WHITEFISH RIVER FIRST NATION

COMMUNITY ENERGY PLAN

Executive Summary

2016

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The Independent Electricity System Operator's

Aboriginal Community Energy Plan Program

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1.0 INTRODUCTION

This document represents an Executive Summary of our Community Energy Plan (CEP) and is intended to highlight key findings, action items, and the implementation plan for our community. A more in depth document is available under a separate cover and provides the more detailed analysis, calculations, and assumptions used to reach the conclusions presented in this document.

At Whitefish River First Nation, we are a community interested in energy – energy education, energy conservation, energy generation, and energy independence. Our history contains numerous examples of energy initiatives, but we now seek a strategy to build upon those initiatives and take us further. Our CEP is that strategy.

We began by developing a thorough understanding of our community, our past and current energy initiatives, and our current and future energy needs. During this process, we consulted with our community to get feedback which allowed us to create our energy vision and the associated goals required to achieve it.

The process also helped identify energy related priorities and opportunities which generally fell into one of three categories: education, conservation, and generation. These categories were carried through to our implementation plan, which is meant to achieve our energy goals and move us towards our energy vision, including energy independence and self-sufficiency.

Existing ideologies, plans, and strategies have been integrated into our new CEP in order to make it as comprehensive as possible. These include our traditional view of energy, capital planning study, and our source water protection draft plan. We also took into account provincial, national, and global trends in energy.

Our CEP follows the format outlined in Figure 1 below.

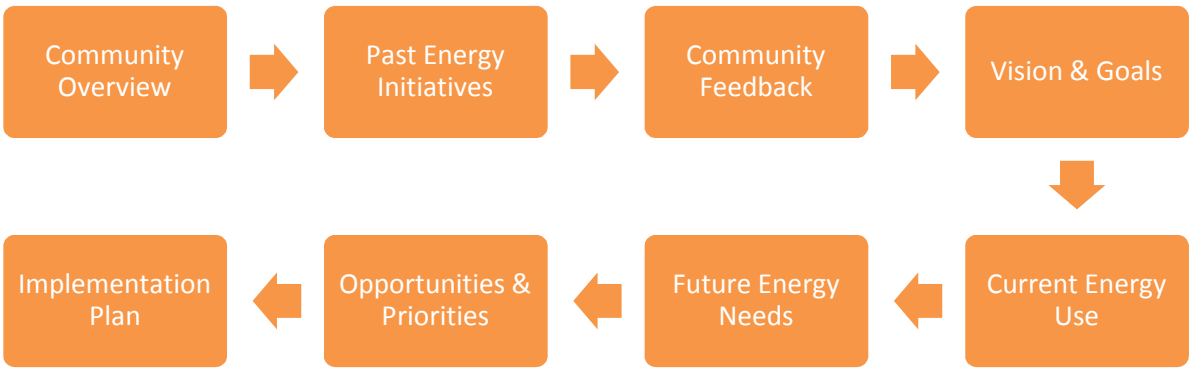

Figure 1 - Community Energy Plan Format

2.0 PAST AND PLANNED ENERGY INITIATIVES

Given our significant interest in energy, we have undertaken a number of energy related projects in recent years. These initiatives have occurred in two areas: conservation and generation. A summary of these initiatives are available in Table 1 and Table 2, below.

Table 1 - Past and Present Energy Efficiency Projects

Initiative	Details
EnerGuide Evaluation For Houses, 2005	Housing stock (specifically the rental units) were evaluated using the EnerGuide Energy Efficiency rating scale. Ratings ranged from 66 to 81, with most in the low-to-mid 70's range. Many homes exhibited potential for improvement.
EcoEnergy Energy Efficiency Evaluation, 2014	Privately owned homes and rental units that were previously assessed in 2005 were re-evaluated. Privately owned homes and rental units achieved ratings in the low-80's and mid-to-high 70's range, respectively. The evaluation indicated minimum potential for further energy efficiency measures due to the nature of the buildings.
Aboriginal Conservation Program, 2014	Participated in the Ontario Power Authority's (OPA's) Aboriginal Conservation Program (ACP), designed to reduce energy demand and costs by increasing energy efficiency of homes, businesses, and community owned facilities. The program reduced our overall energy demand by 19.1 kW and our total energy consumption by 132,500 kWh, with an approximate total savings of about $55,000 annually.
Energy Audits – Community-Owned Buildings – 2012/13	As part of Ontario's saveONenergy program, we completed a lighting audit on all public buildings to potentially upgrade to more energy efficient lighting. Details were not available during the completion of our CEP.
Installation of Motion Sensors	Exterior motion sensors were recently installed on our Administration buildings and we are currently in the process of installing motion sensors in the interior of several of our community-owned buildings.
Streetlights	We have approximately 50 streetlights in our community. We are considering switching 5 to 10 of these streetlights with solar powered models as a pilot project to demonstrate renewable energy generation. We also plan to retrofit the remainder of our streetlights with more efficient LED bulbs.
New Homes and Current Home Renovations – Additional Conservation Measures	Work is underway to renovate 12 of our CMHC Section 95 homes and build 5 new, 2-bedroom homes. Both the renovated and new homes will include a number of energy efficiency measures (considerations from the Ontario Building Code, increasing efficiency of the building envelope, implementation of efficient lighting and appliances, as well as efficient space heating and cooling). These will provide us with an excellent opportunity to assess the impact of these changes and educate our residents.

Table 2 - Energy Generation Initiatives

Initiative	Details
Helios Whitefish River	Whitefish River First Nation owns 51% of Helios Whitefish River, with joint partner Helios. Helios Whitefish River develops, installs, and maintains solar photovoltaic systems for private and public owners, including a 6 kW rooftop system on our Community Centre and a 10 kW rooftop system on our Administration Office.
Mnidoo Mnising Power	Whitefish River First Nation is a part of the United Chiefs and Councils of Mnidoo Mnising (UCCMM). Through an energy corporation known as Mnidoo Mnising Power (MMP), the UCCMM has a 50/50 partnership in the 60MW McLean's Mountain Wind Farm located on Manitoulin Island. Revenue from the project is distributed by UCCMM to support its member communities, including our community.

Our CEP identified a lack of awareness of the projects noted in Table 2. With our community's stated goal of moving towards energy independence, each of the above projects represents an opportunity to educate our community members on renewable energy generation and its benefits.

3.0 SUMMARY OF COMMUNITY FEEDBACK

While developing our plan, we spent a lot of time and effort connecting with our community members to inform them of the project and to gather their feedback. Below is a summary of our activities.

Table 3 - Summary of Community Engagement Activities

Activity	Timing	Details
Kickoff Event	October 22, 2015	Presentation and discussion with community members regarding the CEP. Included meal.
Hiring of Local Energy Liaison	January – August, 2016	Hiring of local community member able to answer questions and investigate concerns.
Community Energy Survey	February – May 2016	Gathered feedback on energy use, concerns, and ideas. 131 surveys were completed.
Winter Carnival	February 27, 2016	Set up display to provide information about our CEP, answer questions, and complete surveys. Approximately 75 visitors and 50 surveys were completed.
Earth Week Presentations & Open House	April 19 – 20, 2016	CEP display, presentations, and discussions with community members. Also included presentations by Hydro One. Approximately 40 visitors and 30 surveys were completed.
Elephant Thoughts – Children's Program	May 2 – 5, 2016	Educational program in Shawanosowe School to teach about energy and environmental issues. Total of 56 participants.
One-on-One Sessions with Energy Liaison	May – August, 2016	Ongoing sessions focused on explaining Hydro One bills. 12 sessions completed to date.
Energy Independence – Community Session	September 23, 2016	Completed a half-day session with 16 community members to chart preferred path to energy independence

Energy Survey

Our community energy survey achieved strong representation (72% of households participated) and focused on our current situation in terms of energy habits and concerns. Regarding concerns, an overwhelming number of our community members want to see lower energy costs as an outcome of our CEP. In addition, almost all of our residents expressed concern that Hydro One rates and delivery charges are too high.

In terms of habits, our key findings included the following:

- Most of our homes (about 79%) use electricity as their primary source of energy, with the secondary source being mainly fuel/heating oil (43%). Other energy sources are propane and wood.
- We primarily heat our homes (60%) and our water (96%) using electricity. We also cool our homes using electricity – fans and air conditioners (55%).
- Three-quarters (75%) of the households in our community are aware of Time-Of-Use (TOU) electricity pricing, with many of us timing our electricity use to avoid peak pricing periods.
- Approximately 59% of us do not prepare our homes for cold winter weather.
- About 76% of us are interested in learning more about energy conservation.

Energy Independence Engagement Session

The development of our CEP also included a community session focused on moving towards energy independence. The event brought together a cross-section of the community and revealed the following key findings:

- An information gap exists between Council/Administration and the community regarding the desire for energy independence and the current renewable energy generation projects – improved and ongoing education is needed.
- The community is open to moving towards energy independence – but would like to do so in a slow and manageable manner.
- Our energy independence strategy should begin with smaller projects (pilot projects) that can then be assessed and used to educate the community on the benefits and challenges - Try – Assess – Educate… and repeat.
- The change in Council every two years represents a potential hurdle to progress – an arm's length energy advisory group should be established to drive the strategy.
- Both residential and community-owned facilities should be part of the strategy.
- Our energy independence strategy should look for opportunities to create employment and to focus on youth.
- Major investments/expenditures should include an "ask" of the community (i.e. vote or referendum).

4.0 COMMUNITY ENERGY PLAN VISION AND GOALS

Energy related vision and goals were vital to the development and implementation of our CEP. The vision provides the future state that our community is hoping to achieve. Without it, there is no direction or inspiration to move away from our current state. The goals provide a defined roadmap towards our energy vision, taking into account feedback that we've received from the community.

Our vision and goals are supported by our community's willingness to play the role of "early adopter" in new and evolving energy technologies that can potentially improve the well-being of our members.

4.1 VISION

The vision for our plan was developed through feedback from our community engagement sessions. It was modified throughout the development of our plan as additional feedback was received.

Concerns of unawareness have been raised regarding our current energy situation, with some describing it as wasteful, costly, anxiety causing, and dependent upon others. However, it's also seen as dependable, reliable, and convenient. Our envisioned energy future was described as one with an educated community, with more freedom and control, that is less costly, more adaptable, and with a more diligent/disciplined use of energy. Overall, our envisioned energy future would result in less worry for future generations.

The Anishinabek of Whitefish River First Nation are recognized leaders in improving community well-being through energy understanding, energy conservation, renewable energy generation, and energy independence.

4.2 GOALS

The goals for our CEP were drafted in the early stage of its development, and modified as necessary as we moved through the Plan's development. Our goals are meant to be achieved by 2026, resulting in a 10 year timeframe. Through discussions, meetings, and presentations, we have determined the following goals of our Community Energy Plan:

- Make our community one of the most energy educated in Canada;
- Create a culture of conservation such that we use as little energy as practically possible;
- Determine the best path for our community to transition towards energy independence; and
- Identify and provide support for funding programs related to our current and future energy initiatives.

To help us accomplish our energy goals, we developed an implementation plan (see Section 0). It is intended that our goals be further refined during the implementation process, specifically to ensure that they are realistic, achievable, and measurable.

4.3 WHAT DOES ENERGY INDEPENDENCE LOOK LIKE?

Energy independence for a community can fall somewhere along the range shown below:

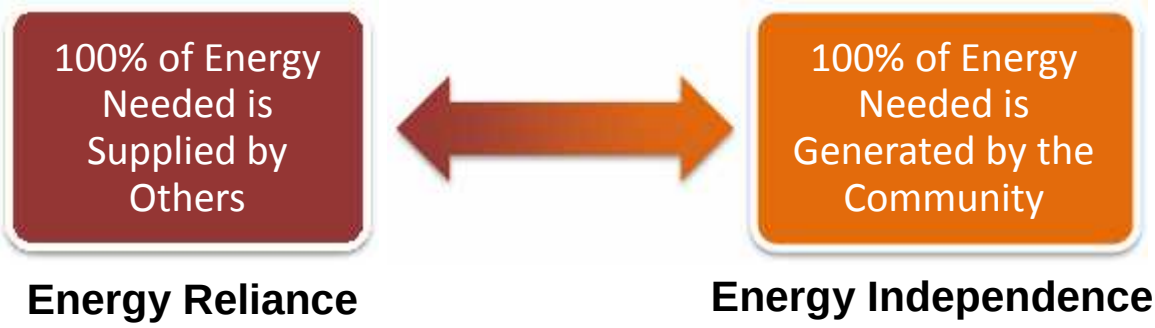

Figure 2 - Energy Reliance vs Energy Independence

Energy independence is made up of both energy generation and energy conservation. Conservation can be viewed as a step towards independence because the less energy you need from others, the less dependent you are on them.

5.0 CURRENT ENERGY USE

In this section of our CEP we confirmed the types of energy used in our community, how we use it, and how much energy we consume annually. We have split energy users within our First Nation into three distinctive sectors: community-owned, commercial, and residential. There are five main types of energy used within our community. In order from most to least consumed, these are: electricity, heating oil, wood, propane, and diesel. Natural gas is not available within our community.

Only diesel used by our public works department and other community-owned equipment was taken into account for this analysis. Energy used for transportation was not included.

5.1 TOTAL ANNUAL ENERGY CONSUMPTION

In order to understand our total energy use, all types of energy must be converted to a common unit of energy measurement. The unit generally used is gigajoules (GJ). A gigajoule is equal to one billion joules, which is equivalent to 30 litres of gasoline, or about 2 barbeque sized propane tanks. The average Canadian household uses about 100 gigajoules of energy in a year.[1]

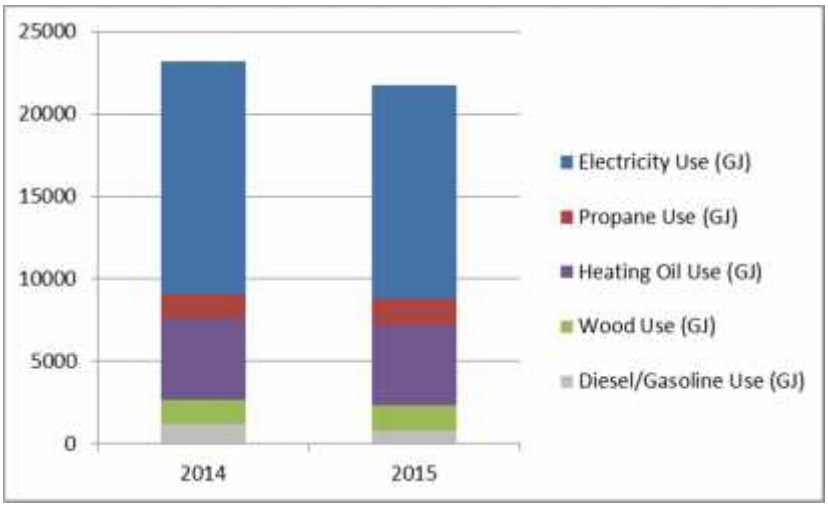

Figure 3 - Total Annual Energy Use

Our community currently uses approximately 21,700 gigajoules (GJ) of energy annually. That's equivalent to 6.0 million kilowatt-hours, or the amount of energy it would require to drive a mid-size car from our community to Ottawa and back about 7,300 times.

Total energy used by our community in 2014 and 2015 are shown in Figure 3. Our total energy use dropped by about 6% between 2014 and 2015.

5.1.1 BREAKDOWN BY TYPE OF ENERGY

Electricity is the most widely-used energy type within our community, resulting in about 59% of total energy consumption in 2015. Heating oil is the second most used energy type within our First Nation and accounted for approximately 22% of the total energy use in 2015. Propane and wood are moderately used in our community and account for 8% and 7% of our total energy consumption, respectively. Diesel consumption by our Public Works Department accounts for about 4% of our community's total energy consumption.

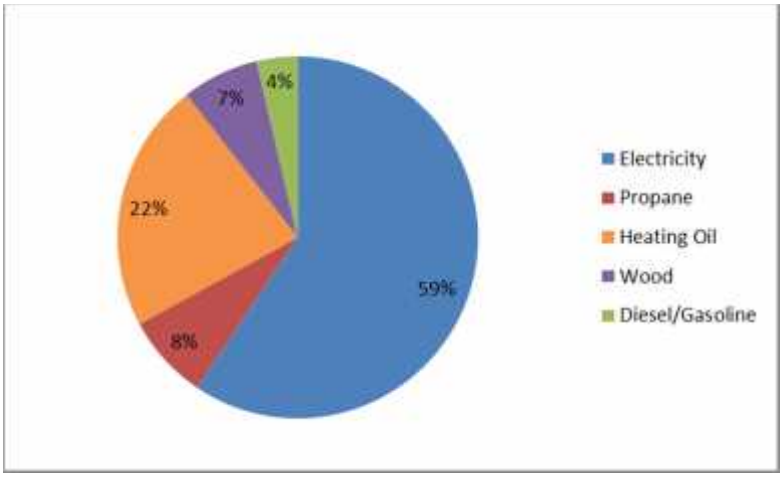

Figure 4 - Breakdown by Energy Type, 2015

5.1.2 BREAKDOWN BY SECTOR

As mentioned above, we have divided energy end users within our community into three distinct sectors; community-owned, commercial, and residential.

Figure 5 shows the breakdown of energy use in each building type. The residential sector is the major energy user within our community, and accounted for about 70% of energy use in 2015. The community-owned and commercial sectors used about 26% and 4% of our total energy in 2015, respectively.

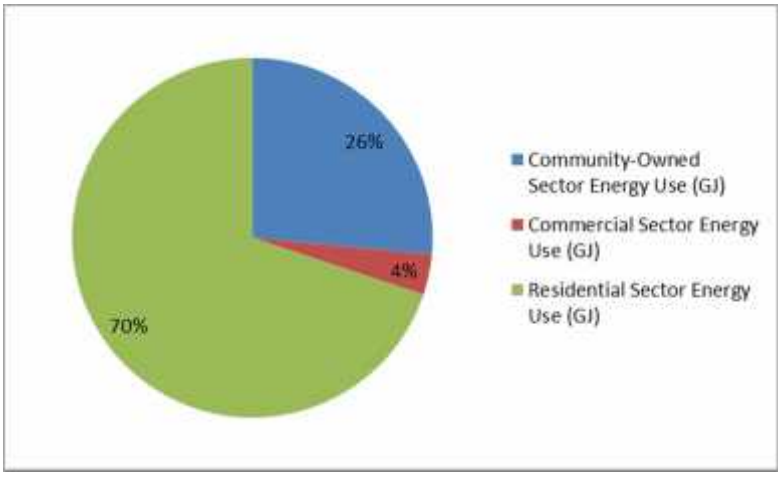

Figure 5 - Total Energy Used by Sector, 2015

5.1.3 RESIDENTIAL ENERGY USE BREAKDOWN

The residential sector uses the most energy in our community. The high cost of energy within homes was also found to be one of the major concerns of our residents.

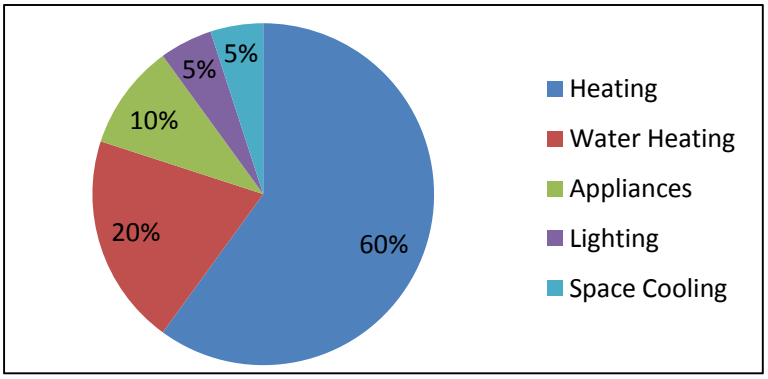

Figure 6 - Typical Breakdown of Home Energy Use

Figure 6 shows the average household energy use breakdown. With space and water heating representing a combined 80% of typical household energy use, they represent the largest opportunities for energy and financial savings.

5.1.4 BASELINE ENERGY USE SUMMARY

Developing a thorough understanding of our baseline energy use is an important part of our CEP. It allows us to know where we stand in terms of our energy use, including which types of energy we use the most and which sectors consume the largest amounts of energy.

With regards to energy conservation, we are able to tell where our efforts will be best spent. For our community, this is electricity and heating oil consumption in residential homes. Since the energy types in this sector are the largest in our community, a reduction in this area will result in the biggest payoff in terms of energy and cost savings. Having baseline data also lets us track our progress and see what impacts our conservation efforts have once implemented.

6.0 FUTURE ENERGY NEEDS

Our CEP seeks to project our future energy needs for 10 years' time. Having an idea of our future energy use requirements is extremely valuable, especially when considering renewable generation opportunities that will help us transition towards our goal of energy independence.

Energy Consumption

Energy consumption is the total amount of energy used over time, which for us was 21,700 GJ in 2015. The three most significant factors in forecasting our 2026 energy consumption were our projected population growth, our projected housing growth, and the National Energy Board energy use forecast.

For the purpose of this plan we are using a "business as usual" scenario, meaning that we are assuming no significant changes will be made in terms of energy conservation or generation. We estimate that our overall energy consumption will grow by 1.3% annually for the next 10 years, giving us an estimated community energy consumption of 25,100 GJ in 2026.

Community Energy Consumption: The Numbers

Current – 21,700 GJ per year

Future – 25,100 GJ per year

Electrical Demand

Having an idea of our current and future electrical demand is extremely valuable in our intention to transition towards energy independence. In our analysis, we calculated current and future values for both average and peak electrical demand. These values are available in Table 4, below.

Table 4 - Current and Projected Electrical Demand

Year	Current Electrical Demand (2015)	Future Electrical Demand (2026)
Average	407 kW	469 kW
Peak	645 kW	743 kW

The average electrical demand is the rate at which electricity is used in our community, assuming that the rate at which electricity is used is constant. The peak electrical demand is the highest rate at which electricity is consumed in our community.

This means that if we were to become 100% energy independent, we would need to be able to produce up to 743 kW of electricity at one time in 2026 to meet the maximum demand of the community. If we are unable to supply that amount, then at the moment of peak demand we will not be able to operate all electricity consuming equipment in our community, and blackouts or brownouts may occur.

7.0 OPPORTUNITIES AND PRIORITIES

During the development of our Community Energy Plan, a number of suggestions, ideas, frustrations, and misunderstandings were uncovered. We viewed each of these items as opportunities for action and have separated them into three categories to match the overall theme of our CEP. These are: energy education, energy conservation, and energy generation. Each category, along with actions and information that can be taken away are summarized in the sections below. More detailed information related to each section can be found in our main CEP report.

7.1 ENERGY EDUCATION

The first goal of our CEP is to continue to educate our community members so that we can become one of the most energy educated in Canada. While a deep, detailed understanding of energy is not necessary, a basic understanding of certain topics is extremely helpful. The table below provides a summary of energy education topics that are important to our community.

Table 5 - Summary of Energy Education Topics

Topic	Details
Energy Prices	This section provides a summary of price trends from 2005 to 2014 for different energy types, including; electricity, propane, diesel, heating oil, and natural gas. The main takeaway is that electricity should be avoided and conserved where possible due to its high current and expected future price.
Energy Cost Comparison – Heating Your Home	The operating costs of various heating methods available to our community are examined in this section. The cost of heating in order of least expensive to most expensive was found to be: wood, heating oil, propane, and electricity. Natural gas was found to be the least expensive type of energy for heating but is currently not available to our community.
Environmental Impact of Energy Use	Greenhouse gas emissions of various energy types are discussed in this section. It is recommended that the community continually be educated on the environmental impacts of energy and that consideration to the environmental impacts of energy use be taken into account in decisions for our community.
Space Heating Choice for Our Community	Heating with wood is an inexpensive option but may not be ideal for all situations due to the amount of work required. Although slightly more expensive than heating oil in our region, propane is recommended for space heating applications as it is generally found to be cleaner burning than oil. Propane storage tanks are also more reliable and require less frequent replacement. Heating with electricity should be avoided, if possible. It is also recommended that discussions be pursued to determine the feasibility and possibility of bringing natural gas to our community.

Topic	Details
Electrical Demand, Consumption and the Kilowatt Hour	This section of the report explains some basic concepts related to electricity. A general understanding of these concepts is required to meaningfully discuss topics related to electricity and electricity conservation. Electrical consumption can be conserved by choosing products and equipment that use less power or by using them less.
Hydro One Invoices	A detailed overview of Hydro One residential invoices is discussed in this section, including a breakdown of electricity, delivery and regulatory charges. The density rating of the community and how this affects delivery charges are discussed at length. HST exemption of First Nations customers is discussed, along with cost management programs that are available to help manage electricity costs.

7.2 ENERGY CONSERVATION

An understanding of energy conservation is essential to achieving our energy vision and also supports the second goal of our CEP. Summaries of the initiatives that can support residential and community energy conservation are provided below.

Table 6 - Summary of Energy Conservation Topics

Topic	Details
Household Energy Use	A breakdown of the energy use of a typical Canadian Home is provided in this section. Approximately 60% of annual energy use in the home is a result of space heating, and about 20% is water heating. Appliances, lighting and space cooling use about 13%, 4% and 2%, respectively. Space and water heating present the largest opportunities for energy savings within the home. Residents should be educated on typical household energy use so that they can make more informed energy conservation decisions.
Changing Energy Use Behaviour	Energy use behaviour (how and when we use it) has a major impact on consumption and cost. Awareness of energy conservation is needed to change energy use behaviours. It takes education, time, and consideration to develop other energy saving habits, such as turning off lights when not in use or taking shorter showers.
Home Energy Audits	In 2014, our community took part in the Aboriginal Conservation Program (ACP). A new program will be launched soon by Hydro One. Those who did not participate in the ACP program may be eligible. Our community should pursue the program when it comes available.
Phantom Load	A phantom load is any household device or appliance that consumes electricity when plugged in, but not in use. Phantom load can be reduced by unplugging devices when not in use. A power bar can be used to make this easy.

Topic	Details
Proper Winter Preparation	70% of our residents do not prepare their homes for cold winter weather. Improving the building envelope (i.e. shrink film for windows, repair/replace caulking) can greatly reduce home energy use.
Use of Firewood	Two factors significantly impact the amount of heat generated from firewood; 1) how dry the wood is, and 2) the type of tree you burn. A summary of the amount of heat produced by various tree types is provided. Posting this information on the community website would be helpful.
Community Energy Advisor	Hiring and training a part-time Community Energy Advisor is key to the implementation of our CEP. Funding for the Community Energy Advisor should be sought through IESO programs.
Youth Energy Champions	We will train selected members of our youth in energy conservation and generation to become energy champions within our community. These youth energy champions will act as role models and also encourage energy conservation and educate in regards to the benefits of renewable energy generation.
Providing Resources	We should develop a section of our community website dedicated to energy and provide information and resources related to energy education, conservation, and generation.
Energy Efficiency in New Construction	The development of more homes in our community represents an excellent opportunity to ensure these homes are built with energy efficiency and generation in mind. Energy efficiency guidelines have been developed and are available in Appendix J of the main CEP report.
Bulk Purchases	Our community could investigate the potential to coordinate bulk purchases of energy efficient appliances for community members.
Consumption Tracking	Our community could implement a process to gather community energy consumption and cost data for ongoing comparison and analysis. This will also help us to track our conservation progress as a community.
Property Management Software	Our community should obtain property management software that can be used to determine improvements to our housing stock and community assets. This software would allow us assess and track retrofits to these buildings that would increase their energy efficiency.

7.3 ENERGY GENERATION

Obtaining energy independence, particularly in relation to Hydro One is one of the major goals of our CEP. Our community already has experience with the development of renewable energy generation projects. This section of our CEP provides a high-level overview of additional renewable energy generation options that are available to us.

7.3.1 WHAT IS RENEWABLE ENERGY GENERATION?

Renewable energy generation is the production of energy from a source that can naturally replenish itself. Examples of renewable energy include the use of wind and solar resources to produce electricity.

There are many benefits to the use of renewable energy. One of the biggest is the inherent sustainability of renewable technologies. Since renewable sources naturally replenish themselves, they will not deplete. Renewable energy generation also has a reduced environmental impact in comparison to traditional energy generation methods (such as oil or natural gas), particularly when considering air and greenhouse gas emissions.

Figure 7 - Renewable Energy Technologies

Source: cleantechies.com

7.3.2 MOTIVATIONS FOR RENEWABLE ENERGY GENERATION

There are several reasons for a community to pursue renewable energy generation. These include economic development (revenue generation), energy independence, lower environmental impact, and an enhanced image. While our community has a stated an objective of energy independence (as per our Band Council Resolution passed in February of 2016), this section explores the other reasons as well.

Table 7 - Summary of Motivations for Energy Generation

Motivation	Description
Economic Development / Revenue Generation	A desire to produce and sell energy (mainly electricity) as a means of revenue generation for our community. The generated electricity is not used locally, but is distributed into the electricity grid.
Energy Independence / Generate for Use	A desire to move towards energy independence, meaning that we would no longer be fully reliant on buying our energy from others (i.e. Hydro One), but would generate electricity for our own use. This scenario utilizes technologies that are not connected to the electricity grid, and is typically referred to as "off-grid" generation.
Both Revenue Generation and Energy Independence	This refers to a desire to produce electricity that can be used by the community or its members first, with any excess being sold to the grid. This option typically uses net metering and micro-grid initiatives.
Lower Environmental Impact	A desire to lower the environmental impact of energy use by moving away from the use of fossil fuel-based energy.

7.3.3 CONNECTION OVERVIEW

An electrical grid is an interconnected network for delivering electricity from suppliers to consumers. It consists of generating stations that produce electrical power, high-voltage transmission lines that carry power from distant sources to demand centers, and distribution lines that connect to individual customers.

Energy generation entails some type of connection system to get the energy to the user. An overview of the three relevant connection types is provided below.

Table 8 - Summary of Connection Types

Connection Type	Details
Feed-only	A feed-only renewable energy generation facility is one that supplies all of its generated energy to the grid. Under this connection type, none of the energy produced is used locally, but is instead sold to our local electricity provider (i.e. Hydro One) and delivered through the grid.
Off-grid	Off-grid renewable energy generation refers to the generation of electricity from a renewable source which is used internally and not supplied or sold to the grid.
Micro-grid	A micro-grid is a local energy grid with capability to disconnect from the traditional electricity grid and operate independently.
Net-metering	Net Metering allows customers who generate electricity primarily for their own use to send the excess electricity to Hydro One's distribution system for a credit.

As described above, our main motivation for renewable energy project development is gaining energy independence. As such, it is recommended that net-metering, micro-grid and off-grid opportunities are considered for our community.

It is recommended that net-metering and micro-grid projects be given priority, as they will result in a more cost effective means of energy generation than an off-grid option. Net-metering and micro-grid projects will also allow for an overall easier and more manageable transition towards energy independence. Since micro-grid and net-metering are still both grid-connected options, they are limited primarily by access to grid connection.

7.3.4 GRID CAPACITY

Although our main motive in relation to renewable energy is energy independence, it is still important for us to know if grid capacity is available. Grid connection may also be required for net-metering and micro-grid opportunities.

Our community's electricity is supplied by Hydro One. We are serviced from Hydro One's Birch Island Distribution Station (DS). The Birch Island DS is fed from the upstream Manitoulin Transmission Station (TS), owned and operated by Hydro One.

The Birch Island DS has very limited capacity. Projects greater than 10 kW require an individual assessment due to transmission constraints and there is no capacity for projects over 250 kW. The limitations of the Birch Island DS can be attributed to the lack of capacity at the upstream Manitoulin TS. Projects connecting to the Manitoulin TS that are greater than 10 kW will require an individual assessment. The Manitoulin TS does not have capacity of generation projects over 500 kW.

In summary, there is limited connection capacity for generation within our community. Small scale projects under 10 kW are likely possible. Medium scale projects, between 10 kW and 500 kW may be possible but will require an individual assessment with Hydro One. Capacity for projects over 500 kW does not exist at this time.

7.3.5 RENEWABLE ENERGY TYPE APPLICABILITY AND SUMMARY

Below, we have outlined the various renewable energy technologies that exist and identified, at a high level, those which would be most suitable for our community based upon technical feasibility.

Table 9 - Summary of Renewable Technologies Available to WRFN

Technology Type	Technically Feasible	Reasoning and Considerations	Consider for Future Development
Solar PV	Yes	Amount of sunlight received is adequate for development (Natural Resources Canada[2]). Land availability may be a challenge.	Yes
Wind	Yes	Adequate wind available, but taller wind turbines (greater than 50 meters) are required (NRC Renewable Energy Atlas[3]). Land availability and public acceptance may be a challenge.	Yes
Hydroelectric	No	Adequate water resources do not exist within the community (NRC Renewable Energy Atlas[4]).	No
Bioenergy	To Be Determined	Limited feedstock (wood) to operate a bioenergy facility sustainably is available from resources located within the community. Research into economic viability of a bioenergy facility in our community and availability of feedstock from the surrounding area is required	Yes
Landfill Gas	No	Limited due to the size of community and landfill.	No
Energy from Waste	To Be Determined	Limited amount of waste generated by community. Importing waste from surrounding area may be an option but further investigation into economic viability and availability of feedstock (waste) from the surrounding area is required. Public acceptance should also be gauged and thoroughly considered.	Yes
Solar Thermal	Yes	Available to all sectors of our community. Does not generate electricity but can reduce heating requirements.	Yes
Geothermal	Yes	Can help reduce heating and cooling requirements. Better suited for larger scale commercial and community-owned buildings.	Yes
Alternative Storage Battery Systems	Yes	Technologies can be considered for any renewable energy system.	Yes
Smart Grid Technology	Yes	Smart-grid technology can be considered for implementation with off-grid and micro-grid connection types.	Yes

Solar PV is the primary candidate for renewable energy generation within our community. Development of wind energy should also be considered, but it is important to note that wind resources are acceptable but only at heights greater than 50m above ground level. It is also recommended that additional research into the viability of electricity from bioenergy be conducted, particularly the availability of biomass and energy from waste feedstock in the surrounding area.

Solar thermal and geothermal technologies are also applicable to our residents. These technologies do not generate electricity but can reduce heating and cooling costs.

It is also recommended that we consider and implement alternative battery storage systems and smart grid technology where possible within our community, especially as we strive towards energy independence. This includes consideration of the implementation of these technologies in all new constructions within our community, both residential and community-owned.

7.3.6 ENVIRONMENTAL APPROVALS AND CONSIDERATIONS

Projects developed within a First Nation territory are not necessarily subject to environmental approval or regulation. However, research should be completed to determine if any regulations must be followed or if any approvals must be obtained for any renewable energy project located within our community.

8.0 IMPLEMENTATION

Ensuring that our Community Energy Plan is implementable was a crucial part of its development. Our implementation plan has been developed as a living document, meant to be updated and added to on an ongoing basis as new ideas, feedback, and opportunities come forward from community members and other stakeholders.

Our approach includes a multi-stage Implementation Strategy, supported by a variety of possible actions (our Actions Inventory), a handful of which are to be implemented each year (our annual Action Plans). Each of these components is explained below.

8.1 IMPLEMENTATION STRATEGY

Our Implementation Strategy plots out a pathway to achieve our CEP goals over the next 10 years, taking the relative cost impact into account. That pathway has been broken down into a number of stages, each of which can be further classified by the following types: education, conservation, and generation.

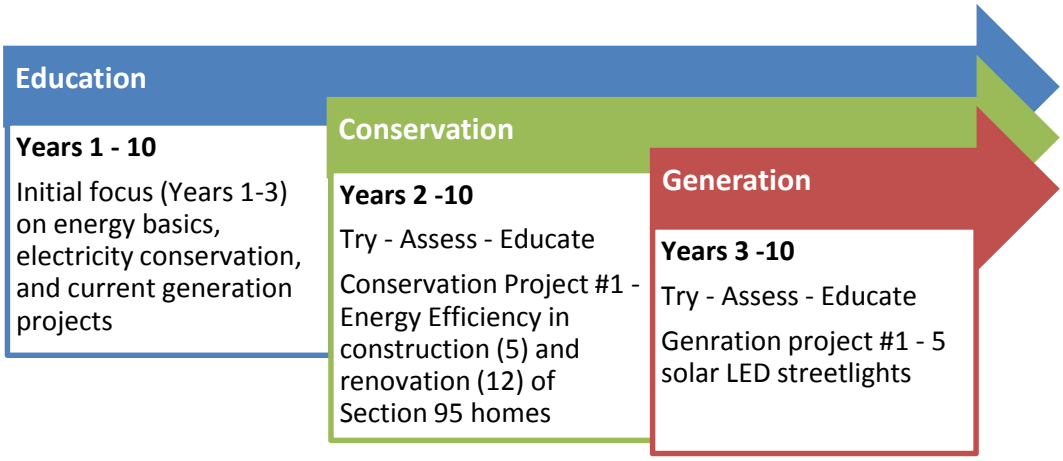

Figure 8 - Summary of Implementation Strategy

Our Implementation Strategy begins with a heavy push on education. This education will be based around general energy concepts and our recent energy conservation and generation projects. Education will play a crucial role in accomplishing all of our CEP goals, and thus will continue throughout the duration of the plan.

Our education program will be supported by a "Try and Assess" strategy for both energy conservation and energy generation – meaning that we will "Try" various projects over the next 10 years and "Assess"

the performance and impacts. This assessment will then be used to educate our community and staff, before we move on to our next "Try".

Our first "Try", which is already underway, will be adding energy conservation components in the construction and renovation of Section 95 homes in 2017 and 2018. Additional conservation actions will be taken throughout the remainder of our plan's timeframe, focusing on various areas including heating, lighting, and appliances. Our conservation goals directly support our generation goal, since it is important that we use as little energy as possible in order to make our energy independence goals more achievable.

One of the major findings of our CEP was that community members support a transition towards energy independence, but want it done in a slow manner and wish to be kept informed and involved along the way. To do this, we have proposed construction of multiple, small scale, demonstration projects. Thus, energy generation begins in Year 3 with the planning of our pilot/demonstration projects and the construction of the first such project: replacing 5 of our current streetlights with solar powered LED streetlights. We will then demonstrate off-grid alternative energy sources on our local school or similarly sized community buildings as our energy independence pilot project 2 in Year 4.

Our implementation strategy concludes with developing our path to large scale energy independence, which would take into account: public opinion on technology and connection type, land availability, connection availability (if applicable), environmental approval requirements (if applicable), and the technical and financial viability of prospective projects.

Our detailed Implementation Strategy can be found in Appendix L of our main CEP report.

8.1.1 FUNDING

As per the fourth goal of our CEP, it is important to pursue funding for all of the actions that we have defined in the Implementation Strategy. Pursuit of funding should be ongoing, as new programs may become available over time. A list of current funding programs can be found in Appendix K of our main CEP report.

8.1.2 UPDATING AND ASSESSING PROGRESS OF THE IMPLEMENTATION STRATEGY

Since the Implementation Plan itself is a living document, it is expected that it will undergo constant evolution throughout the implementation process. However, we have indicated periodic reviews of the entire CEP. We will also use this opportunity to assess our progress towards our goals and adjust all aspects of the Plan as necessary, including the Implementation Plan.

8.2 IMPLEMENTATION TABLE AND ACTIONS INVENTORY

The Implementation Table provides a high level schedule and overview of the various actions that need to be completed in order to move towards our energy goals and can be seen in Table 10, below. These actions are grouped together in stages. Pre-requisites have also been identified to provide a general sense of which stage should be completed prior to beginning the next. The Implementation Table also provides the estimated cost impact associated with each of the identified stages.

The Actions Inventory provides further details on the individual actions that must be completed to meet our energy goals. These actions are categorized in relation to the stages identified within the Implementation Table. Again, pre-requisites are given where necessary to help show the order in which these tasks should be completed in relation to each other. Our Actions Inventory can be found in Appendix L of our main CEP report.

Table 10 - CEP Implementation Table

Whitefish River First Nation
Community Energy Plan
Implementation Table

Stage Type	Stage ID	Stage	Pre-Requisite	Implementation Schedule 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Cost Impact
Planning	P01	Establish Community Energy Advisor and Committee	None											Low
Education	E01	Energy Education Phase #1 - Energy Basics, Electricity Conservation and Renewables, Youth Energy Champion	P01											Low
Conservation	C01	Energy Conservation Project #1 - Section 95 Homes Retrofits (12) & New Construction (5) - Try & Assess	P01				* Continue as needed							Medium
Conservation	C02	Energy Conservation Phase #1 - Electricity Conservation	P01											Low
Planning	P02	1st CEP Check In / Update	P01											Medium
Generation	G01	Plan Renewable Energy Demonstration Projects	None											Medium
Education	E02	Energy Education Phase #2 - Heating Conservation and Streetlight Pilot Project	E01											Low
Generation	G02	Energy Independence Pilot Project #1 - Solar LED Streetlights - Try & Assess	None											Low
Generation	G03	Energy Independence Pilot Project #2 - Local School or Community Building Off-grid - Try & Assess	G01											Medium
Planning	P03	2nd CEP Check In / Update	P02											Medium
Conservation	C03	Energy Conservation Phase #1 - Heating Conservation	C02											Low
Generation	G04	Energy Independence Pilot Project #3 - One First Nation Owned Building (Net-Metering) - Try & Assess	G01											High
Generation	G05	Energy Independence Pilot Project #4 - Five Residential Homes (Micro-grid)- Try & Assess	G01											High
Planning	P04	3rd CEP Check In / Update	P03											Medium
Education	E03	Energy Education Phase #3 - Demonstration Projects	G02, G03, G04, G05											Low
Generation	G06	Develop Path to Large Scale Energy Independence	G02, G03, G04, G05											Medium

2026 Goals:	Make our community one of the most energy educated in Canada
	Create a culture of conservation such that we use as little energy as practically possible
	Determine the best path for our community to transition towards complete energy independence
	Identify and provide support for funding programs related to our current and future energy initiatives

Legend	
Activity Type	
Education	An activity pertaining to educating the community, staff or leadership
Conservation	An activity pertaining to conserving energy
Generation	An activity pertaining to energy generation
Cost Impact	
Low	Will require project based funding or additional human resources less than $50k
Medium	Will require an incremental project based funding or additional HR from $50k - $500k
High	Will require an incremental project based funding or additional HR from $500k - $5M
Extreme	Will require incremental project based funding or additional HR greater than $5M

8.3 THE ANNUAL ACTION PLAN

Each year, a number of actions to pursue will be chosen from the Actions Inventory. The actions are developed in a manner which ensures that they can be completed in a one year time frame. Actions that are too large to be completed in a single year will be broken down into smaller components in order to avoid the "implementation paralysis" sometimes associated with plans that don't break down the actions into smaller bites. At the end of each year the chosen actions will be reported upon, and new set of actions will be chosen for the following year. Thus, the Action Plan is to be reviewed and updated on an annual basis. A first year annual action plan has been developed and is shown in the table below.

Table 11 - Year 1 Annual Action Plan

Goal	Action	Timing
Not Applicable	Establish an Energy Committee	February 2017
Not Applicable	Hire and Train a Community Energy Advisor	April 2017
Education	Develop Community Energy Education Strategy - including a communication plan, 10 year target and method to measure progress	June 2017
Education	Develop a section of our community website as an energy education resource	September 2017
Education	Select and train youth energy champions within our community to act as role models and encourage and educate in regards to energy conservation and generation.	September 2017
Education	Educate community on Hydro One invoices, specifically delivery charges, density ratings, and Time-of-Use pricing	December 2017
Education	Establish an annual community energy day to educate and engage the community, as well as to celebrate energy achievements	December 2017
Conservation	Obtain property management software to determine and track energy efficient improvements to housing stock and community assets	December 2017

9.0 GLOSSARY OF TERMS

Aboriginal Conservation Program (ACP): An IESO program designed to assist First Nations to reduce energy demand and manage costs by increasing energy efficiency in homes and businesses.

Annual Fuel Utilization Factor (AFUE): Measurement of thermal energy generated compared to the total amount of energy that is supplied from a fuel.

Building Envelope: The physical separator between the interior and exterior of a building.

Business As Usual (BAU): A projected forecast given current patterns; assuming no changes.

Capital Cost: Fixed, one-time expenses incurred to bring a project or installation to an operable state.

Carbon emission factor: A numerical conversion factor used to express an electrical quantity as a mass of carbon dioxide (CO_2).

Connection Impact Assessment (CIA): A process through which Hydro One determines an electrical generator's effects on its' distribution and transmission system. A connection impact assessment is required to be completed prior to connection with Hydro One's network.

Cooling System: A system used to cool a building, such as an air conditioning unit.

Density Rating: A Hydro One measurement used to distinguish the amount of customers in a given area. Density Rating affects the rates that a Hydro One customer pays.

Energy: The ability of a system to perform work, including electrical energy and heat energy gained from combustion of various types of fuels.

Energy Audit: A professional assessment of energy needs, use, efficiency, and conservation.

Energy Conservation: The practice of using less energy, or using it more efficiently.

Energy Consumption: The amount of energy that is used over a given period of time.

Energy Efficiency: The practice of managing how energy is used in an efficient manner.

Energy from Waste (EFW): Energy derived from solid waste. Refers to combustion and gasification processes.

Energy Generation: The act of creating usable energy in the form of electricity or heat.

Energy Star Certification: Products that are independently certified to save energy without sacrificing functionality.

Electrical Generator: A technology which produces electrical energy.

Electrical Load Capacity: The amount of electricity available to be supplied to a load from electrical infrastructure.

Feed-in-Tariff (FIT): An economic incentive for large-scale renewable energy projects.

Geothermal Heat Pump: A system used to help adjust home heating and cooling by using the earth's temperature. Does not generate energy but can be used to offset heating and cooling requirements.

Generation Capacity: The amount of electricity that electrical infrastructure can safely accept from an electrical generator.

Gigajoules (GJ): A unit of energy, equivalent to the energy potential of just over two propane tanks.

Greenhouse Gas Emissions: The release of gasses into the atmosphere which trap thermal energy.

Grid-Tied: Having access to an electrical grid system, especially in reference to electrical generation.

Hydroelectric: Electrical energy derived from flowing water, typically from the use of hydroelectric dams.

Independent Electricity Systems Operator (IESO): An organization responsible for the day-to-day operation of Ontario's electrical system as well as the safe and reliable operation of that system.

Infrastructure: The basic physical structures and facilities required for the operation of a society.

Kilowatt (kW): A unit of power that is generally used to describe the rate at which electrical energy is produced or used.

Kilowatt-Hour (kWh): A unit of energy typically used to describe the amount of electrical energy used.

Local Distribution Company (LDC): Responsible for delivering electricity from transmission lines customer's homes.

microFIT: An economic incentive for small-scale renewable energy production.

Micro-Grid: An energy system with energy sources and loads that is capable of operating both in parallel with and independently from the main power grid.

Megawatts (MW): A unit of power that is generally used to describe the rate at which electrical energy is produced or used. A Megawatt (MW) is equal to 1000 Kilowatts (kW).

Net Metering: The system of sending surplus generated power to the grid to offset energy costs.

Off-Grid: Having no access to an electrical grid system, especially in reference to electrical generation.

Payback Period: The length of time required for an investment to recover its initial cost (or capital cost).

Phantom Load: Devices in the home that consume energy when 'off'.

Renewable Energy: Energy that is collected from resources which are naturally replenished on a human timescale.

Smart Meter: An electronic device that records consumption of electric energy in short intervals and communicates that information to a utility company.

Solar Photovoltaic: Electrical energy that is derived from the sun using semiconductor materials.

Solar Thermal: Thermal energy derived from the sun.

Time-of-Use (TOU): A pricing schedule introduced to reflect the costs of producing electricity at different times of the day.

U-Value: A measure of how effective a material is as an insulator. The lower the U-value, the better the material is as a heat insulator.

Upstream Feeder: The distribution or transmission station that supplies electricity to a specified point within an electrical grid.

Endnotes

[1] Statistics Canada. (2005.) Household energy use, by fuel type and by province – Average energy use. Retrieved from: http://www.statcan.gc.ca/pub/11-526-s/2013002/t004-eng.htm
[2] Natural Resources Canada. (2016.) Photovoltaic and solar resource maps. Retrieved from: http://www.nrcan.gc.ca/18366
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