles of sustainable living and respect for the land that are held by residents of Fort Providence.

The initial CEP groundwork was incorporated into the Integrated Community Sustainability Plan (ICSP) process in 2010. Community representatives and AEA participated in the regional ICSP meeting that resulted in the 2010 Community Energy Plan (CEP).

The CEP review process was initiated in January 2017. The review had two (2) objectives:

- Identify the accomplishments the community had achieved from the 2010 CEP; and
- Determine future directions.

The updated CEP was approved by the Hamlet Council March 20, 2017. The CEP process will continue after March 31, 2017 to further develop and implement the goals and strategies that were identified in the updated CEP.

An analysis was completed for each goal and strategy to estimate potential reductions in electricity, fuel use, greenhouse gas emissions, and payback.

Measuring greenhouse gas emissions is going to become very important when a carbon tax is introduced. The NWT has not determined how it will implement its carbon taxing, but the default for Canada is $10/tonne starting in 2018, rising by C$10 a year until it reaches C$50 in 2022.

NRCan provided funding to make the review of the Fort Providence CEP possible, and has also committed to providing some funding in the 2017/18 fiscal year to help support the implementation of some of the strategies.

Community Energy Planning Goals:

The Community Energy Planning goals reflect the values of the community. Some of these values are family, elders and children, hard earned money, language, traditions, respect, healthy living and natural resources. The goals were reviewed as part of the 2017 CEP review and were found to be still relevant. No changes were suggested.

- To reduce energy consumption and reliance on diesel fuel; and

- To improve energy efficiency by using alternative energy and natural power sources that are kindest to the environment and that are in keeping with community and traditional values.

Strategies to Achieve the Updated Community Energy Plan:

- Upgrade arena complex lights to LED
- Do an LED lighting retrofit for municipal buildings (including arena complex)
- Add boiler controllers and do a zone valve check for municipal buildings
- Relocate zamboni shed to utilize unused space
- Install a wood pellet district heating system
- Set up an energy committee
- Encourage store managers to carry Energy Star appliances everywhere

Residential Strategies that would require Research and Appropriate Delivery Agent

- Home energy evaluation and follow-up on the recommendations with homeowners
- Home Winterization and energy conservation project with homeowners
- New wood stove project with homeowners
- New wood pellet stove project with homeowners

The Council wants to take good care of its buildings and make sure future buildings are energy efficient. Maintenance of homes is seen as a high priority by homeowners.

The Hamlet Council and community of Fort Providence want to shift away from their reliance on diesel fuel to create electrical power for the community and find other ways to generate electrical power.

Potential Future Strategies

1. Hire a local resource person/Education (2010 CEP **-** ***action taken during 2017 CEP review and update – part time position***)

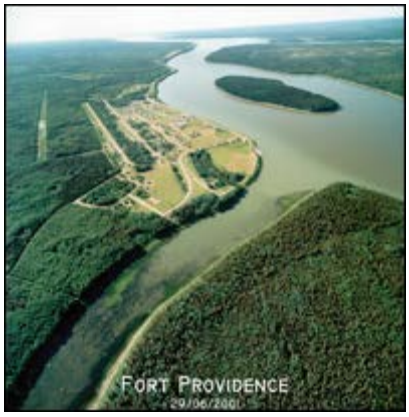
- Education about real costs for pellets and solar in community and also barriers like building needing to be up to new Code to do net metering
- Training of local tradespeople and workers
- Train people to run solar power
- Need education on what's needed for things like solar (for example, PV systems can't be connected because buildings don't meet the new building code)
- Educate our young ones

2. Incorporate energy standards into all new building contracts (2010 CEP)

3. **Adopt a low/no idle policy for community vehicles** (2010 CEP)
4. **Community evaluation and decision-making for large-scale alternative energy projects** (2010 CEP)
5. **Research alternative sources of energy such as hydro, solar,** natural gas, etc. and their potential use in Fort Providence (2010 CEP)
6. **Upgrade existing buildings and homes** (2010 CEP)
    - Encourage home upgrades of windows and insulation and furnaces
    - Research the potential for a subsidy program for energy upgrades for energy efficiency homes (including furnaces and triple-pane windows) perhaps in collaboration with NWTHC
    - Encourage research on the potential and appropriate project delivery agent for solar thermal heating in homes
    - Research the potential and appropriate project delivery agent for a home insulation project
7. **Streetlights** (2010 CEP)
    - o Streetlights were switched to more efficient LED
    - o Get streetlights turned off in the summer at the breaker (this may not be possible due to the way the system is set up and liability issues)
8. **Walking and biking trails** (2010 CEP)
    - o Walking
    - o Reflective clothing to make walking safer
    - o Drive less
9. **Encourage people to build homes with solar PV and solar thermal heat** (2017 CEP)
10. **Work with NWT Housing Corp to help owners make their homes more efficient** (2010 CEP)

Strategies from 2010 CEP that were achieved or are ongoing

- Assess the efficiency of municipal buildings and equipment (mostly completed)
- Investigate the use of wood pellet boilers for community buildings (pre-feasibility study complete)
- Monitor energy use (the Hamlet is doing this through monitoring their bills)



Fort Providence is located on the north shore of the Deh Cho (Mackenzie River) near Great Slave Lake and is a transportation link between the North and South Slave regions.

The community relies on a diesel generator plant for electricity. Most buildings are heated primarily with heating oil, although some use propane, wood pellets or cord wood. Community residents respect their cultures, languages, traditional knowledge and their histories of sustainable living in harmony with the land.

Fort Providence is known for strong leadership and their practice of training, hiring and mentoring residents to fill positions in community governments and the local economy. There is a strong volunteer base and youth involvement in activities.

The community has had an interest in Community Energy Planning for some time. The process developed by Arctic Energy Alliance was used in order to meet the March 31, 2010 deadline for gas tax funding. The CEP process was also used this year (2017), facilitated by the Arctic Energy Alliance, and it is expected that this review and planning process will continue in the future to further develop and implement the goals and strategies in the CEP.

There are three (3) governing bodies that participated in this process in the community. These are the Deh Gah Got'ie First Nations, the Fort Providence Métis Council and the Hamlet Council of Fort

Providence. A questionnaire, drop-in and public meeting were also held to get input from residents of Fort Providence.

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.

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. The original Community Energy Plan was developed and adopted by the community of Fort Providence in 2010

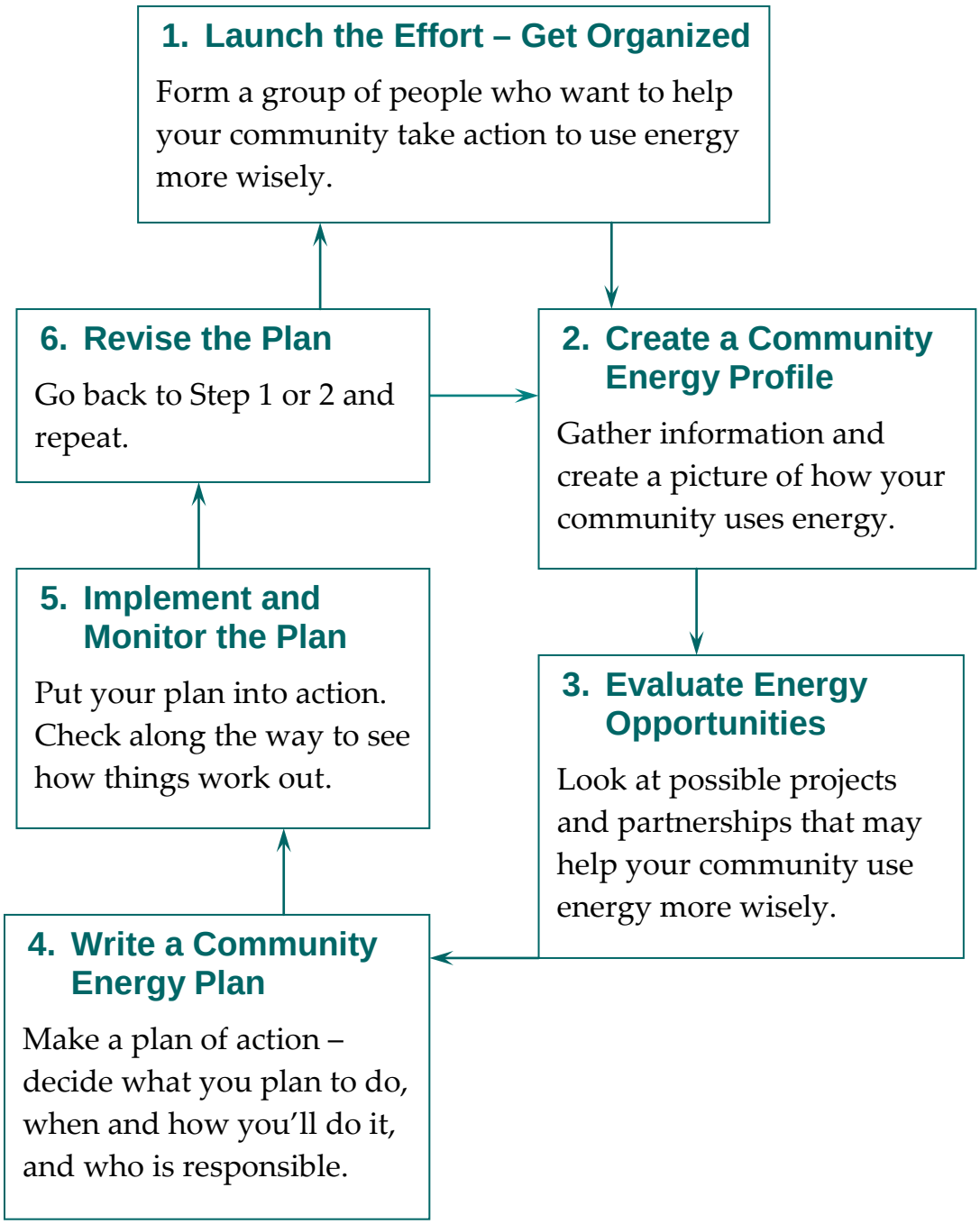
Energy planning is a cycle. The cycle might last for one, three, or five years. During each cycle, the community develops and carries out certain projects that make up the energy plan for that time period.

At the end of the time period, the community reviews the energy plan and their energy use, recognizes the actions and projects that were achieved, decides what other projects they can do, and continues to work towards their vision of a healthier, cleaner energy future.

In 2017 Fort Providence had the opportunity to do exactly this - review and update their CEP.

The diagram shown on the next page is a 6-step Community Energy Planning process a community can use to develop an energy plan. This updated CEP is the result of the completion of Step 6 in the planning process.

6 Steps - Energy Planning Process



Our community's Energy Goals

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. The existing goals were reviewed and no changes were suggested during the CEP review sessions held in February 2017.

Our Energy Goals

- To reduce energy consumption and reliance on diesel fuel; and
- To improve energy efficiency by using alternative energy and natural power sources that are kindest to the environment and that are in keeping with community and traditional values.

"I changed my old light bulbs with the new ones I got from the last swap out, and did it show on our power bills. I didn't really think it will make a difference but it sure did. I swapped out six light bulbs and I had to buy three more and I like what I see. They're bright, and the box says I could save $180/year and lasts about 20 years."

Our community's energy profile

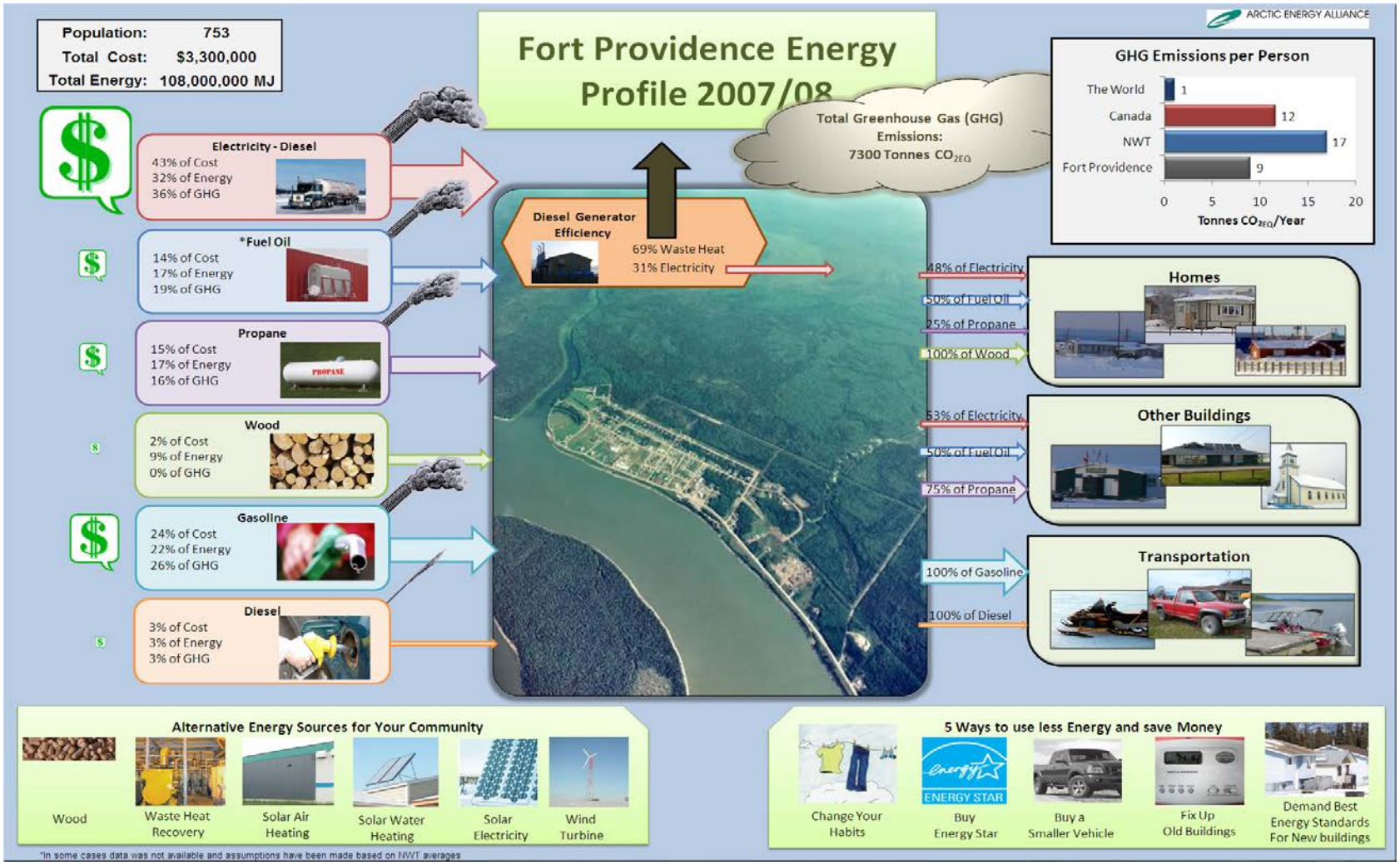
This section of the Community Energy Plan gives a visual summary of our community energy profile.

Attempts were made to make a community energy profile for this CEP update process using 2014/15 data. Unfortunately this was not possible for Fort Providence because the data are not available to the public at this time.

The community of Fort Providence could work with their fuel supplier to try and get the fuel data in order to get the most up to date and accurate community energy use.

"We as a community need more Trades people in our community. Like someone to fix furnaces around town. We lost one of our only Trades people to another community because there's work and money there. We need to start training our young people for the future. Look at the Preschool - it had to shut down for a week because we had to get someone from out of town to fix it. We need to train them and hire them to stay in our community, so when the bad days come, we don't have to bring in people from other towns to fix the problem."

Chief Joachim Bonnetrouge


Population: 753
Total Cost: $3,300,000
Total Energy: 108,000,000 MJ
Fort Providence Energy Profile 2007/08
ARCTIC ENERGY ALLIANCE
Total Greenhouse Gas (GHG) Emissions: 7300 Tonnes CO_{2EQ}
GHG Emissions per Person
The World 1
Canada 12
NWT 17
Fort Providence 9
0 5 10 15 20
Tonnes CO_{2EQ}/Year
Electricity - Diesel
43% of Cost
32% of Energy
36% of GHG
*Fuel Oil
14% of Cost
17% of Energy
19% of GHG
Propane
15% of Cost
17% of Energy
16% of GHG
Wood
2% of Cost
9% of Energy
0% of GHG
Gasoline
24% of Cost
22% of Energy
26% of GHG
Diesel
3% of Cost
3% of Energy
3% of GHG
Diesel Generator Efficiency
69% Waste Heat
31% Electricity
48% of Electricity
50% of Fuel Oil
25% of Propane
100% of Wood
Homes
53% of Electricity
50% of Fuel Oil
75% of Propane
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
ENERGY STAR
Buy Energy Star
Buy a Smaller Vehicle
Fix Up Old Buildings
Demand Best Energy Standards For New buildings
*In some cases data was not available and assumptions have been made based on NWT averages

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.

Measuring greenhouse gas emissions is going to become very important when a carbon tax is introduced. The NWT has not determined how it will implement its carbon taxing but the default for Canada is $10/tonne starting in 2018, rising by C$10 a year until it reaches C$50 in 2022.

Fort Providence CEP survey

This section of the community energy plan gives a summary of the results of a CEP survey conducted in Fort Providence in the weeks leading up to the CEP input meetings. The detailed responses can be found in the Appendix.

The residents of Fort Providence who responded to the survey showed they are well aware of energy conservation and energy efficiency and take a number of actions to reduce their lighting and heating costs.

What are the highlights from the survey?

The questions and some of the common themes from the survey are listed below:

How are you using electricity and heating in your house?

- 9 of 20 said they use wood stoves

How would you reduce your energy use?

- Pellet stove
- Turn things off!!
- Do more things outside; Get the kids outside

Would you come to a meeting?

- Yes (16)
- Maybe (2)
- No (2)

How could we as a community reduce our energy use?

- More wood stoves
- Solar
- Education about energy efficiency and energy conservation
- Use less / recycle
- Go back to our roots

Our community's CEP meetings

The CEP meetings held in Fort Providence during February/March 2017 were the primary means by which input into the plan was discussed and collected. A summary of the strategies discussed can be found in the Appendix.

What were the meetings?

Tri-Council meeting

- A meeting with representatives of the three Councils to explain the CEP review process
- Reviewed goals
- Collected information on what had been done from the previous plan and input towards a revised plan

Public drop-in session

- The public were invited to drop in to find out more about the CEP process and discuss energy issues and problems
- Collected information on what had been done from the previous plan and ideas for a revised plan

Public meeting

- The public were invited to find out more about the CEP process and discuss energy issues and problems
- Reviewed goals
- Collected information on what had been done from the previous plan and suggestions for a revised plan

Hamlet Council meeting

- Update of the process and results to date provided at a regular Council meeting
- Discussed next steps for getting the updated CEP completed and for selecting projects for NRCan funding for the 2017/18 fiscal year

Our Community's Energy Plan

This section of the community energy plan lists the strategies recommended during the meetings and discussions to review and update the CEP in Fort Providence in 2017.

These strategies are based on four sources:

- Participation from community members and Councils in February/March 2017 CEP meetings;
- The community's CEP survey in Winter 2017;
- Information about Fort Providence energy use in the Community Energy Profile; and
- Participation in the Community Energy Plan during the ICSP process in 2009/early 2010.

The strategies are grouped under:

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

The first step in the process was to review the 2010 CEP Goals and strategies. These questions were asked:

- Have we accomplished any of these strategies;
- Are these strategies still relevant; and
- Is there anything we'd like to add to these strategies?

Some new strategies were added to the plan, some were retained and some were removed because they were completed.

Updated List of Recommended Strategies in our Community Energy Plan

- **Upgrade to LED - Arena Complex lights** (new in 2017 CEP)
  LED lighting is becoming the standard in replacing existing lighting in most buildings because it is efficient, durable and can be turned on and off on demand.

  The longer life helps reduce maintenance costs, especially in locations where the ceiling is high and the fixtures are hard to reach. Another advantage is that LED tubes do not contain mercury. LED technology has been improving at a rapid pace over the past couple years, and the cost has been decreasing.

  The lighting over the ice in the arena could be replaced with LED lighting, as could the tube lighting in the rest of the building. Any old exit signs could also be replaced with new LED exit signs.

- **Upgrade to LED - Municipal Building lighting (including Arena Complex)** (new in 2017 CEP)
  LED lighting is becoming the standard in replacing existing lighting in most buildings because it is efficient, durable and can be turned on and off on demand.

  The longer life helps reduce maintenance costs, especially in locations where the ceiling is high and the fixtures are hard to reach. Another advantage is that LED tubes do not contain mercury. LED technology has been improving at a rapid pace over the past couple years, and the cost has been decreasing.

  This project is an expansion of the LED upgrade project above and would include the Fire Hall, 2-Bay garage and Water Treatment plant. This project could be further expanded to include as many of the buildings in the community as desired.

The cost will increase as more buildings are added, but the payback for frequently occupied buildings is expected to remain about the same.

- **Add boiler controllers and do a zone valve check for municipal buildings** (new in 2017 CEP)
  The project involves working on the boilers in municipal buildings. The heating system in the Arena and Fire Hall should be tested and upgraded.

  The zone valves turn the heat on and off in different sections of the building when the thermostat calls for heat. This project would involve checking these to make sure they're working properly and replacing them if they aren't.

  It would also involve installing boiler controllers that regulate the boilers electronically and moderate the water temperature based on outdoor temperature. The controllers can also be set up to turn the circulation pumps off when it is warm outside.

- **Move Zamboni Shed to Curling Rink space** (new in 2017 CEP)
  The Zamboni shed is in very poor condition and is using far more energy than a typical building its size. It could be replaced or moved into the empty curling rink space in the Arena Complex.

  Moving it into the curling rink space would result in the highest savings because it would make use of a space already inside a retrofitted building envelope. The first step in this project would be a feasibility study to explore the two options more thoroughly.

- **Install a wood pellet district heating system** (Result of study done under 2010 CEP)
  This potential project would use a central biomass (wood pellet or wood chip) boiler to provide heat to several nearby buildings through a district heating piping network. The motivation is to use a

local resource harvested by local people to provide heating rather than using imported fossil fuels.

The AEA completed a pre-feasibility study for this project in 2013. The three scenarios examined were:

- Three community buildings in Fort Providence would be served by a biomass boiler and a small district heating system.
- The three buildings from scenario 1 and another 25 buildings would be served by a biomass boiler and a small district heating system.
- Most of the buildings in Fort Providence that are currently supplying their own heat would have their space heating and hot water supplied by a district heating system. The district heating system would receive heat from a biomass cogeneration system that produced all of the electricity currently supplied by the electrical grid.

The Arctic Energy Alliance recommended that a good first step for this project would be to start with the first, and smallest, scenario, ensuring the technology installed was suitable for future expansion.

- **Set up an Energy Committee** (2010 CEP)
  The energy committee could review the Community Energy Plan in more detail and provide motivation, ideas and continuity for ongoing energy awareness and conservation activities in Fort Providence.

  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. Having community support generates enthusiasm.

- **Encourage local stores to carry Energy Star appliances everywhere** (2017 CEP)
  By purchasing Energy Star appliances, people save money year after year and have lower electricity, water and pump-out bills. Energy Star washing machines allow clothes to be dried more quickly as a front loading washer removes more water in the spin cycle. Energy Star fridges use less electricity.

  Fort Providence residents have found it difficult to purchase Energy Star appliances when they need them. A project to work with Northern and Aurora store managers to encourage them to stock Energy Star appliances would increase availability.

> *"One challenge we get in the north is that not everyone can get Energy Star appliances. Like for me I wanted an Energy Star fridge with the two doors and freezer on the bottom but the retail store only had the old model with the freezer on top but I wasn't interested. Sometimes the stores around here have no or little products to the rebate program.*
>
> *Margaret Field*

Residential Strategies that would require Research and Appropriate Delivery Agent

The following recommendations pertain to local homeowners and residences in the community. **The Hamlet would need to research the potential for each of these projects and the appropriate delivery agent.**

- **Encourage home energy evaluation and follow-up on the recommendations with homeowners** (new in 2017 CEP)
  A home energy evaluation provides an assessment of an existing home's energy efficiency through heat loss calculations, heating appliance assessment and a blower door test.

  This evaluation is undertaken according to the standards of Natural Resources Canada's EnerGuide Rating System (EGH). The evaluation includes a report which outlines potential energy

efficiency upgrades and their estimated savings, and funding potential.

Based on AEA's experience, many homeowners likely do not have the cash or borrowing power to take advantage of the ERS program and follow up on recommendations; and, if they do have the money, lack the capacity to find and retain a contactor to undertake the work. This project could include follow-up work organized together as one project and funding could alleviate the barriers by homeowners.

Some examples of a work scope for energy efficiency upgrades could be replace wood stoves, replace electric water heaters with fuel fired water heaters, install low-flush toilets, replace weather stripping, install LED light bulbs, replace refrigerators and washers with Energy Star refrigerators and install combustion air if needed.

- **Winterization and Home Maintenance workshops** (2010 CEP)
  The community and AEA have partnered in the past to provide some of these for community residents, however the need for ongoing workshops was expressed in the CEP meetings.

  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.

  AEA offers a short term workshop for high school students. 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.

  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.

- **Install wood stoves in homes** (2017 CEP).
  There is strong interest in having wood stoves installed in Fort Providence – this came up in questionnaires and the public meeting.

  Wood stoves are already a popular form of supplemental home heating and a project to get more efficient wood stoves installed could be initiated for homeowners. These projects are typically done in a partnership and depending on what the community wishes to focus on, may include a local training component.

  Suggestions for workshops included how to harvest, cut and season cord wood, and chimney-sweeping.

- **Install wood pellet stoves in homes** (2017 CEP).
  There is also interest in having wood pellet stoves installed in Fort Providence. Wood stoves are already a popular form of supplemental home heating and a project to get some wood pellets stoves installed could be initiated for homeowners.

  These projects are typically done in a partnership and depending on what the community wishes to focus on, may include local training components.

*"Since I installed my woodstove I saved a lot of money on my furnace bill. Usually I pay about $1,000 – $1,500 a year, now I pay about half that since I use a woodstove. I keep my furnace on half way (20-23*C) during the winter season. I burn about 5-8 cords during that time, it also keeps me busy and the workouts are paying off. Even though I am buying gas for both the skidoo and chainsaw I still maybe save about $500 after the years done. It's been a big improvement in our house.*

Potential Future Strategies

- **Hire a local resource person to help manage and implement the energy planning process and help with providing public information on energy conservation to community residents** (2010 CEP)

  With this 2017 CEP project, the community has taken steps to achieve this strategy by hiring a part-time Energy Coordinator position.

  This resource person could also help with providing public information to the residents of Fort Providence about energy conservation activities, rebates and ideally, become a champion for energy information, awareness and activities in the community.

- **Incorporate Energy Standards into all new building contracts and assess the energy efficiency of municipal buildings and equipment** (2010 CEP)

  The Council wants to take good care of its buildings and make sure future buildings are energy efficient. Adopting this strategy will mean that energy efficiencies are designed and implemented into all new community infrastructure projects.

  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.

  An energy audit yardstick 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.

  This information helps identify how energy efficient the building is and points out what can be done to improve the energy efficiency of

the building. Using this information, it is possible to make informed decisions about whether to upgrade or replace existing structures. Capital or O&M activities may need to be identified to implement these decisions.

- **Adopt a Low/No Idle policy for community vehicles** (2010 CEP)

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

- **Community Evaluation and Decision Making for Large Scale Alternative Energy Projects** (2010 CEP)

  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.

- **Research alternative sources of energy such as hydro, solar, etc. and their potential use in Fort Providence** (2010 CEP)

  The Hamlet Council and community of Fort Providence want to shift away from their reliance on diesel fuel to create electrical power for the community and find other ways to generate electrical power.

  AEA has done research on what is most applicable for different communities. This is based on computer modeling and certain assumptions. The choice of what you look into is up to community decision making processes and priorities.

Hydro energy, either existing or on site, is identified by community representatives as an area of interest to pursue.

- **Street Lights** (updated based on work done since 2010 CEP)

  The streetlights have been switched to LED, but they are still running in the summer sometimes when they're not needed. Switching them off at the breaker would save electricity. This may not be possible to do with the current electricity distribution system, but further investigation is needed.

- **Walking and Biking Trails** (2010 CEP)

  Having ways to get around other than relying on vehicles powered by fossil fuels will give people options. Making the trails can be done as a volunteer activity or through local employment. Community benefits from this.

Future Residential Strategies

- **Upgrade Existing Homes and Buildings** (2010 CEP)
  Research the potential and appropriate delivery agent for building upgrades. Monitoring energy use and determining how much energy the building uses for heating, lighting, and water can be used to screen buildings for energy upgrades.

  Upgrading existing buildings makes sense where the cost of upgrading is less than the cost of replacing a structure. The next step is to estimate the savings, costs of upgrades and materials for each building. The final step is to complete the upgrades and to monitor energy use post-retrofit. The upgrades could include amongst other things: insulation, windows, furnaces or solar thermal heating.

  Collaboration with the NWTHC on a project like this would be useful.

- **Work with Northwest Territories Housing Corp. (NWTHC) to help owners make their homes more energy efficient** (2010 CEP)
  This strategy builds on the home winterization workshops, moving it into government. Members of Hamlet Council may wish to advocate on behalf of community homeowners who want to make their homes more energy efficient.

- **Encourage people to build homes with solar PV and solar thermal heat** (2017 CEP)
  Some communities in Canada have focused on building projects where new homes are built with solar thermal heat and solar PV. This type of project could be replicated in Fort Providence.

Strategies removed from original plan – Completed or Ongoing

1. **Assess the efficiency of Municipal buildings and equipment** (2010 CEP, ***mostly completed***)

Monitoring energy use and determining how much energy the building uses for heating, lighting, and water can be used to screen buildings for energy upgrades. Upgrading existing buildings makes sense where the cost of upgrading is less than the cost of replacing a structure.

The next step is to estimate the savings, costs of upgrades and materials for each building. This type of information is typically provided in an energy audit report. The building upgrades will require final cost estimates based on the quotes from contractors and suppliers. The final step is to complete the upgrades and to monitor energy use post-retrofit.

2. **Investigate the use of Wood Pellet boilers for community buildings** (2010 CEP, ***completed***)

There are a number of NWT community buildings that are using wood pellet boilers to heat the building. Fort Providence is in a good location to consider using this heating source for large buildings because it is on

a major highway and close to a large wood pellet source in northern Alberta.

A feasibility study on the potential to install a district heating system using pellet boiler(s) was completed in 2012/13. The study looked at three different scenarios. All of these scenarios were found to be feasible.

3. Monitor Energy Use (2010 CEP, ***ongoing***)

Keeping track of energy use 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. The Hamlet of Fort Providence is monitoring its energy use by keeping track of monthly bills and comparing them.

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 how well 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.

NRCAN funding

NRCan has provided funding to make the review of the Fort Providence CEP possible, and has also committed to providing some funding in the 2017/18 fiscal year to help support the implementation of some of the strategies. In 2017/18 NRCAN will fund conservation and efficiency projects.

There is also other funding available that some of the other projects could fall under. See Appendix for the list of strategies table and which funding they may be eligible for.

Energy Efficiency Incentive Program

The Energy Efficiency Incentive Program (EEIP) was designed to provide rebates to homeowners and consumers who purchase new, more energy efficient models of products that they use every day. Buying energy efficient products will help you save energy costs while reducing greenhouse gas emissions.

Alternative Energy Technologies Program

This program provides funding for renewable energy sources such as solar, wind, wood pellet heating, biofuel/synthetic gas and ground source heat pumps. This funding is available to communities, commercial businesses and NWT residents.

Community Government Building Energy Retrofit Program

This Program supports upgrades to Community Government-owned buildings which will reduce their use of electrical/heat energy and water. The Arctic Energy Alliance (AEA) staff can help you get a handle on your building's current energy use and figuring out the best savings, and the cost of upgrades and materials to get

those savings. Community Governments can also hire AEA to manage the implementation of energy upgrades for a fee.

Commercial Energy Conservation and Efficiency Program

Arctic Energy Alliance (AEA) has energy experts and money available to help your businesses conserve energy and improve its energy efficiency. If you own a business and are interested in saving money by reducing the amount of heating fuel, electricity and water used, or want to reduce your greenhouse gas emissions, this program is for you.

POLAR Knowledge funding

Northern Science & Technology and Polar Knowledge Application programs

POLAR's Northern Science and Technology Program encompass four strategic priorities. These include:

1. Baseline information to prepare for northern sustainability
2. Predicting the impacts of changing ice, permafrost, and snow on shipping, infrastructure, and communities
3. Alternative and renewable energy for the North
4. Catalyzing improved design, construction and maintenance of northern built infrastructure

Polar Knowledge Application program: aims to promote and further strengthen polar science and technology nationally and internationally and build science capacity through training, outreach, increased knowledge sharing and learning opportunities.

The program aims to enhance and build awareness of the polar regions across Canada through fostering collaborations with other organizations to promote Canadian northern science and technology and advance the next generation of researchers and highly qualified personnel.

Appendix - 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.

Microgeneration

Microgeneration is small-scale generation of electricity (or heat) by someone other than the utility to supplement the traditional grid-connected power.

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.

Appendix - Community Survey Results

How are you using electricity and heating in your house?

- Heating with woodstove and furnace. Using basic appliances. TV, fridge, stove and washer and dryer.
- Using Furnace. Don't use much power but fridge, coffee pot, stove and TV
- Heating with woodstove only. Furnace don't work. I am using stove, TV Laptop and gaming systems
- I use a woodstove. TV and computers. I try and use as little power
- Woodstove all year round. No furnace. My boys are always playing games and TV is always on. Fridge and stove that about it.
- Using propane furnace to heat my house I try and use as lest amount of power. Basic appliances TV, Fridge stove and truck
- Using my power for everything in the house. Fridge, stove kitchen stuff. I watch TV, laptop. Everyday things in the house. Diesel furnace and woodstove. Mostly furnace this year.
- Using power for appliances in the house. My bill was quite a bit the past couple of months because I was renovating. Furnace is still in good shape
- Since we moved we burn wood for heat. Use power for our TVs and fridge. We cook on the woodstove.
- I have a furnace, I wish I had a woodstove. Power is good, since I don't stay home during the day (work). I try to use wisely. Bill usually $80-$100 a month
- I don't know I been working at the mines, but our bills are pretty average the past two years. Furnace which is diesel, but prices are going up I hear.
- I got a furnace to keep warm. TV, laptop for work and kitchen appliances kept to a minimum.

- Have a diesel furnace which I need to clean, change filter. Uses appliances for cooking, washing clothes. TV for Oilers games
- During winter I use furnace and heaters. My house isn't proper insulated so my power is high during winters
- I use diesel furnace and everyday appliances to cook and clean, but I try to turn off things I don't use while at work
- I got a furnace and wood stove. Use everyday things like washing dishes and clothes. TV is on most of the day. Radio
- I have a furnace. Power Bill usually $100-$120 a month basic appliance washer and dryer. TVs and laptops. Plug in phones
- We have a propane furnace. Power is basic I try to do laundry when we get water delivery. Evenings is when we use power, other than that we turn off everything
- First we burn wood but our furnace is second option. We both work so when we are home we have most things on like TV. Appliances, washers and dyers
- We have both woodstove and furnace. My kids are playing on their computers and games. Husband likes his movies and I like my books.

How would you reduce your energy use?

- Put better insulation in my house, fixed my doors and windows. Was losing heat in winters, was also using heaters. Now can feel the heat staying in.
- Do more things outside like cut wood, shovel snow go for a walk. Just get out more.
- Educate myself more, getting a pellet or woodstove will help.
- I was thinking about getting a pellet stove and I just bought a new Fridge last year. It hard to say since I work at the mines.
- Start with looking at AEA website for tips
- Start with cleaning furnace and using less power. Shut off everything plugged in

- Try and fix my house and my furnace, thinks losing fuel. But no signs of spills
- Turn everything off. Try and save more money
- Start by shut off TV no one watching. Close windows to keep heat in sometimes get hot in the house.
- Start reading, doing other things that require no power during the evenings.
- It's hard to say, I tell my wife to shut off everything.
- We have to start cutting back on gas for both vehicles. One diesel and other unleaded
- Start with my kids getting outside and enjoying the nice weather.

How could we as a community reduce our energy use?

- Use more solar energy and drive less
- Educate more people, and start using woodstoves
- Start unplugging everything
- Use more woodstoves. We need more educations on what we have resources to use as a community
- Buy less gas. But when you want to get wood you need gas, oil for both skidoo and chainsaw. I don't know as a community where to begin, just use less power.
- We have to educate our young ones about going green. It's their future we have to start somewhere.
- We need walkways, too much ATVs and skidoos driving around these days. We need to tell kids about earth and health.
- I don't know as a town. I am just worrying about my own bills. Doing the little things to help my pockets.
- I am seeing more solar and wind turbines on the news. We should look more into those things.
- Everything nowadays has a screen. So technology is everywhere, maybe get back to our roots.
- Now you're coordinator, we need you to educate us more.
- Use less power

- Recycle things, everything you do day-to-day reflects on how we as a community are doing our part going green
- Get more information about what the community has to offer
- Get the community to pay my bills. Ha ha. Or find ways to help out with stopping global warming.
- Teach each other. We have to learn from each other but we need more people doing things outside their homes.
- More solar technology and less generator use.
- I would like to see more wood burning stoves or furnaces.
- Encourage more people to use less energy so we don't use more diesel at the power plant
- I see more different things coming out. We need to invest more into the community.

Appendix - Updated List of Recommended Strategies in our Community Energy Plan	NRCan funding	Capital cost estimate	Savings estimate ($/year)	Savings (GHG tonnes /year)	Payback	Other funding available?	Funding amt	Payback with funding
Upgrade arena complex lights to LED	yes	$81,000	$23,700	20	3	Com. Gov't Retrofit	$25,000	2
Do an LED lighting retrofit for municipal buildings (including arena complex)	yes	$100,600	$34,470	23	3		$25,000	2
Add boiler controllers and do a zone valve check for municipal buildings	yes	$12,200	$4,698	14	3	Com. Gov't Retrofit	$6,100	1
Move zamboni shed	yes	$250,000	$10,000	23	25	Com. Gov't Retrofit	$25,000	23
Install a wood pellet district heating system	no	$210,000	$22,000	72	10	AETP	$25,000	8
Set up an energy committee								
Encourage store managers to carry Energy Star appliances everywhere								

Residential Strategies that would require Research and Appropriate Delivery Agent

Research the potential for, and the appropriate delivery agent for home energy evaluation and follow-up on the recommendations with homeowners	yes	$71,333	$11,891	32	6	ERS and EEIP	$14,583	5
Research the potential for, and the appropriate delivery agent for Home Winterization and energy conservation project with homeowners	yes	$26,175	$986	3	27	no		27
Research the potential for, and the appropriate delivery agent for a new wood stove project with homeowners	no	$120,000	$9,657	4	12	EEIP	$15,000	11
Research the potential for, and the appropriate delivery agent for wood pellet stove project with homeowners	no	$120,000	$5,891	4	20	EEIP	$15,000	18

*Note that these calculations are rough estimates based on class D estimating, at best +/- 40% . Once more information is available, these estimates can be narrowed down.