CHIPPEWAS OF GEORGINA ISLAND FIRST NATION

COMMUNITY ENERGY PLAN UPDATE

2018

Updated: July 29, 2019

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The Independent Electricity System Operator's
Aboriginal Community Energy Plan Program

This Community Energy Plan was developed with the
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EXECUTIVE SUMMARY

Introduction

The Chippewas of Georgina Island First Nation (GIFN) has completed an update to the Community Energy Plan (CEP) developed in 2015. This document outlines the updates and changes to the 2015 GIFN CEP.

Applicable Community Information

Georgina Island First Nation consists of five (5) separate land masses located near the southern shore of Lake Simcoe. According to 2016 Census data, the total population of GIFN (which includes both members and non-members) is approximately 261. GIFN also has a large seasonal influx of residents. GIFN has a total of 120 year round residential units, with all but one (1) located on Georgina Island (the other located on Snake Island). There are also about 444 seasonal residences located on the various islands of the community. There are no residences located on the mainland (Virginia Beach and Island Grove).

Several past and current initiatives relating to energy have been identified within our community, including:

- Funding from the IESO's Education and Capacity Building Program;
- Participation in the Aboriginal Conservation Program; and
- Development of several microFIT Solar Photovoltaic Systems.

An energy vision and several energy goals were developed as part of the 2015 GIFN CEP. The energy vision is:

The Chippewas of Georgina Island are among the leading Ontario First Nations communities in terms of energy conservation, comprehension, self-sufficiency, and support of other First Nations communities in these areas.

The energy goals that were developed for our community are to:

- Improve our knowledge and understanding of our energy use and associated costs;
- Develop a complete understanding by the Community of Hydro One energy costs and billing;
- Engage the Georgina Island community in pursuing energy cost reduction strategies, particularly for residents; and
- Transition towards energy independence in a practical manner.

Significant Changes in Ontario

Since the development of the 2015 CEP, there have been a number of significant changes in relation to energy in Ontario. These changes include:

- The initiation of the Ontario Fair Hydro Plan and First Nations Delivery Credit;
- The cancellation of FIT, microFIT, and Large Renewable Procurement (LRP) subsidies and programs;
- The cancellation of the Ontario Cap and Trade Regulation;
- Development of Ontario's 2017 Long Term Energy Plan; and
- Uncertainty in Ontario's energy sector due to the results of the recent election.

Summary of Community Engagement

To update our CEP, the community was engaged in several different ways. The community engagement activities conducted as part of our CEP Update are listed below:

- Kickoff Meeting
- Year-Round Residential Energy Survey
- Earth Day Event
- Managers Meeting
- Seasonal Residence Energy Survey
- Review of draft CEP update

As described above, a Year-Round Residential Energy Survey and a Seasonal Residence Energy Survey were conducted to obtain feedback on the CEP and to collect information to update the baseline energy use study. A summary of the results from these surveys are available in Appendix A.

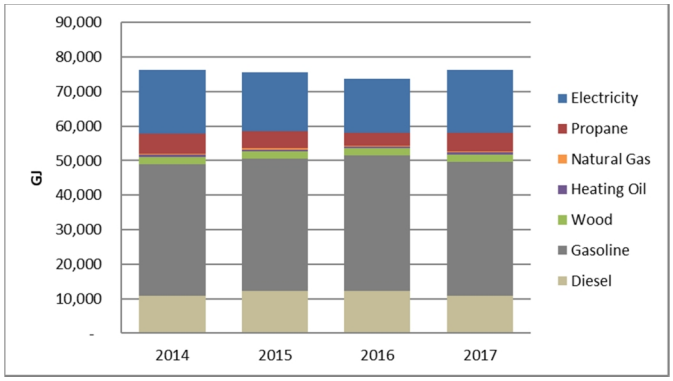
Current Energy Use

We have updated the baseline energy use assessment of our community to include the years 2014 through 2017. For the purposes of our CEP Update, we have classified energy users within the community into four (4) sectors; year-round residential, seasonal residential, Band-owned, and commercial. The methodology that we used to establish our baseline energy use is available in Appendix B.

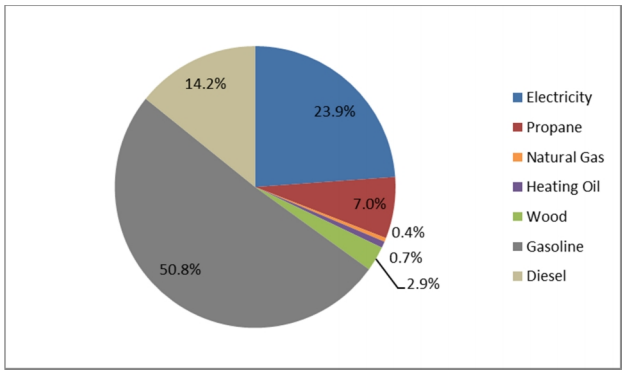
We use a number of energy types within our community for different applications, which are listed below:

- Electricity
- Propane
- Natural Gas
- Heating Oil
- Wood
- Gasoline
- Diesel

We have converted all energy use into a unit called a gigajoule (GJ). This is done so we can better compare energy consumption from different sources, which can be measured in different units. The total energy consumption of our community for the years 2014 to 2017 was calculated. In 2017, our total community energy consumption was about 76,300 GJ. Total energy consumption remains fairly consistent in years 2014, 2015, and 2017, but declines slightly (by about 2,500 GJ) in 2016.



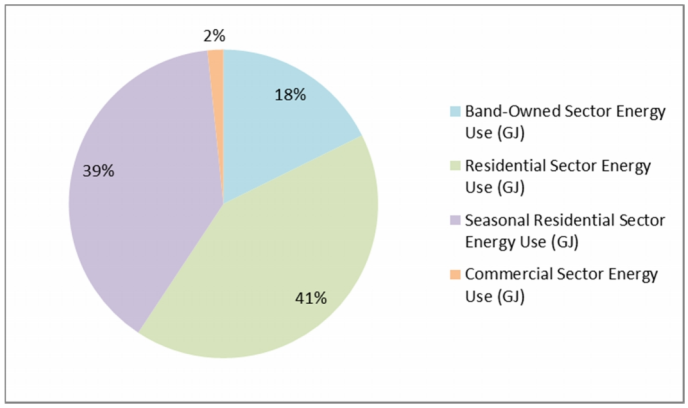
Annual Energy Consumption by Type



Total Energy Use by Type, 2017

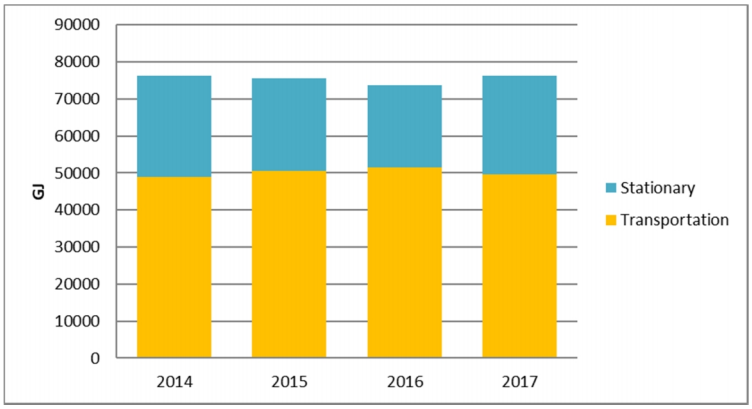
Overall, gasoline is the type of energy most used within the community, accounting for about 51% of the community's total energy consumption in 2017. Other significant energy types used are; electricity, diesel, and propane, accounting for about 24%, 14%, and 7% of GIFN's total energy use, respectively. Wood, heating oil, and natural gas consumption represent a minimal percentage of the community's total energy consumption.

The largest energy user in our community is the year-round residential sector, consuming about 41% of the total energy used in 2017. The seasonal residential sector is anticipated to account for about 39% of total energy use. Our Band-owned sector is also significant, accounting for about 18% of our total energy use. Our commercial sector represented only about 2% of the total energy consumed by our community in 2017.



Total Energy Use by Sector, 2017

We have also categorized energy consumption into two major groups; stationary and transportation. In 2017, transportation energy use accounted for about 65% (49,600 GJ) of the total energy used within GIFN, while stationary energy use (related to houses and buildings) accounted for about 35% (26,700 GJ).



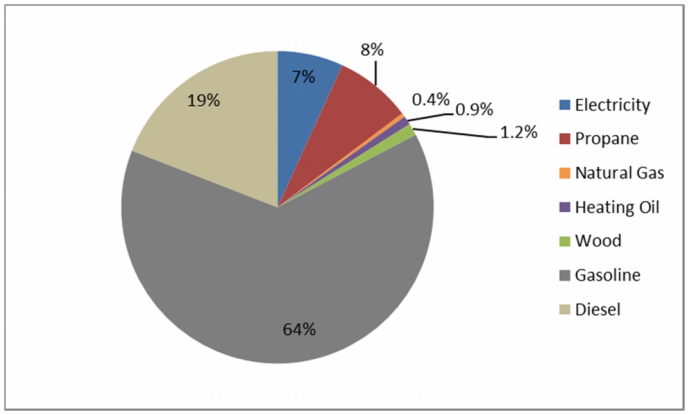
Stationary vs. Transportation Energy Consumption

The results of the baseline assessment of this CEP update were compared to the results of the 2015 CEP baseline analysis. Please note that since the 2015 CEP baseline analysis did not include a full assessment of transportation related energy, the comparison is limited to stationary energy consumption and the energy consumption of the Aazhaawe ferry. It is anticipated that the current energy consumption within the community, in regards to stationary consumption and operation of the Aazhaawe Ferry, has been fairly consistent with the values presented within the 2015 CEP, with the exception of:

- Conservation efforts made in relation to electricity from community participation in the Aboriginal Conservation Program; and
- Increased energy use in the commercial sector due to the operation of the Island View Business Centre (which was not operational during the period covered by the 2015 CEP).

Although we see a discrepancy in overall consumption, this can be largely attributed to a better understanding of energy use within the seasonal residential sector, which does not represent an actual increase in energy, but an estimate that more accurately represents the energy used within that sector.

Based upon the breakdown of energy use, it is estimated that GIFN produced approximately 4,130 tonnes of CO_2eq in 2017. Approximately 83% of GHG emissions in the community are produced in relation to energy used for transportation.



Breakdown of GHG Emission by Energy Type (2017)

Future Energy Needs

As part of the CEP update, we have projected the future energy needs of our community for the year 2028, based on a "business as usual" assumption. We estimate that our overall energy consumption will grow by a total of about 10% within the next 10 years, resulting in an estimated total community energy consumption of about 82,500 GJ in 2028.

Total Energy Consumption Forecast

This "business as usual" estimation of our future energy consumption allows our community to establish targets for energy conservation and track our progress towards these targets. The methodology that we used to establish our future energy needs is available in Appendix B.

Opportunities and Priorities

A number of actions were identified within the 2015 CEP (see the Actions Inventory of the original CEP). For our CEP Update, we have re-organized these actions into the following opportunities:

Administrative/Planning

- Community Energy Advisor
- Investigation of Community Electrical Infrastructure
- Energy Committee

Education

- Community Outreach Strategy
- Training and Education

Conservation

- Residential Conservation Programs
- Conservation in Band-Owned Buildings
- Streetlight Conversion

Generation

- Energy Independence Demonstration Project
- Residential Renewable Projects

The initiatives listed above will be considered "existing" opportunities, carried over from GIFN's 2015 CEP. Due to the re-organization, some of the existing actions have been grouped as sub-tasks, becoming a component within an overall opportunity. Additional information related to the re-organization of existing actions can be found in the updated Actions Inventory.

A number of new opportunities and potential actions have been identified through this CEP update. Please note that in some cases, newly identified action will become sub-tasks to be incorporated into the existing opportunities described above. These newly identified opportunities include:

Administrative/Planning

- Apply for IESO Funding Programs
- Energy Advisor Training
- Justify Future Work-Term (of Advisor)
- Investment in Renewable Energy
- Update Community Energy Plan

Education

- Youth Education
- Supplier Forum and Job Fair
- Department Meetings and Workshops

Conservation

- GHG Considerations for Potential Bridge
- Reducing Transportation Energy
- Energy Retrofits
- Streetlight Retrofit Potential

Generation

- Develop Energy Independence Demonstration Project
- Use Residential Solar PV to Educate
- Natural Gas Infrastructure
- Smart Energy Community Scorecard
- Long Term Energy Independence

Implementation Plan

As part of our CEP Update, we have improved upon the Implementation Plan presented in the 2015 CEP. This Implementation Plan is meant to be a "living document", and updated on an ongoing basis.

GIFN began implementing its 2015 CEP with the hiring of a full-time Community Energy Advisor. The current Community Energy Advisor's work plan includes tasks related to four (4) existing opportunities from the 2015 CEP. These tasks include:

- Community Outreach Strategy
- Streetlight Conversion
- Green Procurement Strategy
- Energy Independence Demonstration Project

In addition, GIFN submitted applications for the IESO's Community Energy Champion (CEC), Education and Capacity Building (ECB), and Indigenous Energy Projects (IEP) programs for funding towards various initiatives described in this report. As of the date of this report, the IESO has not provided a decision on funding approval.

An overall list of actions has been developed as part of the Implementation Plan, which we have called the Actions Inventory. The Actions Inventory includes a brief overview of details related to each of the actions, as well as the current status of various initiatives, and is meant to work hand-in-hand with our Implementation Table. The Actions Inventory is available in Appendix E.

An Implementation Table has also been developed, which provides a high level schedule and overview of the various tasks that need to be completed as part of the overall Implementation Plan. Please note that the schedule presented in the Implementation Table is an outline only, and should be updated as the CEP progresses. The Implementation Table is also available in Appendix E.

An Action Plan for 2019 has been developed and is shown in the table on the following page. Note that all costs presented in the table are estimates only, and further refinement of anticipated costs is necessary. In addition, application to various funding programs may require proposals to account for timelines different from that presented above (i.e. 18 months, 3 years, etc.). Potential overlap with any current funding should also be considered. Additional tasks, and associated funding, may also be identified at any time, and should be included in funding applications (if possible).

Conclusion

This update builds on GIFN's 2015 CEP, and is an effort to move us towards our overall energy vision. We'd like to sincerely thank everybody who participated in this project, including residents that completed various surveys, staff members who provided information and feedback, energy suppliers (Hydro One and Budget Propane), the IESO, and our current Community Energy Advisor. We hope that this document is informative and assists us in achieving our energy goals.

2019 Action Plan

Action	Subtask	Estimated Costs[1]	Potential Funding/Incentive Program
Community Energy Advisor	Hire Energy Advisor	$50,000	CEC (IESO)
	Apply for IESO Funding Programs	N/A	Not Required
	Energy Advisor Training	$31,000[2]	ECB (IESO)
Community Energy Committee	Energy Committee Meetings	$2,000	ECB (IESO)
Community Outreach Strategy	Education	$9,000	ECB (IESO)
	Website	N/A	Not Required
Training and Education	Youth Education	$10,000	ECB (IESO)
	Supplier Forum and Job Fair	$4,000	ECB (IESO)
	Department Meetings and Workshops	$2,000	ECB (IESO)
Streetlight Conservation	Streetlight Retrofit Potential	$90,000[3]	Retrofit Program (Hydro One)
Energy Independence Demonstration Project	Investigate Options and Feasibility	$32,000	IEP (IESO)
Residential Renewable Projects	Complete Analysis on Existing Systems	N/A	Not Required
	Use Residential Solar PV to Educate	N/A	Not Required
Smart Energy Community Scorecard	Participate in Scorecard Project	N/A	Not Required
		Total:	$230,000

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1.0 INTRODUCTION

The Chippewas of Georgina Island First Nation (GIFN) has completed an update to the Community Energy Plan (CEP) developed in 2015. This document outlines the updates and changes to the 2015 GIFN CEP, which primarily include:

- An update to the community baseline energy use analysis, and comparison to the results of the analysis completed as part of the 2015 CEP;
- An update to the future energy needs analysis;
- A review of the energy opportunities developed as part of the original CEP and the identification of any new energy opportunities that may be of importance;
- An update to the proposed implementation plan; and
- General updates and changes related to energy within GIFN and the province of Ontario.

This document (the CEP Update) does not replace the original 2015 GIFN CEP, but provides updates to specific sections of the original CEP.

Figure 1 - Map of Chippewas of Georgina Island First Nation

2.0 APPLICABLE COMMUNITY INFORMATION

This section will highlight significant information applicable to the CEP update and any changes that have occurred. Additional information can be found in Section 2.0 of the 2015 GIFN CEP.

2.1 COMMUNITY LAND BASE

Georgina Island First Nation consists of five (5) separate land masses located near the southern shore of Lake Simcoe. This includes three (3) islands; Georgina Island, Snake Island, and Fox Island, as well as two (2) small acreages located at Virginia beach and Island Grove on the mainland. A map of the land base areas are shown in Figure 1.

2.2 POPULATION

GIFN has a total membership of about 823 members, of which about 205 reside on reserve.[1] According to 2016 Census data, the total population of GIFN (which includes both members and non-members) is approximately 261[2]. GIFN also has a large seasonal influx of residents.

2.3 RESIDENTIAL HOUSING

GIFN has a total of 120 year round residential units, with all but one (1) located on Georgina Island (the other located on Snake Island). There are also about 444 seasonal residences located within the community, significantly outnumbering member residences. There are no residences located on the mainland (Virginia Beach and Island Grove). A breakdown of the location of residences are provided in the table below.

Table 1 - Residential Unit Breakdown[3]

Location	Year Round Residential Units	Seasonal Residences
Georgina Island	119	167
Snake Island	1	229
Fox Island	0	48
Mainland (Virginia Beach and Island Grove)	0	0
Total	120	444

Note: A small number of seasonal residences may reside within Georgina Island First Nation year round. However, for the purposes of this report, these residences have been classified as "seasonal residential". Due to the small number of these residences, it is not anticipated to have a significant impact on the overall calculations conducted as part of this report.

[1] *Georgina Island First Nation*

[2] *Statistics Canada, 2016, Chippewas of Georgina Island First Nation - Census Profile, Retrieved from: www.12.statcan.gc.ca*

[3] *Georgina Island First Nation*

2.4 BAND-OWNED FACILITIES AND ASSETS

There are a number of Band-owned facilities and assets within our community, which include:

- Administration Office
- Community Centre
- Health Centre
- Child Care Building
- Waabgon Gamig School and Library
- Fire Hall
- Police Station
- Public Works Building and Yard
- Trails Building
- Landfill
- Water Plant
- Aazhaawe Maintenance Building
- Seasonal Public Skating Rink
- Aazhaawe Ferry
- Public Works Vehicles
- Band Office Fleet Vehicles

In addition, a new Aazhaawe Ferry Building is currently under construction. Our community also owns several businesses and commercial operations. Due to the nature of these businesses, they have been included as part of the commercial sector for the purposes of our CEP.

2.5 COMMERCIAL BUILDINGS

Our community has several businesses that constitute its commercial sector. Commercial operations within our community include:

- Island View Business Centre
- Virginia Beach Marina
- Island Grove Marina
- Nish Radio 92.3
- East Point Marina
- Eagles Nest Restaurant, Store and Campground

Please note that although some of the businesses listed above are Band-owned, they have been categorized as being part of the commercial sector due to their nature. Also note that energy consumption associated with Nish Radio 92.3 is included as part of the energy consumption of the Community Centre.

2.6 PAST AND PRESENT ENERGY INITIATIVES

Several past and current initiatives relating to energy have been identified within our community. These initiatives are described in more detail below.

2.6.1 EDUCATION AND CAPACITY BUILDING PROGRAM

Georgina Island First Nation successfully applied to the IESO's Education and Capacity Building (ECB) program in 2017. The ECB provided funding for the hiring of a full-time Community Energy Advisor. The Community Energy Advisor is currently working to complete the initiatives outlined in the 2015 GIFN CEP. The Community Energy Advisor has also contributed greatly to this CEP update, and will continue to complete the initiatives described within it.

2.6.2 ABORIGINAL CONSERVATION PROGRAM

Georgina Island First Nation participated in Year 3 of the Aboriginal Conservation Program (ACP) in 2016. The ACP was offered as part of the SaveOnEnergy programs funded through the Independent Electricity System Operator (IESO). It was designed to reduce energy demand and help to manage energy costs within participating First Nations communities by increasing the energy efficiency of homes and businesses.

Through the ACP, our residents, businesses, and Band-owned facilities had the opportunity to receive energy assessments and energy saving upgrades. In total, the changes reduced our overall estimated energy demand by 42 kilowatts (kW) and our estimated energy consumption by about 197,700 kilowatt hours (kWh's)[4].

Did you know?
Participation in the ACP program reduced the total electricity consumption of GIFN per year by about 4%.

An overhaul of the ACP program has recently taken place. The new program, called the First Nation Conservation Program (FNCP) and administered by Hydro One, now focuses solely on the residential sector. The initiative is similar, offering energy efficient upgrades to homeowners that qualify. In addition, the program now offers building envelope related retrofits (attic and basement insulation) to homeowners that heat with electricity[5]. Since GIFN recently participated in the ACP, the community may not qualify for participation within the FNCP for some time. However, individual residents that

[4] *First Nations Engineering Services Ltd. 2016. Aboriginal Conservation Program - Chippewas of Georgina Island First Nation Community Summary.*

[5] *Hydro One. 2018. First Nations Conservation Program. Retrieved from: https://www.hydroone.com/saving-money-and-energy/residential/first-nations-conservation-program*

did not participate may be eligible for the SaveOnEnergy Home Assistance Program (HAP), which offers qualified homeowners and social housing providers free energy assessments and efficiency upgrades.[6] Application to the Affordability Fund may also be possible. Please note that qualification for these programs is based on annual income, and proof of income (usually in the form of income tax statements), is required.

2.6.3 EXISTING SOLAR PHOTOVOLTAIC SYSTEMS

There are currently four (4) small rooftop solar photovoltaic systems within Georgina Island First Nation. These systems were all developed under the IESO's microFIT program, and are approximately 10 kW in size. The systems are located on the following community buildings:

- Child Care Building
- Waabgon Gamig School and Library
- Fire Hall
- Police Station

The operation of these systems, including their output, can be assessed and used to as an educational tool within our community (and made part of the Community Outreach Strategy). The operation and financial characteristics of these systems can also be used as a basis for any potential renewable generation systems developed in the future.

In addition, several residents (estimated to be about 5% of community members) within the community indicated that they currently have renewable energy systems (from our Year Round Residential Energy Survey).

[6] *SaveONEnergy. 2018. Home Assistance Program. Retrieved from: https://saveonenergy.ca/Consumer/Programs/Home-Assistance-Program.aspx*

2.7 COMMUNITY ENERGY VISION AND GOALS

An energy vision and several energy goals were developed as part of the 2015 GIFN CEP. No changes have been made in relation to this energy vision and associated energy goals in this CEP Update.

Our energy vision, which identifies the future state that our community hopes to achieve, is as follows:

The Chippewas of Georgina Island are among the leading Ontario First Nations communities in terms of energy conservation, comprehension, self-sufficiency, and support of other First Nations communities in these areas.

The energy goals that were developed aim to:

- Improve our knowledge and understanding of our energy use and associated costs.
- Develop a complete understanding by the Community of Hydro One energy costs and billing.
- Engage the Georgina Island community in pursuing energy cost reduction strategies, particularly for residents.
- Transition towards energy independence in a practical manner.

3.0 SIGNIFICANT CHANGES IN ONTARIO

Since the development of the 2015 CEP, there have been a number of significant changes in relation to energy in Ontario that should be considered.

Ontario Fair Hydro Plan and First Nations Delivery Credit

The introduction of the Ontario Fair Hydro Plan in 2017 provided residential customers across Ontario an average savings of about 25% on their electrical utility bill. In addition, the On Reserve First Nation Delivery Credit, implemented on July 1, 2017, has eliminated delivery charges for status First Nation members living on reserve. These initiatives have greatly reduced the financial burden of electricity use in the residential sector of our community. However, the Ontario Fair Hydro Plan was only promised for four (4) years, and the future of electricity pricing is unknown. Furthermore, the results of the recent Ontario election provide further uncertainty in relation to these initiatives.

FIT, microFIT, and Large Renewable Procurement (LRP) Cancellation

Renewable generation subsidy programs, such as the FIT, microFIT, and LRP programs, are no longer available for renewable energy projects in Ontario. The lack of these programs will significantly affect the financial viability of renewable energy projects developed in the future.

Ontario Cap and Trade Program Cancellation

Effective July 3, 2018, Ontario cancelled the newly initiated Cap and Trade Regulation. The Cap and Trade Regulation, which began in January of 2018, was developed in an effort to reduce GHG emissions in Ontario. Revenue generated through the program was to be put back into Ontario towards GHG emission reduction initiatives, primarily through the Green Ontario Fund. Due to the cancellation of the Regulation, the Green Ontario Fund and all related incentives and initiatives have also been cancelled. Please note that Ontario also developed a 5-year Climate Change Action Plan: 2016 – 2020, but its validity is uncertain at this time.

Ontario's 2017 Long Term Energy Plan

Ontario released an updated Long Term Energy Plan (LTEP) in 2017. Some important topics identified by Ontario in the 2017 LTEP include:

- Ensuring that energy is affordable and easily accessible;
- Creating a flexible energy system in Ontario;

- Pursuing innovation within the energy sector;
- Improving performance within the energy sector;
- Ensuring continued commitment to energy conservation and increased energy efficiency;
- Making an effort to reduce GHG emissions associated with energy use;
- Supporting Metis and First Nation communities; and
- Supporting regional energy solution and infrastructure needs.

Please note that the results of the recent Ontario election may affect the initiatives identified within the 2017 LTEP.

Uncertainty in Ontario

The results of the recent Ontario election have caused a great deal of uncertainty within the energy sector, as well as available funding and incentive programs. The information provided is accurate, to the greatest extent possible, as of the date of this report.

4.0 SUMMARY OF COMMUNITY ENGAGEMENT

To update the GIFN CEP, the community was engaged in several different ways. This was done to ensure that feedback from community members, administration staff, and leadership were incorporated into the update to the best extent possible. Below is a summary of our community engagement activities.

Table 2 - Summary of Community Engagement Activities

Activity	Timing	Details
Kickoff Meeting	April 12, 2018	Discussion with GIFN`s Economic Development Officer, Environmental Coordinator, and Community Energy Advisor in relation to the CEP update.
Year Round Residential Energy Survey	May 2018 (Completed)	Gathered feedback from community members on energy use, concerns, and ideas. 68 surveys were completed by members residing within our community.
Earth Day Event	May 9, 2018	Engagement at the GIFN earth day cleanup event. Educational materials and information about the CEP update were provided to community members.
Managers Meeting	May 29, 2018	Presentation and meeting with various GIFN departments to discuss the CEP update and gather feedback.
Seasonal Residence Energy Survey	July 2018 (Completed)	Gathered feedback from seasonal residents in relation to energy use. 20 surveys were completed by seasonal residents.
Review of Draft CEP Update	September 2018	Gathered feedback on the draft CEP document from GIFN's Environmental Coordinator. Feedback incorporated into document.

4.1 YEAR-ROUND RESIDENTIAL ENERGY SURVEY RESULTS

As part of our CEP, we have conducted a Year-Round Residential Energy Survey to engage our residents and help determine their thoughts on energy use within our community. This survey focused on year-round residents. The survey was completed by 62 households, or about 56% of our year-round residential sector.

Our Year-Round Community Energy Survey was administered by our Community Energy Advisor. Although we were unable to survey our entire community, the results represent a significant sample size within our community. For the purposes of this report, the results of survey will be taken to represent our entire year-round residential sector.

Key findings from the Year-Round Residential Energy Survey include:

- Year-round residences within our community primarily heat with either electricity (52% of respondents) or propane (40% of respondents);

- The majority of respondents (92%) use electricity for water heating applications;
- The majority of respondents (83%) indicated that they are interested in learning more about energy conservation;
- Almost all respondents (94%) feel it is important (to some extent) for GIFN to invest in energy education;
- Almost all respondents (99%) indicated that they feel that it is important (to some extent) for GIFN to invest in energy conservation measures;
- The majority of respondents (97%) feel that it is important (to some extent) for GIFN to invest in energy generation; and
- The majority of respondents (87%) believe that GIFN should move towards energy independence, either as soon as possible (37% of respondents) or as a long term goal (50% of respondents).

Many of our community members expressed outcomes they want to see as a result of our CEP, which include:

- Self-sufficiency in energy and energy independence for the community;
- Energy awareness and education, and the creation of a more energy conscious community;
- Increased renewable energy generation within the community (specific references to solar PV);
- Special consideration to the environment in relation to energy, and an overall reduction in the community's carbon footprint;
- Energy conservation in both the residential and Band-owned sectors of the community;
- Development of an action plan/goals in relation to the Community Energy Plan;
- Support for residential energy efforts; and
- Job creation.

An in-depth summary of the results from our Year-Round Residential Energy Survey is available in Appendix A. This summary includes information that is not necessarily presented in this report, but will be valuable for future energy planning purposes.

4.2 SEASONAL RESIDENCE ENERGY SURVEY

Due to the large number of seasonal residences within GIFN, an additional survey was administered. This survey was significantly shorter that the Year-Round Residential Energy Survey, and focused primarily on energy use of these seasonal residences. An in-depth summary of the results from our Seasonal Residence Energy Survey is available in Appendix A.

5.0 CURRENT ENERGY USE

We have updated the baseline energy use assessment of our community to include the years 2014 through 2017. This assessment allows us to gain an understanding of how energy is used within our community, and also allows us to:

- Focus future conservation efforts to where they will have the greatest impact; and
- Compare our baseline consumption to the results of the 2015 CEP and track the effectiveness of conservation efforts in our community.

For the purposes of our CEP, we have classified energy users within the community into four (4) sectors; year-round residential, seasonal residential, Band-owned, and commercial. This section outlines the major findings of our baseline energy assessment. The methodology that we used to establish our baseline energy use is available in Appendix B.

5.1 TYPES OF ENERGY

We use a number of energy types within our community for different applications. The energy types used, and how we use each of these energy types is described in greater detail below.

Electricity

Electricity is the most common energy type used for space heating in the year-round residential and seasonal residential sectors. Electricity is also the most common energy type used for water heating in all sectors of the community. Electricity is used for many additional applications in the community, such as lighting, operation of electronic devices, cooking, and cooling. Electricity is supplied to our community by Hydro One. Our entire community (Georgina Island, Snake Island, Fox Island, and the mainland) are all connected to the Hydro One electricity grid, with the islands serviced by submarine cables. A map of the Hydro One distribution system within our community is available in Appendix C.

Propane

Propane is the most common energy type used for space heating in the Band-owned sector, and the second most common energy type used for space heating in both the year-round residential and seasonal residential sectors. Propane is also used for cooking, and is used by a small percentage of our community for water heating applications. Propane is supplied to our community by Budget and Superior Propane.

Natural Gas

Natural gas is the most used type of energy for space heating applications in the commercial sector. Natural gas may also be used for cooking applications. Natural gas is only available on the mainland, with the Island View Business Centre and its tenants being the only users identified.

Heating Oil

Heating oil is used minimally in both the year-round residential and seasonal residential sectors of Georgina Island First Nation, with the primary application among users being space heating. Breakaway was identified as a supplier of heating oil within the community.

Wood

Wood is used, to a minimal extent, in both the year-round residential and seasonal residential sectors of the community. Wood is primarily used for space heating applications. There is no significant wood consumption in the Band-owned or commercial sectors. Wood is harvested locally or supplied from local retailers.

Gasoline

Gasoline is the most common type of fuel used in the year-round residential and seasonal residential sectors of the community.

Diesel

Diesel is the most used fuel in the Band-owned sector of the community, with the Aazhawee Ferry being the largest user.

5.2 TOTAL ANNUAL ENERGY CONSUMPTION

We have categorized energy consumption into two major groups; stationary and transportation. Stationary energy relates to energy consumption from users such as residential homes and buildings. Transportation energy relates to vehicles used within the community and the Aazhawee Ferry. Please note that GIFN's 2015 CEP included on stationary sources and the Aazhawee Ferry.

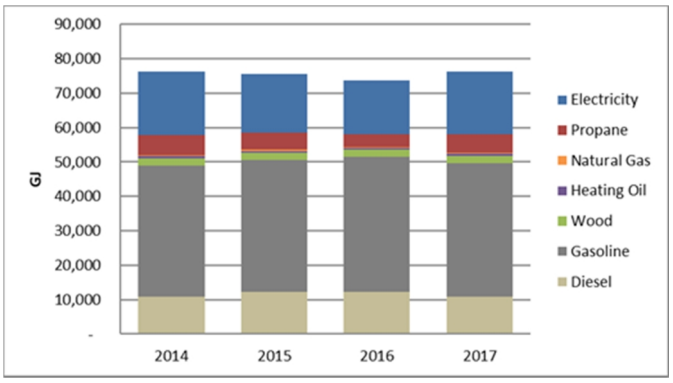

Figure 2 - Annual Energy Consumption by Type

We have also converted all energy use into a unit called a gigajoule (GJ). This is done so we can better compare energy consumption from different sources. A GJ is equal to one billion joules, which is equivalent to about 278 kWh of electricity, or 39 liters of propane.

The total energy consumption of our community for the years 2014 to 2017 is shown in Figure 2. This figure includes both stationary and transportation energy use. In 2017, our total community energy consumption was about 76,300 GJ. Total energy consumption remains fairly consistent in years 2014, 2015, and 2017, but declines slightly (by about 2,500 GJ) in 2016. A closer look shows that this fluctuation is largely attributed to stationary energy use.

5.2.1 BREAKDOWN BY TYPE OF ENERGY

A breakdown of energy used in 2017 is shown in Figure 3. Overall, gasoline is the type of energy most used within the community, accounting for about 51% of the community's total energy consumption in 2017.

Other significant energy types used are electricity, diesel, and propane; accounting for about 24%, 14%, and 7% of GIFN's total energy use, respectively. Wood, heating oil, and natural gas consumption represent a minimal percentage of the community's total energy consumption.

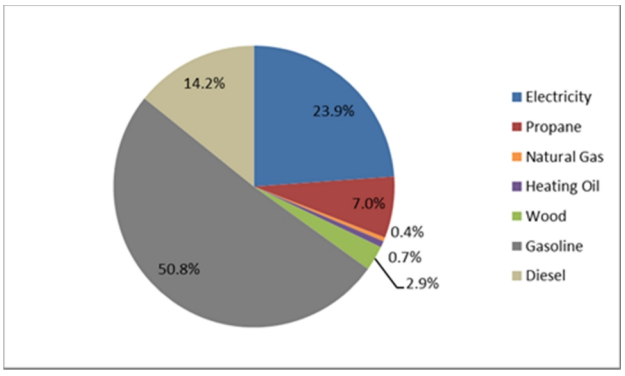

Figure 3 - Total Energy Use by Type, 2017

5.2.2 BREAKDOWN BY SECTOR

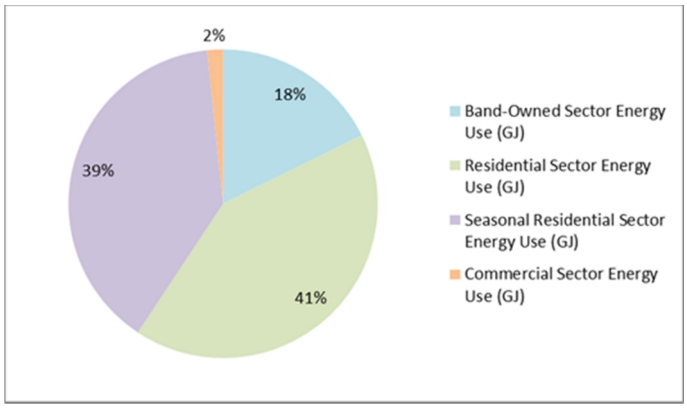

Figure 4 - Total Energy Use by Sector, 2017

The breakdown of our total community energy use in 2017 by sector is available in Figure 4. The largest energy user in our community is the year-round residential sector, consuming about 41% of the total energy used in 2017. The seasonal residential sector is anticipated to account for about 39% of total energy use. Our Band-owned sector is also significant, accounting for about 18% of our total energy use. Our commercial sector represented only about 2% of the total energy consumed by our community in 2017.

5.2.3 STATIONARY VERSUS TRANSPORTATION CONSUMPTION

Figure 5 shows the breakdown of stationary verses transportation energy consumption within the community. Energy consumption related to transportation remains fairly constant over the period assessed, while stationary consumption appears to drop slightly (by about 2,500 GJ) during 2016.

In 2017, transportation energy use accounted for about 65% (49,600 GJ) of the total community energy use, while stationary energy use accounted for about 35% (26,700 GJ).

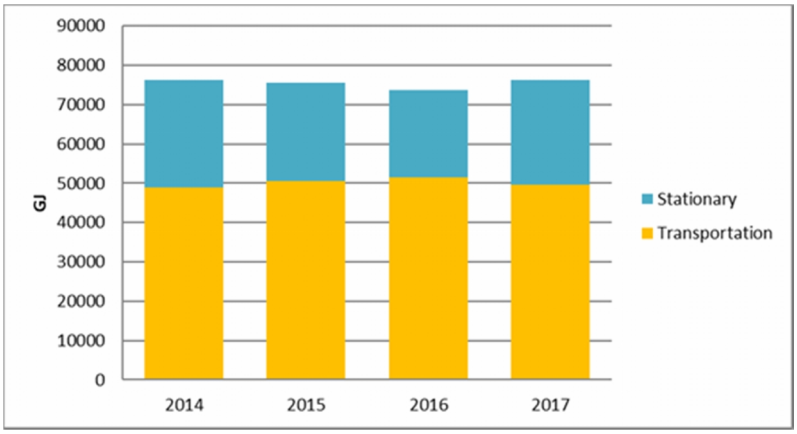

Figure 5 - Stationary vs. Transportation Energy Consumption

5.3 STATIONARY ENERGY CONSUMPTION

Energy consumption from stationary use within the community for 2014 to 2017 is shown in Figure 6. Stationary consumption includes energy use related to all applications within year-round residential units, seasonal residential units, Band-owned buildings, and commercial buildings that do not relate to transportation. Stationary energy use within Georgina Island First Nation is attributed to electricity, propane, natural gas, heating oil, and wood. The average stationary energy consumption from 2014 to 2017 was 26,700 GJ.

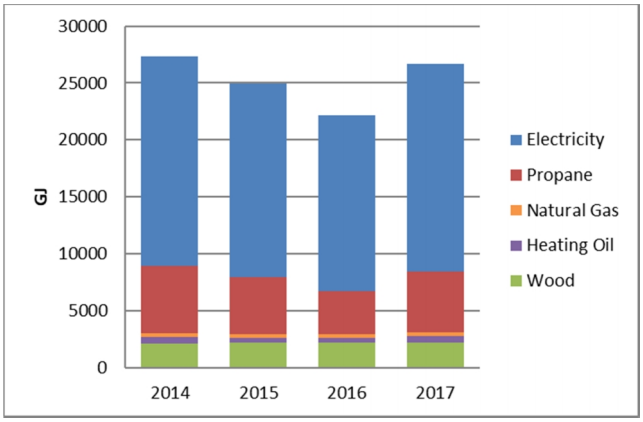

Figure 6 - Total Stationary Energy Consumption

Stationary energy consumption within the community remains fairly consistent for the years 2014, 2015, and 2017, however, there is a significant drop in consumption during 2016. This drop is primarily related to propane and electricity consumption. The exact cause of this fluctuation is not known, however, it is expected that temperature impacts may have played a significant role in this observed trend. Electricity and propane are the two major sources of space heating within the community, and 2016 is the warmest year on record over the time period assessed.

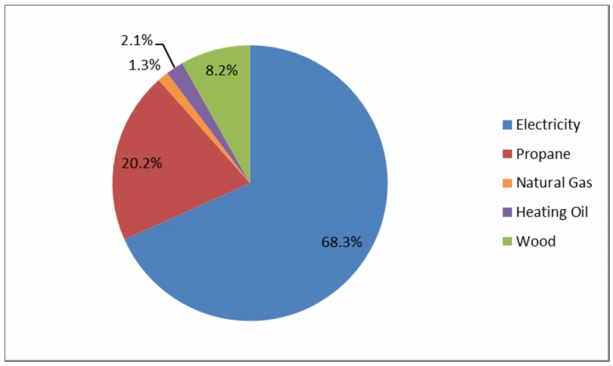

Figure 8 - Stationary Energy Use by Type, 2017

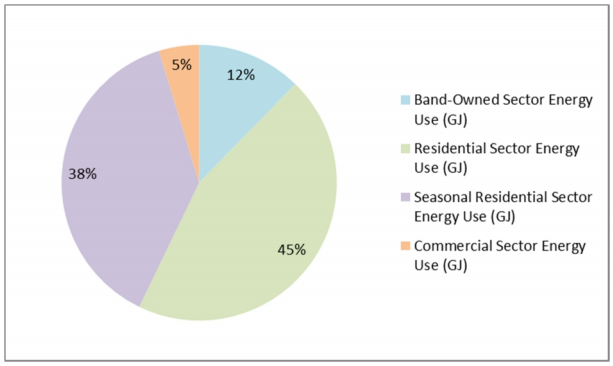

Figure 7 - Stationary Energy Use by Sector, 2017

5.3.1 EFFECTS OF TEMPERATURE

Since a large amount of energy is consumed for space heating purposes, average yearly temperatures can significantly impact annual energy consumption. This is especially true for our region, where the temperatures and duration of winters can vary on a yearly basis. One way that average yearly temperatures can be measured, particularly in relation to heating, is the total number of Heating Degree Day (HDDs) per year. A HDD is the number of degrees that a day's average temperature is below 18°C, when buildings typically need to be heated. The number of HDD is approximately proportional to the amount of energy needed for heating requirements for a given year.

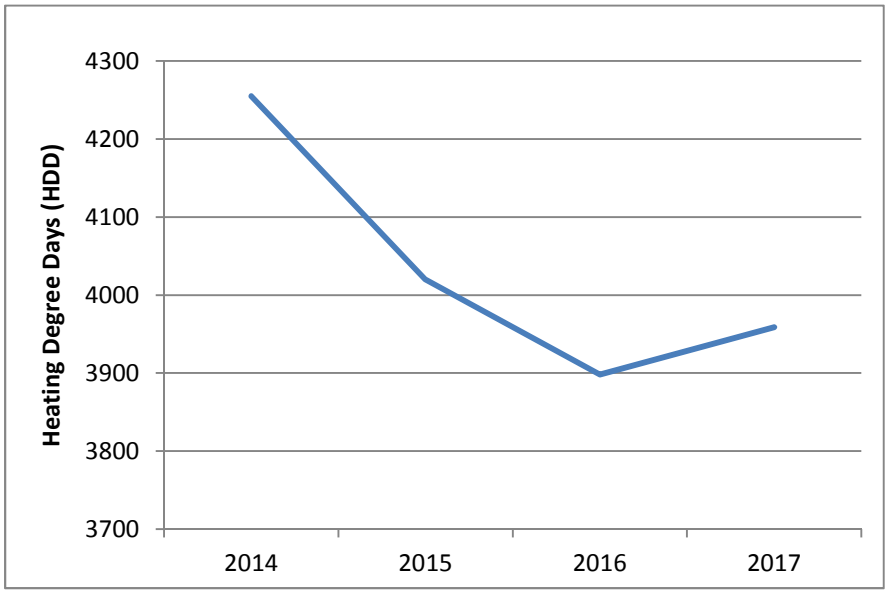

Figure 9 - Historic HDD Data – Udora, Ontario

For the purposes of our CEP, we have chosen to use HDD data from Udora, Ontario, which is within approximately 20 km of GIFN. The graph in Figure 9[7] shows HDD data for Udora over the past four (4) years.

The number of HDD per year has varied substantially over this time period. Most notably, it can be observed that the number of HDD days has decreased over the period from 2014 to 2016, but rose in 2017. This means that 2016 is the warmest year within the time period assessed, and would require the least amount of heating within the community. This helps to explain the drop in stationary energy consumption in 2016, however, since the number of HDD in 2017 is still significantly less than in 2014, but the total stationary energy consumption of these two years is relatively similar, there may be additional unknown factors at play.

[7] *Gov't of Canada. 2018. Monthly Climate Summaries. Retrieved from: http://climate.weather.gc.ca/prods_servs/cdn_climate_summary_e.html*

5.3.2 RESIDENTIAL ENERGY CONSUMPTION

In Canada, the typical household uses an average of 105 GJ per year[8]. Based on our analysis, the average (year round) residential household in our community currently uses approximately 98 GJ per year (stationary consumption), slightly less than the Canadian average.

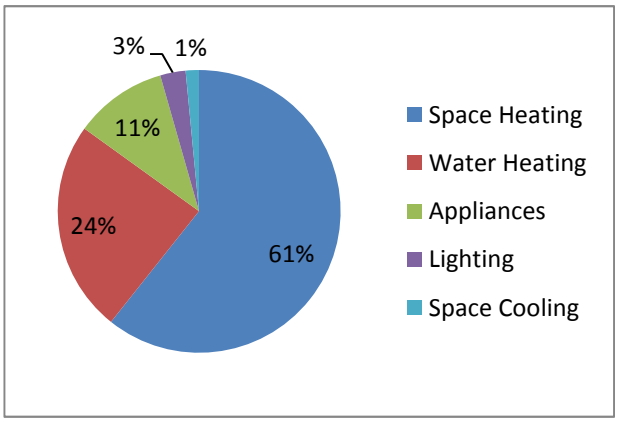

Figure 10 - Residential Energy Use, 2014

Figure 10 shows the average breakdown of energy use in Canadian households[9]. Since the majority of energy use in a typical home is used for space and water heating, focusing energy conservation in these areas represent the greatest opportunity to reduce overall energy consumption within the year-round residential sector.

Based on our analysis, the average seasonal residence within GIFN has a stationary consumption of approximately 21 GJ per year. This number is low primarily due to the limited amount of time these residents spend within the community on average. Aiming to conserve energy within the seasonal residential sector is also important, although energy consumption related to space heating may be significantly lower due to the seasonal nature of the use of these households.

5.3.3 BAND OWNED BUILDINGS AND ASSETS

The breakdown of a typical Canadian commercial/institutional facility is shown in Figure 11[10]. Although the energy use of commercial operations and institutions within our community will vary, this information can still provide valuable insight into major energy users within the Band-owned and commercial sectors.

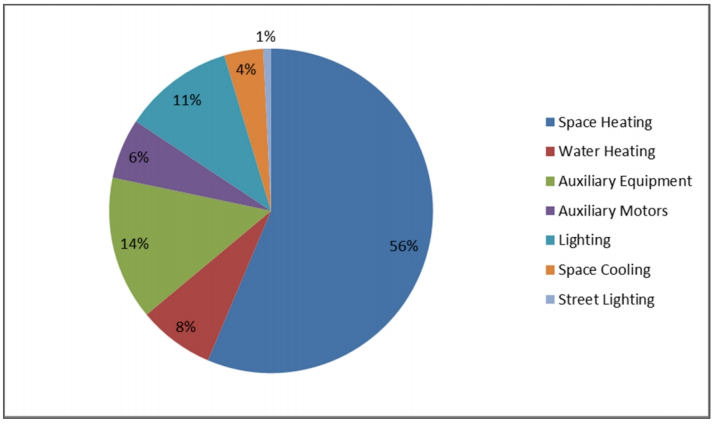

Figure 11 - Commercial/Institutional Energy Use, 2014

[8] *Statistics Canada. 2015. Households and the Environment: Energy Use: Retrieved from: http://www.statcan.gc.ca/pub/11-526-s/2013002/part-partie1-eng.htm*

[9] *Natural Resources Canada. NA. Residential Sector – Energy Use Analysis. Retrieved from: http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=AN&sector=res&juris=00&rn=12&page=0*

[10] *Natural Resources Canada. NA. Commercial/Institutional Sector – Energy Use Analysis. Retrieved from: https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=AN&sector=com&juris=00&rn=11&page=0*

Like homes, space heating represents the largest energy use in commercial/institutional facilities. However, applications such as auxiliary equipment and lighting make up a substantial portion of overall consumption.

5.4 TRANSPORTATION ENERGY CONSUMPTION

Transportation related energy use within the community for 2014 to 2017 is shown in Figure 12. Transportation energy use within Georgina Island First Nation includes gasoline and diesel fuels. Transportation energy consumption in 2017 was approximately 49,600 GJ. Stationary energy consumption within the community remains fairly consistent over the time period assessed.

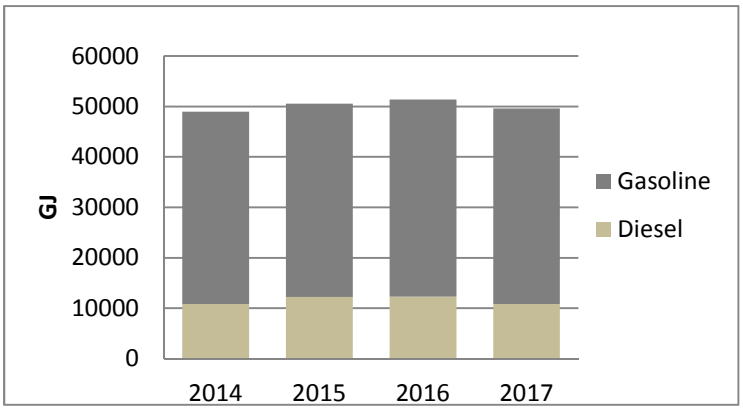

Figure 12 - Total Transportation Energy Consumption

Breakdowns of transportation energy consumption by energy type and sector are available in Figure 13 and Figure 14, respectively. Please note that transportation energy consumption within the commercial sector has been assumed as negligible for the purposes of our CEP.

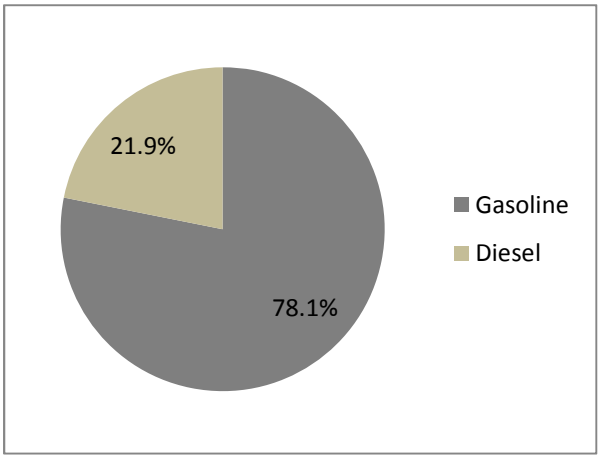

Figure 13 - Transportation Energy Use by Type, 2017

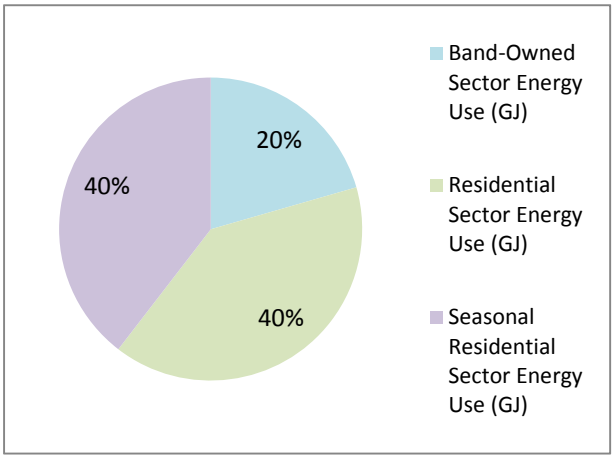

Figure 14 - Transportation Energy Use by Sector, 2017

5.5 LARGE ENERGY USERS

Since our administration has influence on our Band-owned facilities, they represent an opportunity to more easily implement energy related actions and can serve as a demonstration to the community. It is recommended that energy conservation efforts be implemented within Band-owned facilities and assets, focusing on the largest energy users first. The seven (7) largest single energy users within our Band-owned sector are shown in Table 3, below.

Table 3 - Largest Energy Users in Our Band-Owned Sector

Facility or Asset	Average Consumption – 2014 to 2017 (GJ)	Percentage of Band-Owned Sector Energy Consumption
Aazhaawe Ferry	9,463	64%
Band Office	527	4%
Community Centre	425	3%
Waabgon Gamig School/Library	345	2%
Streetlights	324	2%
Public Skating Rink	295	2%
Water Plant	280	2%

5.6 COMPARISON TO RESULTS OF 2015 CEP

In this section, the results of the baseline assessment of this CEP update will be compared to the results of the 2015 CEP baseline analysis. Please note that since the 2015 CEP baseline analysis did not include a full assessment of transportation related energy, the comparison presented in this section will be limited to stationary energy consumption and the energy consumption of the Aazhaawe ferry, and adjustments to the data have been made as necessary for comparison purposes.

5.6.1 TOTAL ENERGY USE COMPARISON

The total energy use from 2010 to 2013 (calculated as part of the 2015 GIFN CEP) is shown in Figure 15. From this past baseline analysis, it was found that GIFN used approximately 31,000 GJ annually.

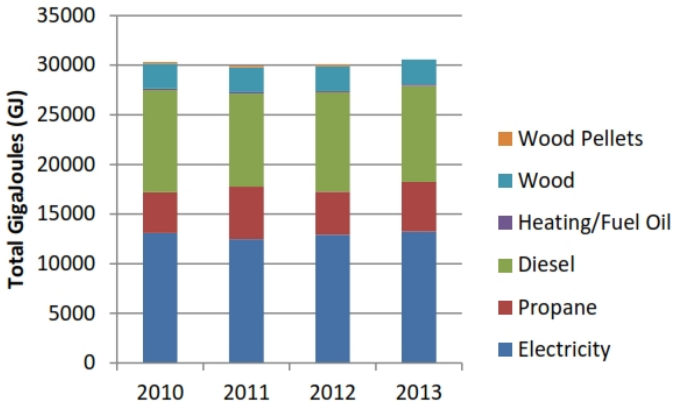

Figure 15 - Total Energy Use, 2010 - 2013

In order to better compare these results, stationary energy must be calculated. The value listed above (31,000 GJ) includes diesel for the Aazhaawe Ferry, constituting approximately 31.6% of the total value. Knowing this, the stationary energy component of the value can be calculated as being approximately 21,200 GJ, while the ferry constitutes approximately 9,800 GJ of the total annual energy consumption.

The annual stationary energy consumption from 2014 to 2017 was found to be approximately 26,700 GJ, a significant discrepancy from the 2015 CEP results. The average consumption the Aazhaawe Ferry was calculated to be approximately 9,500 GJ per year from 2014 to 2017. This value is consistent with the results of the 2015 CEP. These results are shown in the table below.

Table 4 - Comparison of Total Energy: 2015 CEP vs 2018 CEP Update

	2015 CEP Results - 2010 to 2013 average (GJ)	2018 CEP Update Results - 2014 to 2017 average (GJ)
Stationary	21,200	26,700
Aazhaawe Ferry	9,800	9,500

The discrepancy in stationary energy use between the 2015 CEP and 2018 CEP Update is likely not due to a significant increase in energy consumption within the community, but is a result of a more thorough understanding of energy consumption within the seasonal residential sector. The Seasonal Residential Energy Survey completed as part of this CEP update allowed us to better estimate energy use within the seasonal residential sector, which was underestimated in the 2015 CEP. In addition, the operation of the Island View Business Centre, which was not operational during the period analysed as part of the 2015 CEP, is expected to have increased consumption within the commercial sector by about 500 GJ. Regular seasonal variances due to heating requirements should also be considered.

It is important to note that the community did participate in the Aboriginal Conservation Project (ACP) in 2016, which contributed to a lowering of total energy consumption in the remainder of 2016 and 2017. However, it is expected that the increase in energy consumption attributed to the better understanding of the seasonal residential sector outweighed this reduction.

5.6.2 ENERGY CONSUMPTION BY TYPE COMPARISON

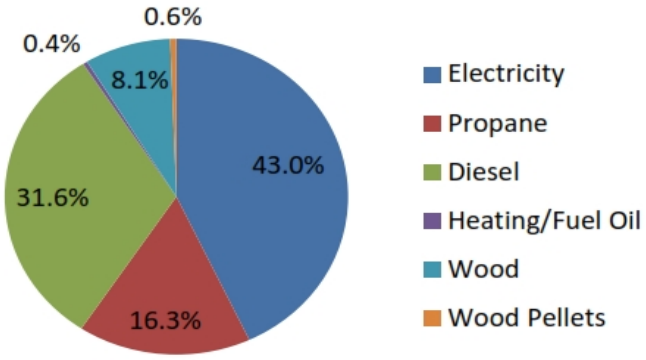

Figure 16 - Energy Consumption by Energy Type, 2013

The breakdown of energy consumption by energy type for the year 2013 is shown in Figure 16. Once again, this value includes transportation consumption associated with the Aazhaawe Ferry.

The table below shows a comparison between the energy consumption results for 2013 compared to the updated results for the year 2017. Please note that the 2013 values were adjusted to remove diesel consumption from the breakdown (effectively making this a comparison of stationary sources only), and combines wood with wood pellets.

Table 5 - Stationary Energy Use Breakdown Comparison - 2013 vs 2017

Energy Type	2015 CEP Results - 2013		2018 CEP Update Results - 2017	
	(% of Total)	GJ	(% of Total)	GJ
Electricity	62%	13,100	68%	18,200
Propane	24%	5,100	20%	5,400
Wood	13%	2,800	8%	2,200
Heating Oil	1%	200	2%	600
Natural Gas	0%	0	1%	300

Although they vary slightly, the values calculated for the breakdown in 2017 generally agree with those calculated for 2013 (although total consumption increases). The minor discrepancies are expected to be due to:

- The inclusion of natural gas consumption related to the Island View Business Centre;
- Participation in the ACP program in 2016;
- Differences in heating requirements between years;
- Normal variance in individual energy use; and
- The impact of the changes made to the seasonal residential sector calculation due to additional information gathered through the seasonal residence energy survey.

It is interesting to note that although a better understanding of energy use within the seasonal residential sector significantly affected the estimations for total consumption within the community, it did not affect the breakdown of energy use. This indicates that the breakdown of energy consumption within the seasonal residential sector is similar to the breakdown within the year-round residential sector.

5.6.3 ENERGY CONSUMPTION BY SECTOR COMPARISON

The breakdown of energy consumption by sector for 2013 is available in Figure 17. Again, this value includes transportation consumption associated with the Aazhaawe Ferry.

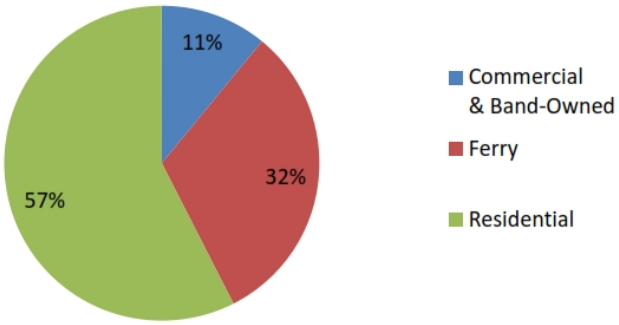

Figure 17 - Percentage Energy Breakdown by Sector, 2013

The table below shows a comparison between the results for the year 2013 compared to the updated results for the year 2017. Please note that the results from 2013 have been adjusted to remove the consumption of the Aazhaawe Ferry (which has remained fairly consistent) and the commercial and Band-owned stationary consumption in 2017 has been combined for a more accurate comparison.

Table 6 - Percentage Stationary Energy Breakdown by Sector - 2013 vs 2017

Energy Type	2015 CEP Results - 2013		2018 CEP Update Results - 2017	
	(% of Total)	GJ	(% of Total)	GJ
Commercial and Band-Owned	16%	3,400	17%	4,500
Year-Round Residential and Seasonal Residential	84%	17,800	83%	22,200

The breakdown (% of total) of the 2015 CEP and 2018 CEP Update results appear to have remained fairly consistent. It is important to note that consumption in the commercial sector raised by about 500 GJ due to operation of the Island View Business Centre, which is significant at an increase of about 15% of the 2015 CEP value.

5.6.4 SUMMARY OF COMPARISON

In summary, it is anticipated that the current energy consumption within the community, in regards to stationary consumption and operation of the Aazhaawe Ferry, has been fairly consistent with the values presented within the 2015 CEP, with the exception of:

- Conservation efforts made in relation to electricity from community participation in the Aboriginal Conservation Program; and
- Increased energy use in the commercial sector due to the operation of the Island View Business Centre (which was not operational during the period covered by the 2015 CEP).

Although we see a discrepancy in overall consumption, this can be largely attributed to a better understanding of energy use within the seasonal residential sector, which does not represent an actual increase in energy, but an estimate that more accurately represents the energy used within the community.

5.7 WHERE CAN WE CONSERVE ENERGY?

Energy conservation efforts within all aspects of our community are important, although there are areas which will allow for a greater overall impact than others. Based on our analysis, energy related to transportation (gasoline and diesel consumption) account for about 65% of all energy used within our community, with the year-round residential and seasonal residential sectors responsible for most of this consumption (about 80% can be attributed to these sectors). In regards to buildings within our community, electricity and propane use are responsible for a significant percentage of our overall community energy consumption, which can largely be attributed to the year-round residential sector. Energy conservation efforts in these areas should be given priority as they will have the largest impact on our overall energy consumption.

5.8 GREENHOUSE GAS EMISSIONS

Climate change is the rise in global average temperature and its associated effects. Climate change has been largely linked to human impacts, particularly to the release of greenhouse gases such as carbon dioxide (CO_2). Greenhouse gases are molecules that trap heat within the earth's atmosphere. Although important for our survival, the natural balance of greenhouse gases within our atmosphere has been largely impacted by the burning of fossil fuels. Carbon dioxide is not the only greenhouse gas, but it is one of the most prominent. Greenhouse gas emissions are often expressed as equivalent carbon dioxide (CO_2eq).

All sources of energy, with the possible exception of electricity generated from renewable sources, have some level of greenhouse gas emissions associated with their use. It is important to note that the amount of GHG emissions from electricity is dependent upon the mix of generators that provide electricity within Ontario. The table below shows the amount of greenhouse gas emission (in kg of CO_2eq per GJ) of various energy types.

Table 7 - Greenhouse Gas Emissions by Energy Type

Energy Type	Greenhouse Gas Emissions (kg of CO_2eq per GJ of energy)
Electricity (from Grid)	15.5†
Wood	23.5††
Natural Gas	49.3†††
Propane	60.9†††
Heating Oil	68.4†††
Gasoline	67.8†††
Diesel	72.7†††
Total	**N/A**

† From GHG Emissions Associated with Various Methods of Power Generation in Ontario[11]
†† From BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions[12]
††† From Guideline for Quantification, Reporting and Verification of Greenhouse Gas Emissions[13]

Based upon the breakdown of energy use within Georgina Island First Nation, it is estimated that GIFN produced approximately 4,130 tonnes of CO_2eq in 2017. A breakdown of GHG emissions within GIFN by energy type is available in Figure 18. From this figure, approximately 83% of GHG emissions in the community are produced in relation to energy used for transportation, with 64% of GHG emissions from gasoline consumption and about 19% from diesel consumption.

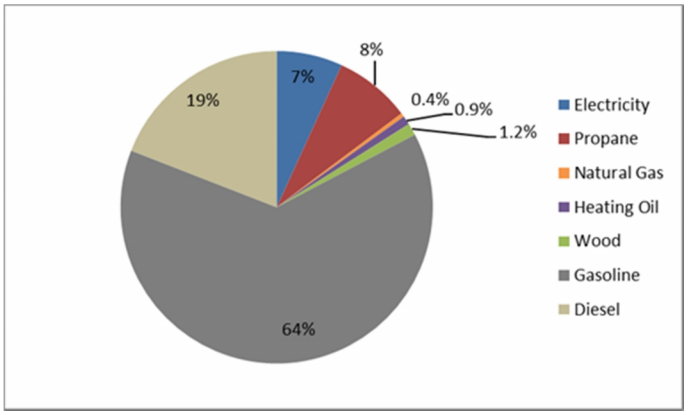

Figure 18 - Breakdown of GHG Emission by Energy Type (2017)

[11] *Intrinsik. 2016. GHG Emissions Associated with Various Methods of Power Generation in Ontario. Retrieved from: https://www.opg.com/darlington-refurbishment/Documents/IntrinsikReport_GHG_OntarioPower.pdf*

[12] *British Columbia Ministry of Environment. 2017. Best Practices Methodology for Quantifying Greenhouse Gas Emissions. Retrieved from: https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/methodology/ 2016-17-pso-methodology.pdf*

[13] *Ontario Ministry of Environment and Climate Change. 2017. Guideline for Quantification, Reporting and Verification of Greenhouse Gas Emissions. Retrieved from: http://www.downloads.ene.gov.on.ca/envision/ env_reg/er/documents/2017/013-1457_d_Guide.pdf*

6.0 FUTURE ENERGY NEEDS

As part of the CEP update, we have projected the future energy needs of our community to the year 2028. To do this, we have considered a number of factors, each of which is described further in this section.

For our future energy needs calculation, we will assume a "business as usual" scenario, meaning that energy consumption within the various sectors of our community will remain constant over the next 10 years, impacted mainly by growth within the sectors themselves. As such, any future conservation efforts to reduce household energy consumption are not considered for this calculation. We have also adjusted for variations in annual temperature, which is discussed in more detail in Section 6.5.

Further details and the calculations used to determine our future energy needs are available in Appendix B.

6.1 RESIDENTIAL FUTURE ENERGY NEEDS

Our year-round residential sector as a whole uses the most energy within our community. Currently, the year round residential sector accounts for approximately 41% of our total energy use. Growth within this sector is expected to have the greatest impact on our total community energy consumption.

It is estimated that the number of year-round residential units within our community will grow by about 2 per year, from 120 units in 2018 to approximately 140 units in 2028[14]. However, we have also determined that the on-reserve population residing within the community year round will grow from about 205 to about 231 from 2018 to 2028, at a rate slightly faster than our housing growth[15]. As a result, it is expected that the number of residents per household will increase over time.

From our baseline consumption data, we have completed a breakdown of our year-round residential energy consumption into two sets; energy consumption used for space heating and energy consumption used for other applications. HDD normalization has been applied to energy used for space heating. To calculate our future year-round residential energy needs, we have assumed that energy consumption related to space heating is proportional to the number of homes in our community, but other energy use (such as lighting, use of appliances, water heating, and transportation) is dependent upon the number of residents per household. Our calculated year-round residential energy consumption growth is available in Table 8.

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[14] *Georgina Island First Nation*

[15] *Natural Resources Canada. Aboriginal peoples in Canada: Key results from the 2016 Census. 2017. Retrieved from: https://www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm*

Table 8 - Year-Round Residential Energy Growth

Year	Average (2014 – 2017)	2018	2020	2022	2024	2026	2028
Number of Year Round Residences	115	120	124	128	132	136	140
On-Reserve, Year Round Population	199	205	210	215	220	226	231
Total Year-Round Residential Energy Consumption (GJ)	30,540	31,480	32,300	33,140	33,990	34,860	35,720

Based on the assumptions mentioned above, we anticipate energy consumption in our year-round residential sector to grow from an average of 30,540 GJ from 2014 to 2017, to about 35,720 GJ in 2028.

6.2 SEASONAL RESIDENTIAL FUTURE ENERGY NEEDS

The seasonal residential sector of GIFN represents approximately 39% of our total energy use. It is estimated that the number of seasonal residential units within our community will grow by about 1 per year, from 444 seasonal units in 2018 to approximately 454 units in 2028[16]. It is anticipated that the number of residents per seasonal unit will remain constant over the next 10 years.

Again, HDD normalization has been applied to energy used for space heating. Since it has been assumed that the number of residents per seasonal unit will remain constant, all consumption has been assumed to be proportional to the number of homes in our community. Our calculated seasonal residential energy consumption growth is available in Table 9.

Table 9 - Seasonal Residential Energy Growth

Year	Average (2014 – 2017)	2018	2020	2022	2024	2026	2028
Number of Seasonal Residences	442	444	446	448	450	452	454
Seasonal Population	1148	1,154	1,160	1,165	1,170	1,175	1,180
Total Seasonal Residential Energy Consumption (GJ)	28,960	29,130	29,260	29,390	29,520	29,660	29,780

Based on the assumptions mentioned above, we anticipate energy consumption in the seasonal residential sector in our community to grow from an average of 28,960 GJ from 2014 to 2017, to about 29,780 GJ in 2028.

[16] *Georgina Island First Nation*

6.3 BAND-OWNED FUTURE ENERGY NEEDS

Our Band-owned sector currently represents about 18% of our overall energy consumption. Specific details on the growth of our Nation-owned sector could not be obtained, although growth within the sector is expected. Since specific growth details are not known, we will assume an average growth within the number of Band-owned facilities to be 0.7% annually, as per the National Energy Board forecast. This growth is assumed to include the construction of the new Aazhaawe Ferry Building and assumes continued operation of the Aazhaawe Ferry.

Table 10 - Band-Owned Energy Growth

Year	Average (2014 – 2017)	2018	2020	2022	2024	2026	2028
Total Seasonal Band-Owned Energy Consumption (GJ)	14,730	14,830	15,040	15,250	15,460	15,680	15,900

Our Band-owned sector is anticipated to grow from about 14,730 GJ in from 2014 to 2017, to approximately 15,900 GJ in 2028.

6.4 COMMERCIAL FUTURE ENERGY NEEDS

The commercial sector considered as part of our CEP represents only about 2% of the community's total energy consumption. Like our Band-owned sector, exact plans for growth within the commercial sector could not be determined at this time, so an average growth of 0.7% annually, as per the National Energy Board forecast, will be assumed.

Table 11 - Band-Owned Energy Growth

Year	Average (2014 – 2017)	2018	2020	2022	2024	2026	2028
Total Seasonal Commercial Energy Consumption (GJ)	1,020	1,030	1,050	1,060	1,080	1,090	1,110

Our Band-owned sector is anticipated to grow from about 1,020 GJ in from 2014 to 2017, to approximately 1,110 GJ in 2028.

6.5 CLIMATE AND WEATHER IMPACT

In order to calculate the most accurate future energy needs estimation possible, all data used in this section of the report has been adjusted so that the total number of HDDs experienced per year are equal to the average number of HDDs of the past 4 years. We have referred to this adjustment as HDD normalization.

Climate change, long-term patterns in regional weather, is beginning to impact both climate and weather patterns. Almost all of the 10 hottest years on record globally have occurred since 2005.[17] Climate change can have a significant effect on energy use within our community. Effects of climate change have not been included in our future energy needs calculations.

6.6 TECHNOLOGY AND BEHAVIOUR

Changes in technology and behavior can have significant impacts on energy use. Some changes can increase energy consumption, while others can contribute to energy conservation. One of the major goals of this CEP is to help reduce our overall energy consumption. As per the "business as usual" assumption, the impacts of changes in technology and behaviour are not included within our future energy use estimations.

6.7 TOTAL FORECASTED ENERGY CONSUMPTION

We estimate that our overall energy consumption will grow by a total of about 10% within the next 10 years, giving us an estimated total community energy consumption of about 82,500 GJ in 2028. Our total forecasted energy consumption is available in Figure 19.

This "business as usual" estimation of our future energy consumption allows our community to establish targets for energy conservation and track our progress towards these targets.

Figure 19 - Total Energy Consumption Forecast

[17] *Climate Central. January 2015. 10 Warmest years on record globally. Retrieved from: http://www.climatecentral.org/gallery/graphics/10-warmest-years-globally*

6.8 FORECASTED ELECTRICAL DEMAND

Electrical demand is the rate at which electricity is used, meaning the faster it's consumed, the higher the demand. The fastest rate at which it is consumed is referred to as peak demand.

Average annual electrical demand is the rate at which electricity is used in our community, assuming this rate is constant. Our average annual electrical demand was calculated to be about 550 kW from 2014 to 2017, and is projected to be about 600 kW in 2028.

Although average yearly demand offers some insight into our community's total energy use, it is important to remember that because demand is the rate of energy consumption, it fluctuates seasonally and even daily. Since electricity cannot be effectively stored, it is typically generated as it's needed. This means that electricity generation projects and infrastructure must be sized to handle our peak demand. If electricity cannot be generated to meet our peak demand, blackouts or brownouts may occur.

Our peak electrical demand was calculated assuming the "business as usual" scenario and using a ratio of peak vs average demand based on IESO forecasts for 2016. Our average peak electrical demand from 2014 to 2017 was calculated to be about 870 kW. The peak electrical demand for 2028 is projected to be about 960 kW.

7.0 OPPORTUNITIES AND PRIORITIES

Within our CEP, an opportunity represents an actionable item, and can be grouped into one of four (4) categories; administration/planning, energy education, energy conservation, and energy generation. In this section of the report, we have provided a brief summary of the opportunities identified in the 2015 CEP, as well as new opportunities identified as part of this update.

7.1 OVERVIEW OF OPPORTUNITIES FROM THE 2015 CEP

A number of actions were identified within the 2015 CEP (see the Actions Inventory of the original CEP). For our CEP Update, we have re-organized these actions into the following opportunities:

Administrative/Planning

- Community Energy Advisor
- Investigation of Community Electrical Infrastructure
- Energy Committee

Education

- Community Outreach Strategy
- Training and Education

Conservation

- Residential Conservation Programs
- Conservation in Band-Owned Buildings
- Streetlight Conversion

Generation

- Energy Independence Demonstration Project
- Residential Renewable Projects

The initiatives listed above will be considered “existing” opportunities, carried over from GIFN’s 2015 CEP. Due to the re-organization, some of the existing actions have been grouped as sub-tasks, becoming a component within an overall opportunity. Additional information related to the re-organization of existing actions can be found in the updated Actions Inventory.

Several opportunities identified within the 2015 CEP have changed, are no longer applicable, or have dropped in priority since the development of the original plan. The most significant changes are listed below.

- The 2015 CEP called for consideration of making a formal appeal to the Ontario Ombudsman regarding issues with Hydro One, particularly those related to electricity pricing. Since the initiation of the Ontario Fair Hydro Plan, including the On-Reserve Delivery Credit, the burden of electricity pricing to community members has been (at least temporarily) alleviated. As such, it is suggested that this initiative be removed from the CEP for the time being. The initiative can be included again should electricity pricing become a significant issue within our community at a future date.
- The original CEP proposed communicating to all community members that Hydro One is creating a new billing system. This action will be abandoned, since Hydro One's new billing system and bill layout have already been implemented.
- The 2015 CEP proposed an action to ensure that "Low Density Residential" customers are benefitting from the Rural or Remote Rate Protection (RRRP) program. This action will be abandoned, since the RRRP is automatically applied to customers who qualify.
- The 2015 CEP proposed that GIFN work with Ontario Energy Matrix to investigate potential options for energy generation within the community and produce community specific sample analyses of potential residential renewable energy projects. Ontario Energy Matrix could not be contacted. A new renewable technology supplier will be identified moving forward with the CEP.
- The 2015 CEP proposed an annual energy event to be held. This initiative has been updated to the inclusion of energy related display booths to be set up at various community events. This initiative is part of the ongoing "Community Outreach Strategy". In addition, annual Supplier Forum and Job Fair events have been proposed as separate events, which will be part of the overall "Training and Education" initiative.

7.2 NEWLY IDENTIFIED OPPORTUNITIES

A number of new opportunities and potential actions have been identified through this CEP update. Please note that in some cases, newly identified action will become sub-tasks to be incorporated into the existing opportunities described above.

7.2.1 ADMINISTRATIVE/PLANNING

Apply for IESO Funding Programs

Georgina Island First Nation should apply for various IESO funding programs, including:

- Community Energy Champion (CEC) – Georgina Island First Nation's Energy Advisor was hired with assistance with funding through the IESO's Education and Capacity Building (ECB) program, covering 18 months from September 2017 and ending in February of 2019. GIFN should apply to the IESO's new Community Energy Champion (CEC) program for funding to support an energy staff resource within the community for an additional three (3) years.
- Education and Capacity Building (ECB) – Georgina Island First Nation should re-apply to the IESO's Education and Capacity Building (ECB) program for funding towards various energy education and training initiatives to be completed within the community.
- Indigenous Energy Projects (IEP) – Georgina Island First Nation should apply to the IESO's Indigenous Energy Projects (IEP) program for funding towards a feasibility study for potential renewable generation project within the community. Georgina Island First Nation should reapply to this program for funding towards the development of this project, once the feasibility study is complete (if applicable).

This initiative will become a sub-task under the existing "Community Energy Advisor" opportunity.

Energy Advisor Training

The GIFN Community Energy Advisor (or another relevant GIFN staff member) should have an opportunity to increase their skills and capacity to increase their effectiveness in their role. Potential programs to do this are:

- 20/20 Catalyst – A program designed to support First Nation communities that are developing clean energy projects. The program consists of three (3), one (1) week workshops held at various locations throughout Canada over the course of several months. Applicants must be approved to participate in the program. The window for application to the next round of the program is September 2018 to March 2019.

- Energy Manager Training – Energy manager training, through online courses, are provided by the British Columbia Institute of Technology. The program consists of six (6) courses. Applicants must be approved to participate in the program. Application windows for the courses vary, and the BCIT website should be regularly checked for deadline details.
- Relay Curriculum Training – Training to qualify a GIFN staff resource to deliver licensed Relay educational material within the community and surrounding area.

Funding for these initiatives is available through the IESO Education and Capacity Building (ECB) program. This initiative will become a sub-task under the existing "Community Energy Advisor" opportunity.

Justify Future Work Term

Although potential funding sources to continue the Energy Advisor position should be sought, a justification for continuing the Energy Advisor position without external funding should be developed. This justification should include the benefits of having a full-time Community Energy Advisor, including potential savings and revenue from conservation and generation initiatives. This initiative will become a sub-task under the existing "Community Energy Advisor" opportunity.

Investment in Renewable Energy

It is recommended that if Georgina Island First Nation considers future investment for economic development purposes, that investments related to clean energy and the renewable sector be given consideration. However, it is important that a risk analysis be completed that includes the impacts of the recent changes to the Green Energy Act. Investment opportunities should be considered on a case-by-case basis.

Update Community Energy Plan

Our CEP is expected to undergo constant evolution throughout the implementation process. As such, it is recommended that a periodic review of our entire CEP occur. During this review, any changes to the plan can be updated within our CEP, including identification of new opportunities and revisions to the implementation plan. Funding is available to update our CEP through the IESO's Indigenous Community Energy Plan (ICEP) program.

7.2.2 ENERGY EDUCATION

Youth Education

Educating youth within our community in relation to energy is an important step in moving towards our energy goals. A suite of youth workshops relating to energy conservation and energy generation should occur on an annual basis. Please note that since many community youth attend elementary school in surrounding communities, in-classroom workshops may need to be held in schools outside of the community. Funding for these initiatives is available through the IESO Education and Capacity Building (ECB) program. This initiative will become a sub-task under the existing "Training and Education" opportunity.

There are several organizations that offer youth education that might suit our community. These organizations are:

- Relay Education – Offers classroom and community education programs focusing on renewable energy. Relay offers workshops on several topics which are linked to STEM curriculum.
- Elephant Thoughts – Offers a wide array of indigenous education programs, including workshops relating to renewable energy and energy conservation.

Please note, as described in the newly identified "Energy Advisor Training" action above, it is being recommended that GIFN's Community Energy Advisor be trained to deliver Relay licensed educational material.

Supplier Forum and Job Fair

GIFN should hold an annual energy supplier forum and employment fair events. The supplier forum will allow community members to ask questions and gather information from local energy suppliers and other energy-related organizations. The employment fair event will allow community members to become aware of employment opportunities within the energy sector.

Potential companies and organizations that should be considered for participation in these events include, Hydro One, Ontario Power Generation (OPG), Ontario Energy Board (OEB), Independent Electricity Systems Operator (IESO), as well as other applicable local energy suppliers and organizations.

Department Meetings and Workshops

An annual, multi-department meeting and workshop should be held for GIFN staff and leadership. The meeting will allow staff and leadership to be informed of the energy related initiatives occurring within the community,

and offer an opportunity to provide feedback. The workshops will provide an opportunity for staff and leadership to learn about various applicable energy topics.

7.2.3 ENERGY CONSERVATION

GHG Considerations for Potential Bridge

According to GIFN's 2013 Economic Strategic Plan, a bridge from Georgina Island to the mainland is heavily desired by community members[18]. Georgina Island has begun to consider the possibility of a bridge, which would increase the community's accessibility of the mainland. In addition, a bridge would eliminate the need for the operation of the Aazhaawe Ferry, potentially saving energy and GHG production of the community.

The Aazhaawe Ferry is the single largest energy user within GIFN. From 2014 to 2017, the Aazhaawe Ferry consumed approximately 244,600 L of diesel annually, accounting for 66% of energy consumption in the Band-owned sector, and about 12% of all the energy used within the community as a whole. In addition, the Aazhaawe Ferry is responsible for the production of approximately 690 tonnes of CO_2eq annually, which is about 17% of the total GHG emissions produced by GIFN per year. Ensuring that GIFN members have access to the mainland is a critical consideration.

By building a bridge and eliminating the need for the Aazhaawe Ferry, there is a potential for annual GHG production (and energy use) to be reduced. However, a full analysis requires consideration of a number of factors, which include;

- **Type of Bridge** – GHG emissions are associated with construction projects, including the operation of equipment, material manufacturing and material transportation. There are multiple bridge types available (i.e. causeway, span bridge, etc.), each with a unique GHG emission rate. For the purposes of this analysis, GHG emission rates for the construction of a bridge have been taken to be between 10 and 35 Tonnes of CO_2eq, depending on the structure type[19].
- **Bridge Length** – GHG emissions for any infrastructure project will be dependent upon the amount of work required to complete the project. In the case of roads and bridges, this is most easily expressed by the

[18] *Georgina Island First Nation. 2013. Economic Development Strategic Plan*

[19] *Journal of Cleaner Production. 2016. Estimation of carbon dioxide emission in highway construction. Retrieved from: https://www.researchgate.net/publication/279212076_Estimation_of_carbon_dioxide_emission_in_highway_construction_A_case_study_in_southwest_region_of_China*

length of the project. There are several proposed routes available for the bridge, the shortest being about 1.4 km and the longest being about 3.1 km.[20]

- **Increased Vehicle Traffic** – If a bridge were built, it is anticipated that vehicle travel by GIFN residents would increase. The rate of increase is difficult to determine, but for the purposes of this analysis we have assumed a range of increases between 5% and 50% of current use. Only vehicle traffic from year-round residents has been considered, and it has been assumed that there will be no increase in efficiency of vehicles. Impacts due to growth within the residential sector have also been ignored in this analysis.

Due to the many unknowns that exist in relation to construction of the bridge, potential GHG savings under three (3) separate scenarios have been calculated, using the variables shown in Table 12, below.

Table 12 - Values used in GHG Savings Estimation for Bridge

Variable	Best-Case	Realistic-Case	Worst-Case
Bridge Length (m)	1,400	2,600	3,100
GHG in Bridge Construction (tonnes CO_2eq/m)	10	15	35
Increase in Traffic (%)	5%	25%	50%

In addition to any assumptions listed above, the calculation also assumes: 1) The typical life of a Ferry is 30 years. The current Ferry will require replacement in 5 years. Replacement of a Ferry results in approximately 1,000 tonnes CO_2eq due to manufacturing. 2) Potential increase in the efficiency of any subsequent Ferry's is neglected, as well as any need to increase the size of the Ferry.

As demonstrated in the table above, actual GHG savings achieved over the life of the bridge (estimated to be 100 years) varies greatly depending on the factors listed above. As a best-case scenario, which includes choosing the shortest possible route for the bridge, choosing a low producing GHG emission construction (i.e. a causeway), and if driving does not significantly increase, the construction of a bridge will save about 50,000 tonnes of CO_2eq over its lifetime. Conversely, if the longest route for the bridge is chosen, along with a high producing GHG emission construction, and traffic significantly increases, the bridge would actually "cost" about 100,000 tonnes of CO_2eq over its lifetime. Realistically, the construction of a bridge would likely be close to neutral in relation to GHG emissions over its lifetime, emitting about as much GHG emissions during construction as would be saved due to the elimination of the Aazhaawe Ferry.

[20] *Chippewas of Georgina Island. Preliminary Evaluation of Engineering and Environmental Alternatives Study.*

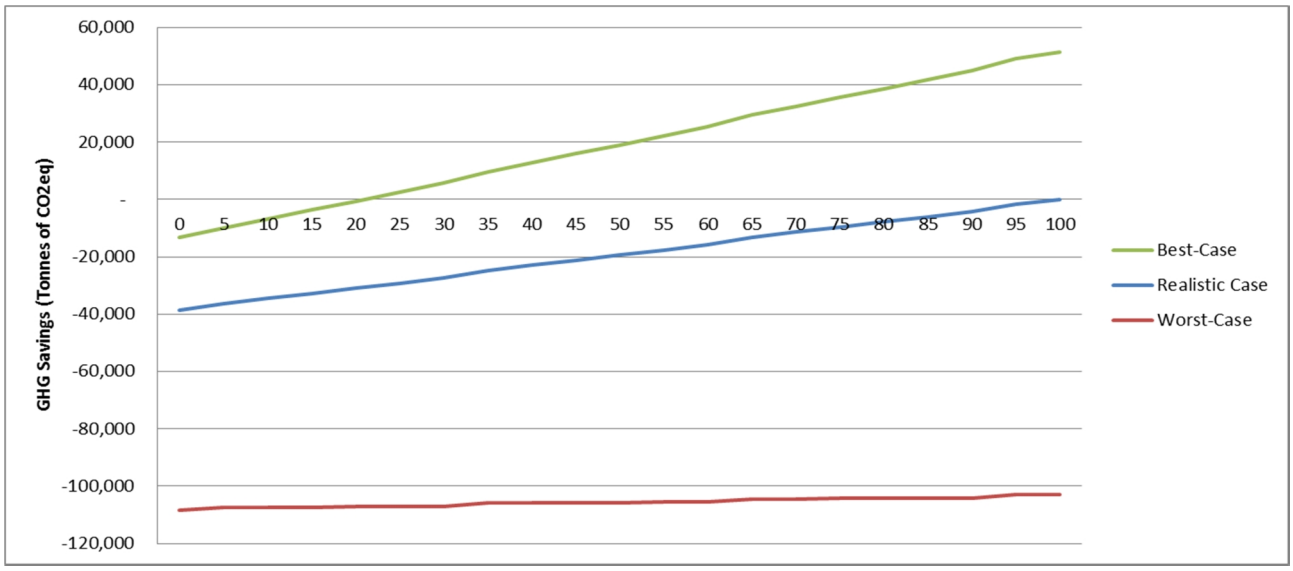


Figure 20 - Potential GHG Savings for Bridge

Please note that the values presented in the chart above are intended to demonstrate the potential impacts of the bridge design in relation to GHG emissions. That said, there are several considerations that should be made during the planning stages of the bridge in order to increase the potential for a reduction in GHG emissions in comparison to the Aazhaawe Ferry. These considerations include:

- Choosing the shortest route for the bridge;
- Choosing a construction method that limits GHG emission production (although this should be weighed in relation to potential physical impacts to the local environment); and
- Should a bridge be built, actively attempting to reduce GHG emissions associated with residential transportation (encouraging carpooling and increasing personal vehicle efficiency).

Incorporating GHG considerations for the potential bridge should occur on an as-needed basis, and will be dependent upon development of the potential bridge.

Reducing Transportation Energy

As discussed in 5.2.3, energy use related to transportation accounts for about 65% of the total energy used within our community. Although a significant portion of this energy (about 12%) can be attributed to the Aazhaawe Ferry, personal vehicle use in both the year-round residential and seasonal residential sectors make up a significant portion of the remainder.

Identifying ways to reduce energy consumption associated with transportation in the residential sectors should be a priority of our CEP moving forward. Potential initiatives include;

- Encouraging methods of reducing transportation, such as carpooling and cycling;
- Educating the community on the impact of energy use related to transportation;
- Encouraging residents to purchase efficient vehicles, including hybrid and electric models; and
- Developing infrastructure within the community to support the use of electric vehicles, including electric vehicle charging stations.

In addition, efficient vehicles (including hybrid and electric models) should be considered when replacement of administrative vehicles is required (and where hybrid/electric models are suitable).

Energy Retrofits

The 2015 CEP called for audits to be conducted on Band-owned buildings. It is recommended that the community work to improving efficiency within Band-owned buildings based on the results of these audits. Significant potential energy savings may be possible, and there are several incentive programs available which may increase the overall financial viability of retrofits. A thorough cost-savings analysis should be conducted prior to pursuing any potential retrofits. This initiative will become a sub-task under the existing "Conservation in Band-Owned Buildings" opportunity.

Streetlight Retrofit Potential

The 2015 CEP called for several actions to take place in regards to community streetlights. These actions included a plan to gradually phase in LED streetlights, as well as to determine ownership of the streetlights within the community. It is recommended that an analysis of completing a retrofit of all community streetlights to LED models be conducted and pursued if viable. This initiative will become a sub-task under the existing "Streetlight Conversion" opportunity.

7.2.4 ENERGY GENERATION

Develop Energy Independence Demonstration Project

A preliminary analysis of renewable generation opportunities for Georgina Island First Nation has been completed, and can be found in Appendix D.

The points below summarize the findings of the preliminary analysis.

- About 47% of survey participants think that renewable energy projects should be developed for both energy independence and economic development purposes. Developing renewable energy projects solely for energy independence purposes was also preferred by about 24% of participants. In addition, about 87% of participants believe Georgina Island First Nation should move towards increased energy independence, reaffirming the energy goal outlined within the 2015 GIFN CEP.
- Although off-grid renewable applications should definitely be considered, the cost of off-grid renewable applications is typically high in comparison to other option, making them less practical. As a result, micro-grid and net-metering applications become the primary candidates for renewable energy project development within our community.
- Based on this preliminary assessment, it appears that there is capacity for development of small and moderately scaled micro-grid and net-metering projects within our community. Additional consultation with Hydro One is required.
- The most applicable renewable technologies for development in our community are solar PV, solar thermal, and geothermal. Water power and biomass technologies should also be considered, to a lesser extent.

Based on these findings, it is recommended that consideration for small to moderate scale net-metering and micro-grid demonstration projects, utilizing solar PV technology, be considered for Band-owned facilities and Band-owned residential units (such as multi-plexes). Opportunities to develop innovative projects and technologies should also be considered.

The development net-metering and micro-grid projects will be a relatively large undertaking. The first subtask will be to identify a potential project and complete a feasibility study. General considerations during the feasibility study phase will include:

- Identification of site;
- Determination of project size;
- Consultation to determine grid connection process;
- Preliminary discussions with solar PV contractors capable of developing the project;
- Acquisition of budget quotes and estimates;
- Completion of a thorough cost/savings analysis; and

- Identifying sources of possible funding for the project.

During the feasibility study phase, the costs/savings of any proposed project will be determined and overall feasibility of a potential project will be assessed. In addition, community consultation will occur to determine the community's acceptance of the potential project.

Once the feasibility study has been complete, and an overall plan determined, the next step will be to acquire the necessary contractors and construct the project. It is imperative that an experienced and qualified design company be acquired, as well as a reputable contractor, to ensure that the system will function safely and reliably. It is also critical that the potential for connection of a project to the electricity grid be assessed. Potential environmental and connection impact assessment costs are not included. It is also recommended that these requirements and their associated costs be determined as early in the development process as possible.

An assessment period on the system should be completed once it becomes operational. This assessment can provide information that can be used for education initiatives, and will also give our community members and decision makes a better understanding of the technology, and used to transition towards greater energy independence within the community.

The IESO's Indigenous Energy Projects (IEP) program should be utilized to assist with costs associated with the development of potential demonstration projects. Additional sources of potential funding should also be identified. The potential for partnerships should also be considered. This initiative will become a sub-task under the existing "Energy Independence Demonstration Project" opportunity.

Use Residential Solar PV to Educate

Georgina Island's current Community Energy Advisor has recently begun to explore the viability of small scale solar PV net-metering projects for residential customers, as per the action described within the 2015 CEP. It is recommended that this analysis continue, with the results used to educate residents on net-metering systems. If the results of the analysis show that these systems are financially viable, the results of the analysis should be used to encourage privately-owned solar PV net-metering systems in our residential sector. This initiative will become a sub-task under the existing "Residential Renewable Projects" opportunity.

Natural Gas Infrastructure

As described in Ontario's 2017 Long-Term Energy Plan (LTEP), Ontario seeks to expand access to natural gas to give consumers greater choice in their energy supply.[21] This is largely due to the fact that natural gas is one of the least expensive ways to heat a house. In addition, although the burning of natural gas is not completely clean, it produces significantly less GHG emissions (per unit of useful energy) than propane or heating oil. The LTEP also states that innovative uses for Ontario's natural gas distribution system will be pursued, including increasing the content of renewable natural gas.

Recently, concerns relating to electricity use have been alleviated, particularly for First Nations residents through the On-Reserve Delivery Credit. However, the future of this credit is uncertain. With about 52% of residents within GIFN using electricity to heat, the potential to bring natural gas to Georgina Island should be considered and assessed. It should also be noted that a natural gas distribution system exists on the mainland (the Island View Business Centre is a customer). The potential to incorporate a connection to this distribution system into a potential bridge design should also be examined. Potential for Natural Gas Infrastructure should begin to be considered in mid-2020 to prepare for the ending of the Ontario Fair Hydro Plan in mid-2021. However, consideration should occur sooner if necessary to coincide with development of potential bridge.

It is recommended that feedback be sought from community members in relation to their views on potentially bringing natural gas to the community. Natural gas, although inexpensive and fairly clean to burn in comparison to other fossil fuels, does have a certain amount of controversy surrounding it due to pipeline construction and the methods used to collect it.

The Government of Ontario has established a Natural Gas Grant Program, which can help fund the expansion of natural gas infrastructure to communities. The Natural Gas Grant Program should be examined in greater detail should the community with to pursue a connection to the natural gas system. Please note that the future of this program in relation to the cancellation of the Ontario Green Fund is not known at this time.

Smart Energy Community Scorecard

Quest and Pollution Probe have recently asked Georgina Island First Nation to participate as a pilot community in its Smart Energy Community Scorecard program. The Scorecard program has recently expanded to engage with Indigenous Communities in an effort to inform and improve federal policy and program development. The

[21] *Ontario. 2017. Ontario's Long-Term Energy Plan: Delivering Fairness and Choice.*

Scorecard program is intended to provide an approach for evaluating and benchmarking the progress of Smart Energy Communities across Canada in relation to integrated energy systems.

This is an excellent opportunity for Georgina Island First Nation. Some benefits of participation in the pilot project include:

- Identification of GIFN as a forward thinking community in relation to energy independence and energy generation;
- Opportunity to learn from other communities across Canada;
- Access to valuable resources in relation to energy independence and energy generation;
- Opportunity to provide feedback; and
- Assisting the community in working towards its energy independence goal.

Georgina Island should agree to participate as a pilot community for the Smart Energy Community Scorecard. This initiative is anticipated to require 12 to 14 days of human resource time over a 1-year timeframe. It is anticipated that the Community Energy Advisor can take the lead on this initiative for Georgina Island First Nation.

Long Term Energy Independence

As stated, one of the major goals of the GIFN CEP is to transition towards energy independence in a practical manner. Completing the actions related to generation that are described above will help to move the community towards this goal.

It is recommended that planning for increased energy independence within GIFN occur after completion of the demonstration projects. This will be a long term overall goal, working towards increasing energy independence within GIFN over the next 5 to 10 years.

8.0 IMPLEMENTATION PLAN

As part of our CEP Update, we have improved upon the Implementation Plan presented in the 2015 CEP. This Implementation Plan is meant to be a "living document", and updated on an ongoing basis. Our Implementation Plan is intended to establish a realistic and obtainable course towards our energy vision and goals.

Although we have strived to create an Implementation Plan that is as realistic and accurate as possible, it is a guide only, and is expected to undergo constant evolution as implementation of the plan progresses. It is the intent that the plan will be updated and adjusted through periodic reviews of the CEP as a whole.

8.1 CURRENT PROGRESS

GIFN began implementing its 2015 CEP with the hiring of a full-time Community Energy Advisor. GIFN's current Community Energy Advisor was hired for an 18 month work term, beginning in September of 2017. Funding for this work term was obtained through the IESO's Education and Capacity Building (ECB) program.

The current Community Energy Advisor's work plan includes tasks related to four (4) existing opportunities from the 2015 CEP. These tasks include:

- **Community Outreach Strategy –** The current Community Energy Advisor conducted door-to-door visits with community members to gather additional feedback and provide energy related information to community members. The Year Round Residential Energy Survey and the Seasonal Residence Energy Survey were also completed as part of this task. The Community Outreach Strategy is intended to provide GIFN community members with additional information related to energy conservation and generation, including information from actions identified in the 2015 CEP, as well as newly identified opportunities. The Community Outreach Strategy will include community engagement and education activities such as; development of distribution of quarterly mail-outs and information booths at suitable community events. Work on the Community Outreach Strategy is underway and will be ongoing in the coming years. Education initiatives will be released periodically, with new content developed during the CEP update periods.
- **Streetlight Conversion –** The potential for the conversion to more energy efficient LED lighting will be assessed, including a cost-benefit analysis of the potential conversion process. A complete retrofit will be

pursued if viable. The Streetlight Conversion task is planned but substantial work on this task has not yet been initiated.

- **Green Procurement Strategy –** The Green Procurement Strategy is an internal policy that would require equipment and appliance purchases by the GIFN administration to meet specific energy requirements, such as ensuring that all new purchases are Energy Star certified, and ultimately contributing to a reduction in energy use within the Band-Owned sector of the community. The Green Procurement Strategy is planned but substantial work on this task has not yet been initiated. This initiative will become a sub-task under the existing "Conservation in Band Owned Buildings" opportunity.
- **Energy Independence Demonstration Project –** This task includes a preliminary assessment of the renewable energy options that are available to GIFN. A preliminary assessment of renewable energy options has been completed as part of this CEP update and is available in Appendix D. Additional work, including a preliminary cost-savings analysis and development of a report to provide GIFN Chief and Council for further direction is also planned, but has not yet commenced. Work on this initiative has been pushed to 2020 to reduce the Community Energy Advisor's workload in 2019.

Note that having a staff resource within the community to implement the Community Energy Plan is imperative to its overall success. As such, it is assumed that GIFN will have a Community Energy Advisor throughout the entirety of the implementation process.

In addition, GIFN has submitted applications for the IESO's Community Energy Champion (CEC), Education and Capacity Building (ECB), and Indigenous Energy Projects (IEP) programs for funding towards various initiatives described within this report. As of the date of this report, the IESO has not provided a decision on approval of funding.

8.2 ACTIONS INVENTORY

An overall list of actions has been developed as part of the Implementation Plan, which we have called the Actions Inventory. The Actions Inventory includes a brief overview of details related to each of the actions, as well as the current status of various initiatives, and is meant to work hand-in-hand with our Implementation Table. The Actions Inventory is available in Appendix E.

8.3 IMPLEMENTATION TABLE

An Implementation Table has also been developed, which provides a high level schedule and overview of the various tasks that need to be completed as part of the overall Implementation Plan. Please note that the schedule presented in the Implementation Table is an outline only, and should be updated as the CEP progresses. The Implementation Table is available in Appendix E.

8.4 ANNUAL REVIEW AND ACTION PLAN

It is suggested that on an annual basis, we review our Implementation Table and Actions Inventory and create an Annual Action Plan. This will allow for the implementation actions for the year to be better planned and updated as necessary. It is also suggested that some of the larger components be broken into smaller stages that can be more readily managed throughout the year.

During this annual action plan process, long-term scheduling should be updated and refined, and costs determined to the best extent possible. This is particularly important for identification of and application to funding opportunities, as some funding programs may provide funds beyond a 1 year timeframe.

An Action Plan for 2019 has been developed and is shown in the table on the following page.

Table 13 - 2019 Action Plan

Action	Subtask	Estimated Costs[1]	Potential Funding/Incentive Program
Community Energy Advisor	Hire Energy Advisor	$50,000	CEC (IESO)
	Apply for IESO Funding Programs	N/A	Not Required
	Energy Advisor Training	$31,000[2]	ECB (IESO)
Community Energy Committee	Energy Committee Meetings	$2,000	ECB (IESO)
Community Outreach Strategy	Education	$9,000	ECB (IESO)
	Website	N/A	Not Required
Training and Education	Youth Education	$10,000	ECB (IESO)
	Supplier Forum and Job Fair	$4,000	ECB (IESO)
	Department Meetings and Workshops	$2,000	ECB (IESO)
Streetlight Conservation	Streetlight Retrofit Potential	$90,000[3]	Retrofit Program (Hydro One)
Energy Independence Demonstration Project	Investigate Options and Feasibility	$32,000	IEP (IESO)
Residential Renewable Projects	Complete Analysis on Existing Systems	N/A	Not Required
	Use Residential Solar PV to Educate	N/A	Not Required
Smart Energy Community Scorecard	Participate in Scorecard Project	N/A	Not Required
		Total:	$230,000

1 - All costs are estimates, based on a 12 month timeframe. All costs rounded up to nearest $1,000.

2 - Assumes20/20 Catalyst at $20,000, Energy Manager Training at about $3,000, and Relay Curriculum Training at $8,000.

3 - Assuming retrofit of 90 streetlights at $1,000 each.

Note that all costs presented in the table above are estimates only, and further refinement of anticipated costs is necessary. In addition, application to various funding programs may require proposals to account for timelines different from that presented above (i.e. 18 months, 3 years, etc.). Potential overlap with any current funding should also be considered. Additional tasks, and associated funding, may also be identified at any time, and should be included in funding applications (if possible).

8.5 FUNDING

Possible energy related funding options for each action have been identified, where applicable, in the table above. Please note that the energy related funding (and incentive) programs suggested may not completely cover the identified costs for the various actions identified, and funding from additional sources may be required. The applicability of these funding programs to each action will also have to be reviewed on a case-by-case basis.

The intent here is to ensure that funding programs are utilized to their full potential during the implementation of our CEP. As such, a general idea of future funding requirements may be necessary, as funding programs may provide funding for aspects of multiple actions beyond a one year timeframe.

A list of available funding and incentive options has been provided in Appendix F. Please note that the status of funding programs and incentives is constantly changing. In addition, this list is not all-encompassing, but is meant to be a starting point for further research. Regularly checking the status of funding and incentive programs, as well as actively searching for more, is necessary and encouraged.

9.0 CONCLUSION

This update builds on GIFN's 2015 CEP, and is an effort to move us towards our overall energy vision. We'd like to sincerely thank everybody who participated in this project, including residents that completed various surveys, staff members who provided information and feedback, energy suppliers (Hydro One and Budget Propane), the IESO, and our current Community Energy Advisor. We hope that this document is informative and assists us in achieving our energy goals.

GLOSSARY OF TERMS

Annual Fuel Utilization Factor (AFUE): *Measurement of thermal energy generated compared to the total amount of energy that is supplied from a fuel.*
Ballasts: *An electrical ballast is a device which limits the amount of current in an electrical circuit and is typically used in fluorescent lamp fixtures.*
BioEnergy: *Energy created through the combustion of biological materials.*
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 defined by the EPA which is used to express an electrical quantity as a mass of carbon dioxide (CO_2).*
Climate: *Prevailing regional patterns in weather over a long period of time.*
Climate Change: *A long-term change in the statistical distribution of weather patterns.*
Commercial Sector: *All commercial buildings within the community, excluding those that are* Nation-*owned.*
Comprehensive Community Plan: *A process to create a plan that enables a community to build a roadmap to sustainability, self-sufficiency and improved governance capacity.*
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 to the 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.*
Diesel: *A fuel type typically used in transportation and electrical generators. It is used in diesel engines. Diesel is typically derived from petroleum, but may be derived from other sources as well.*
Economic Development: *The process and policies by which a community improves the economic and social well-being of its people.*
Energy: *The ability of a system to perform work. Includes the electrical energy and heat energy from the combustion of fuels.*
Energy Conservation: *The practice of using less energy, or using it more efficiently.*
Energy Consumption: *Amount of energy is used over a given period of time.*
Energy Education: *Information aimed to help a community understand energy, especially in regards to increasing energy conservation and efficiency within a community.*
Energy Efficiency: *The practice of managing energy use 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 Independence: *A community's ability to produce its own energy and rely less on major suppliers. There are varying degrees of energy independence.*
Energy Star Certification: *Products that are independently certified to save energy without sacrificing functionality.*
Energy Use Behavior: *The way in which a person, or group of people, typically use energy.*
Electrical Generator: *A technology which produces electrical energy.*
Electricity: *A type of energy consisting of charged particles flowing as a current. Electricity has many uses and is commonly used to power appliances, devices, and for heating purposes.*
Feed-in-Tariff (FIT): *an economic incentive for large-scale renewable energy projects.*
Feeder Line: *An electrical line within an electrical distribution system used to transport electricity.*
First Nation Conservation Program (FNCP): *An IESO program designed to assist First Nations to reduce energy demand and manage costs by increasing energy efficiency in homes.*
Forecasted Energy Needs: *An estimation of energy requirements needed in the future.*
Gasoline: *A refined petroleum fuel used in internal combustion engines.*
Geothermal Energy: *Energy obtained from the earth for heating or cooling purposes.*
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.*
Green Procurement Strategy: *The practice of only purchasing certified "green" products.*
Greenhouse Gas Emissions: *The release of gases in the atmosphere which trap thermal energy.*
Grid-Tied: *Having access to an electrical grid system, especially in reference to electrical generation.*
Heating Degree Day (HDD): *The number of degrees that a day's average temperature is below 18 degrees Celsius, or the temperature below which a building needs to be heated*
Heating Oil: *A liquid petroleum fuel that is used in furnaces and boilers to produce heat. Also referred to as Furnace Oil or Fuel Oil.*
Heating System: *A system used to control the heat within a building or space.*
Hot Water System: *A system used to heat water for domestic use within a building.*
Hydroelectric: *Electrical energy derived from flowing water, typically from the use of hydroelectric dams.*
Hydro One: *The local distribution company and electricity service provider.*
Incandescent Light Bulb: *An electric light source that produces visible light by passing an electric current through a filament.*
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-Hours (kWh): *A unit of energy typically used to measure electricity.*
Local Distribution Company (LDC): *Responsible for delivering electricity from transmission lines to customers. Hydro One is a LDC.*
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).*
Natural Gas: *A type of fuel consisting largely of methane and other hydrocarbons found naturally underground.*
Net-Metering: *Sending surplus electricity generated from a renewable energy source 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'.*
Propane: *A common fuel type derived from petroleum. Is a gas at standard temperature and pressure but can be compressed to a liquid for storage and transportation.*
Renewable Energy: *Energy that is collected from resources which are naturally replenished on a human timescale.*
Residential Sector: *All houses and residential buildings within the community.*
Seasonal Residential: *A Hydro One residential customer that does not live in the residence year-round.*
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. Was introduced to help reduce provincial electrical demand.*
Upstream Feeder: *The distribution or transmission station that supplies electricity to a specified point within an electrical grid.*
Weather: *The state of the atmosphere at a specific time or place.*
Wind Energy: *Energy derived from wind, typically from the use of wind turbines.*
Winter Preparation: *The act of reducing heat loss in order to conserve energy during the winter months.*

Appendix A
Energy Survey Summaries

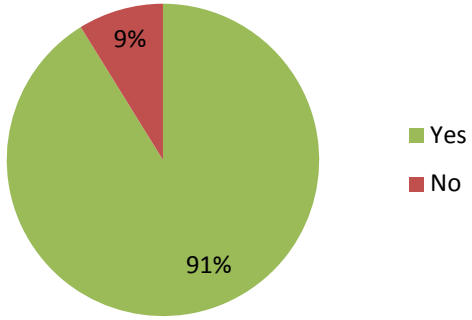
YEAR ROUND RESIDENTIAL ENERGY SURVEY SUMMARY

An analysis of the results of the Georgina Island First Nation (GIFN) Year Round Residential Energy Survey is provided in this appendix. A total of 68 surveys were completed, although some questions were skipped by individual survey participants.

There were 6 participants that completed a survey for a primary residence not located within GIFN (see Q1). For the purposes of this survey, these responses have been excluded in results related to energy use in the community (Q2 through Q8).

QUESTION 1:

This is my primary residence and it is located on Georgina Island.



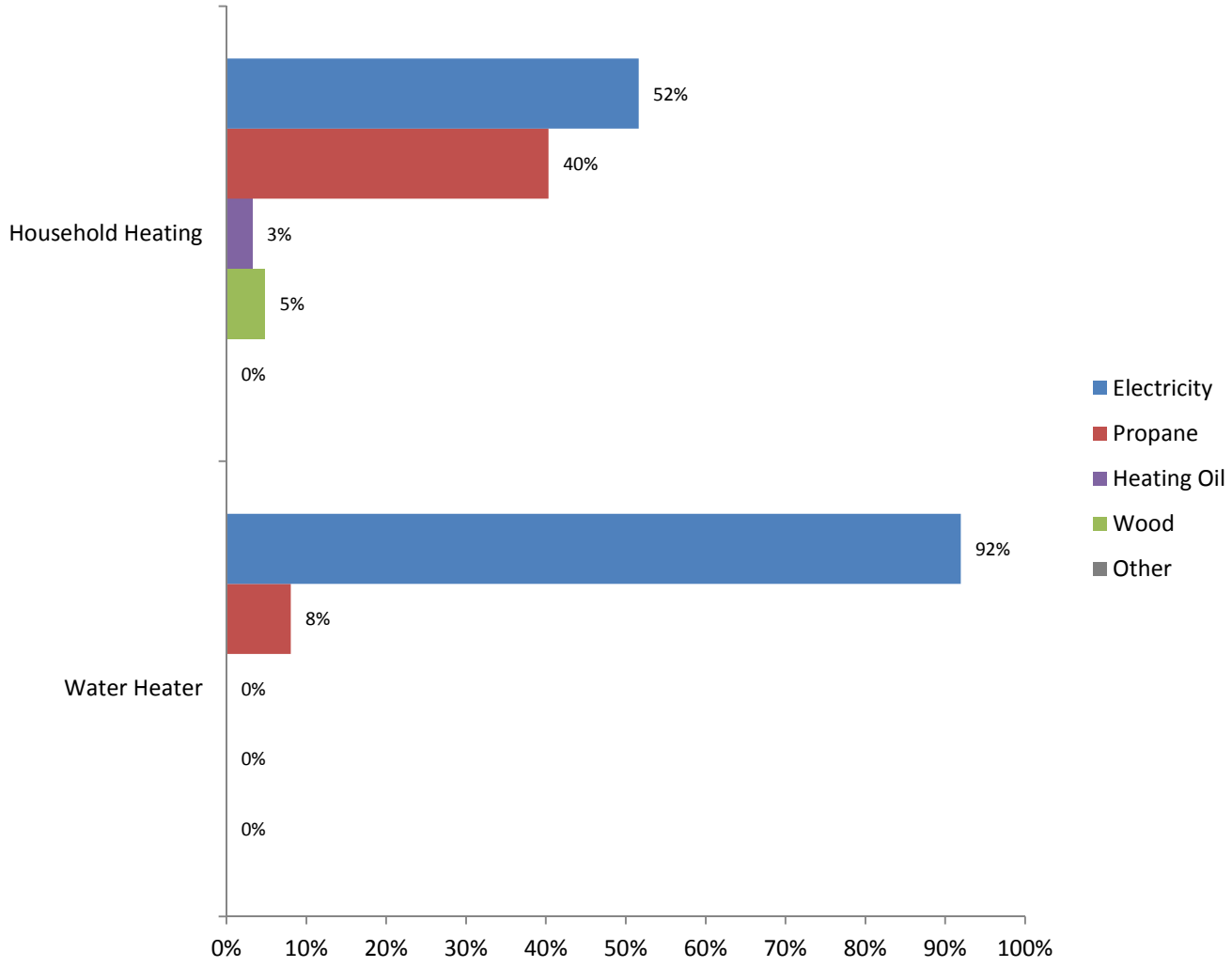
Most participants (91%) completed the survey for a residence located within Georgina Island.

This question was answered by 68 participants and skipped by none.

QUESTION 2:

What is the primary type of energy you use for the following?

Electricity was identified as the primary energy source for household heating by about 52% of survey respondents. About 40%, 5%, and 3% of survey respondents identified propane, wood, and heating oil respectively, as the primary energy sources for household heating. Electricity is used for water heating by the majority of households (92%) in the community, with the remainder using propane (8%). Additional information is available in the chart below.



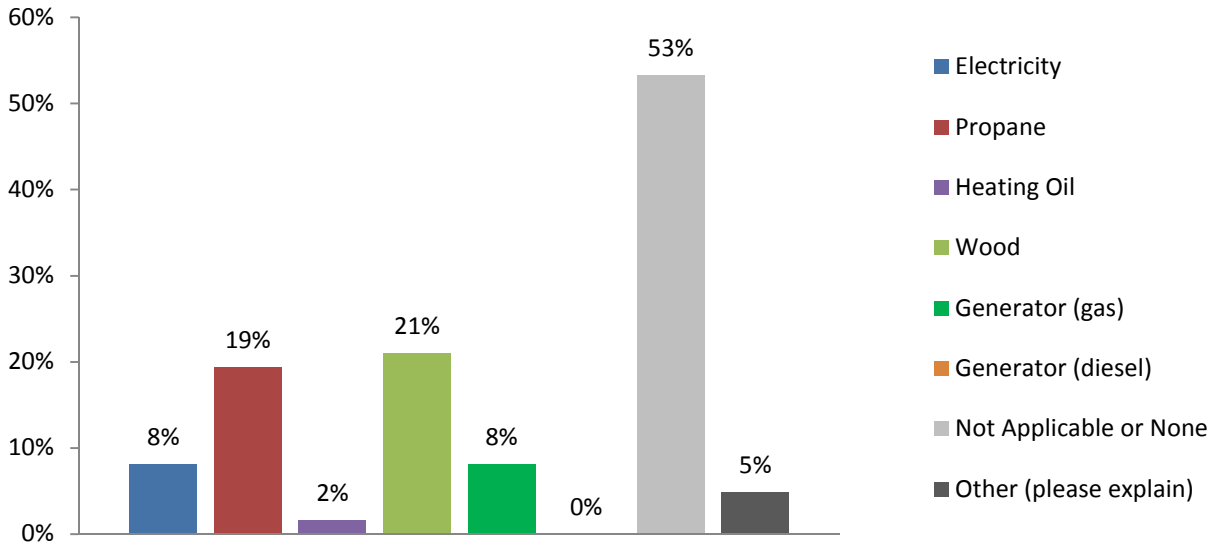
This question was answered by 62 participants and skipped by none. The results of this question exclude responses from participants with a primary residence not located within GIFN.

QUESTION 3:

What is the secondary types of energy you use in your home? Choose all that apply.

About 53% of participants indicated that a secondary heating source is not applicable to them. Respondents' use of wood, propane, electricity, and heating oil were indicated as secondary energy sources by about 21%, 19%, 8% and 2% respectively. About 5% of respondents indicated "other" forms of secondary energy. In addition, about 8% of respondents indicated the use of gas fueled generators.

This question was answered by 62 participants and skipped by none. The results of this question exclude responses from participants with a primary residence not located within GIFN.



QUESTION 4:

If you use wood, how many face cords (8'x4'x16") do you use per year and what is the cost? Please skip if you do not use wood.

This question was answered by 15 participants residing within GIFN, indicating that about 24% of participants use wood as either a primary or secondary source of energy in the home (agreeing with the results of Q2 and Q3). From these participants, it was found that the average annual wood consumption is approximately 7 face cords per year (per household using wood as either a primary or secondary heating source). Participants using wood as the primary heating source use an average of 12 face cords per year while participants using wood as a secondary source use an average of about 6 face cords per year.

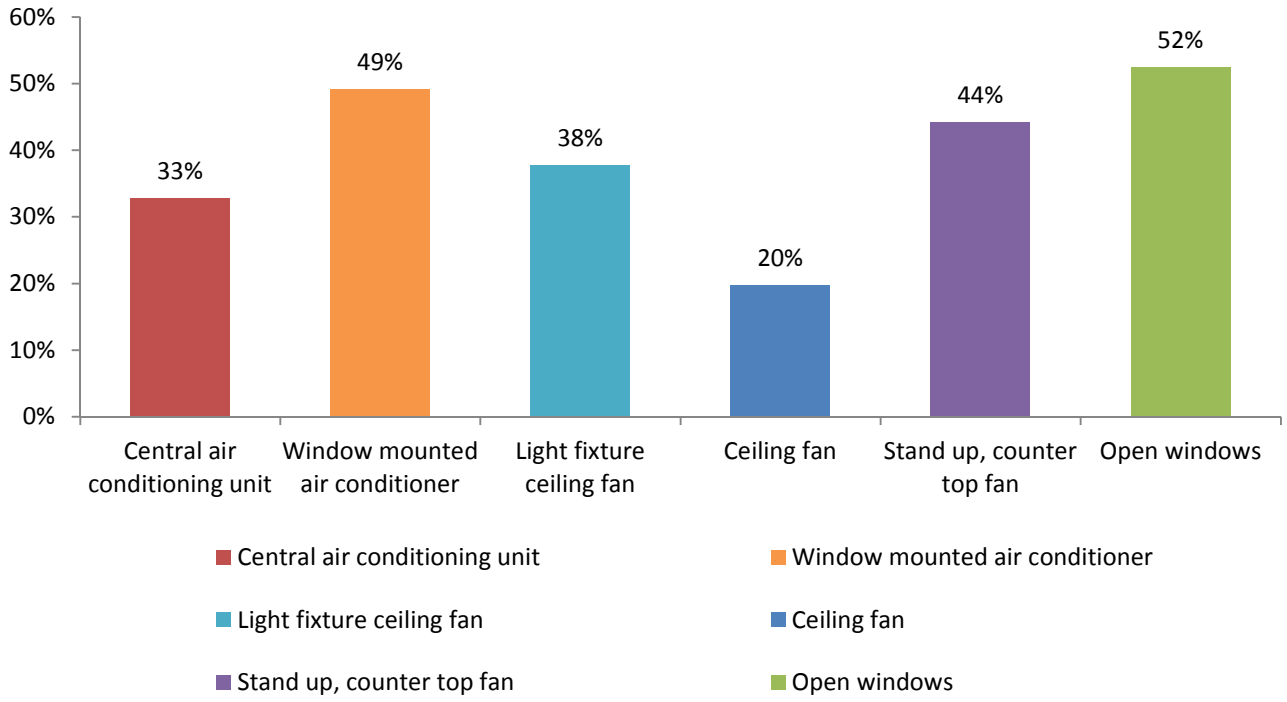
Many respondents indicate that they cut and harvest their own firewood (at no cost). From survey participants that provided cost data (6), it was found that the average price of wood in the community is approximately $225 per face cord. However, some participants may have misunderstood the question (providing total cost per year versus cost per cord). $180 per cord was a common answer by participants.

This question was skipped by 47 participants. The results of this question exclude responses from participants with a primary residence not located within GIFN.

QUESTION 5:

Do you use any of the following to cool your home? (check all that apply)

A breakdown of methods of home cooling used within GIFN is shown in the table below.



This question was answered by 61 participants and skipped by 1. The results of this question exclude responses from participants with a primary residence not located within GIFN.

QUESTION 6:

Identify your energy supplier for the following energy types where applicable.

Hydro One was listed as the supplier for all electricity users. Propane is supplied by Budget and Superior Propane. Breakaway was listed as a heating oil supplier. Wood is harvested locally or purchased from local retailers.

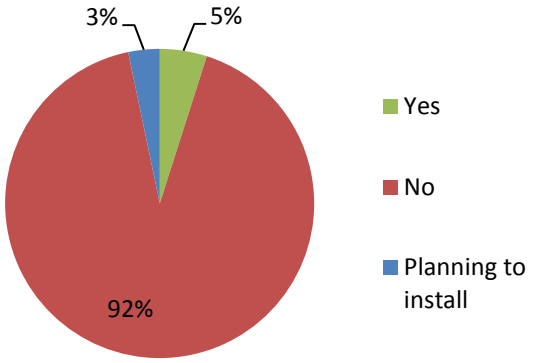
This question was answered by 62 participants and skipped by none. The results of this question exclude responses from participants with a primary residence not located within GIFN.

QUESTION 7:

Do you have a renewable energy system in use in your home, shop, or greenhouse?

There were 3 survey participants (5%) that indicated that they have a renewable energy system in use in their home, shop, or greenhouse. An additional 3% of respondents are planning to install a system.

This question was answered by 61 participants, and skipped by 1. The results of this question exclude responses from participants with a primary residence not located within GIFN.



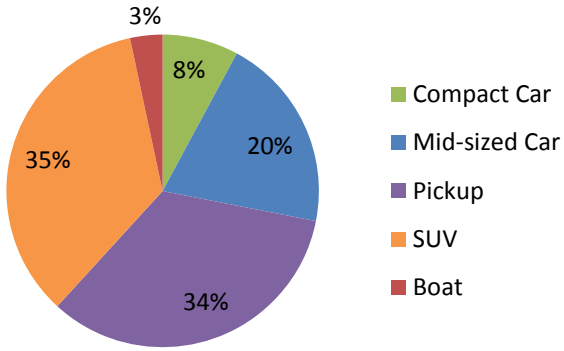
QUESTION 8:

Please list all vehicles that use fuel. Cars, trucks, utility vehicles, boats, etc.

This question has been separated into three components. This question was answered by 52 participants, and skipped by 10. The results of this question exclude responses from participants with a primary residence not located within GIFN. This question asked for a breakdown for each vehicle in the household. The results presented below have been adjusted to remove this breakdown per vehicle, and have been adjusted to exclude skipped responses.

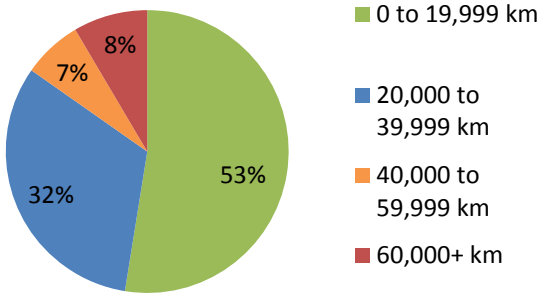
A: Please list all vehicles that use fuel. Cars, trucks, utility vehicles, boats, etc.

SUVs and pickups make up the greatest number of vehicles amongst respondents at 35% and 34%, respectively. Mid-sized cars are also common, at about 20%. Compact cars are owned by only about 8% of respondents. Boats were identified as a vehicle by about 3% of respondents.

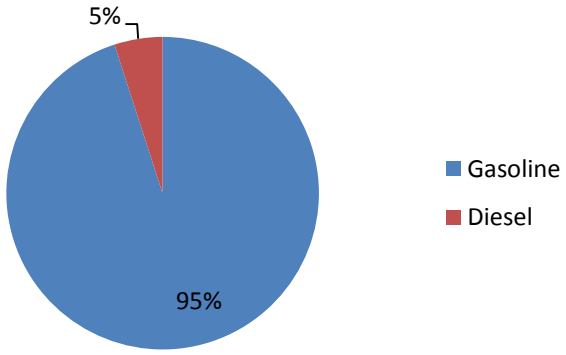


B: Kilometers (km) driven annually? (0 to 19,999, 20,000 to 39,999, 40,000 to 59,999, 60,000+)

About 53% of participants drive less than 20,000 km annually. About 32% drive 20,000 km to 39,999 km annually. About 7% of respondents drive between 40,000 km to 59,999 km annually, and 8% of participants drive more than 60,000 km annually.



C: Fuel Type (gasoline, diesel, electric, hybrid)



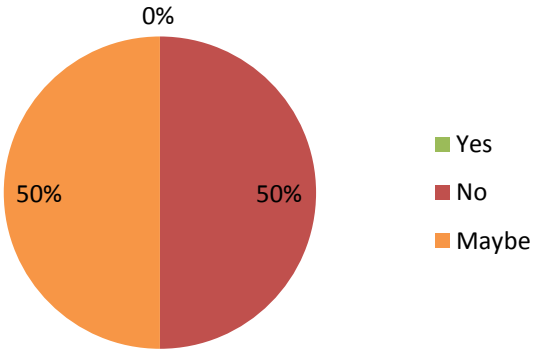
Gasoline vehicles are by far the most common in the community. Amongst participants that provided responses, about 95% indicated the use of gasoline vehicles. Diesel accounts for just over 5% of vehicle fuel types among respondents.

QUESTION 9:

Are you considering purchasing an electric or hybrid vehicle in the next 3 years?

Of community members that participated in the survey, about 50% would possibly consider purchasing an electric car within the next 3 years. No respondents indicated that they would definitely consider purchasing an electric car within the next 3 years.

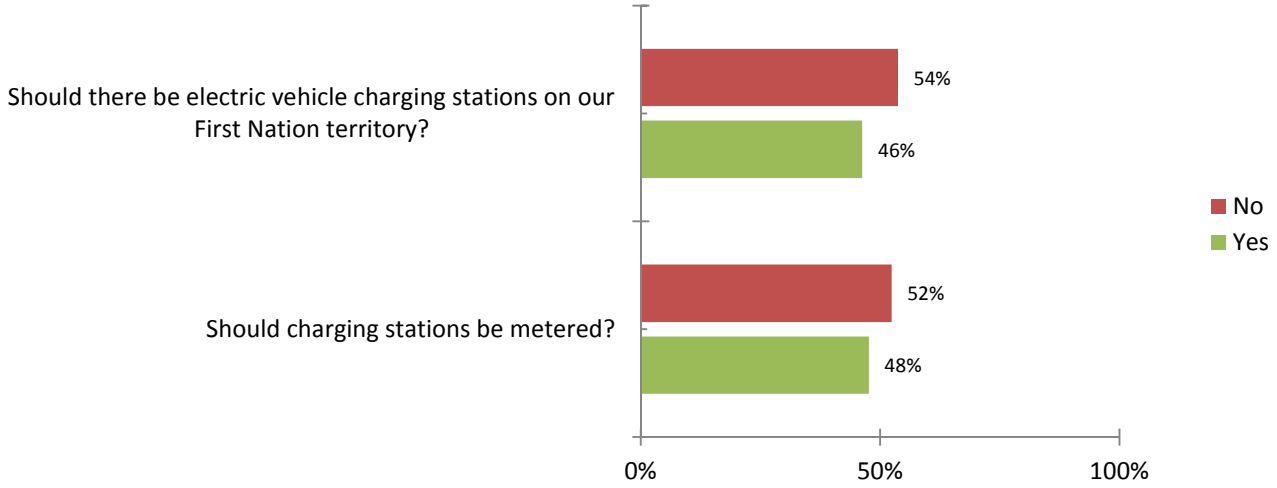
This question was answered by 68 participants, and skipped by none.



QUESTION 10:

In relation to electric vehicles:

Of the participants that responded to this question, about 46% think that there should be charging stations within Georgina Island, and 48% believe that if there are charging stations, they should be metered.

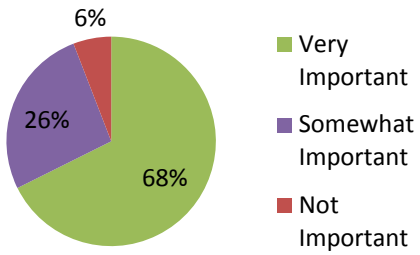


The first part of this question (if charging station should be within GI) was answered by 67 respondents and skipped by 1, and the second part of this question (if these stations should be metered) was answered by 63 respondents and skipped by 5).

QUESTION 11:

Rate the importance of our community investing in energy education. Radio ads, newsletter, website, and social media.

About 94% of respondents feel that it is important for Georgina Island to participate in energy education initiatives to some degree, with 68% of respondents feeling that it is very important. Only about 6% of respondents indicated that they believe energy education initiatives are not important.

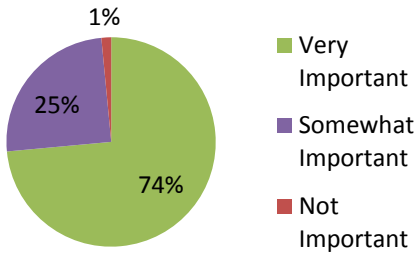


This question was answered by 68 participants, and skipped by none.

QUESTION 12:

Rate the importance of our community investing in conservation measures.

About 99% of respondents feel that it is important for Georgina Island to participate in energy conservation initiatives to some degree, with 74% of overall respondents feeling that it is very important. Only about 1% of respondents indicated that they believe energy conservation initiates are not important.

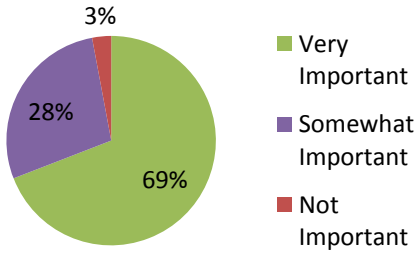


This question was answered by 68 participants, and skipped by none.

QUESTION 13:

Rate the importance of our community investing in energy generation.

About 97% of respondents feel that it is important for Georgina Island to invest in energy generation initiatives to some degree, with 69% of overall respondents feeling that it is very important. Only about 3% of respondents indicated that they believe energy generation initiatives are not important.

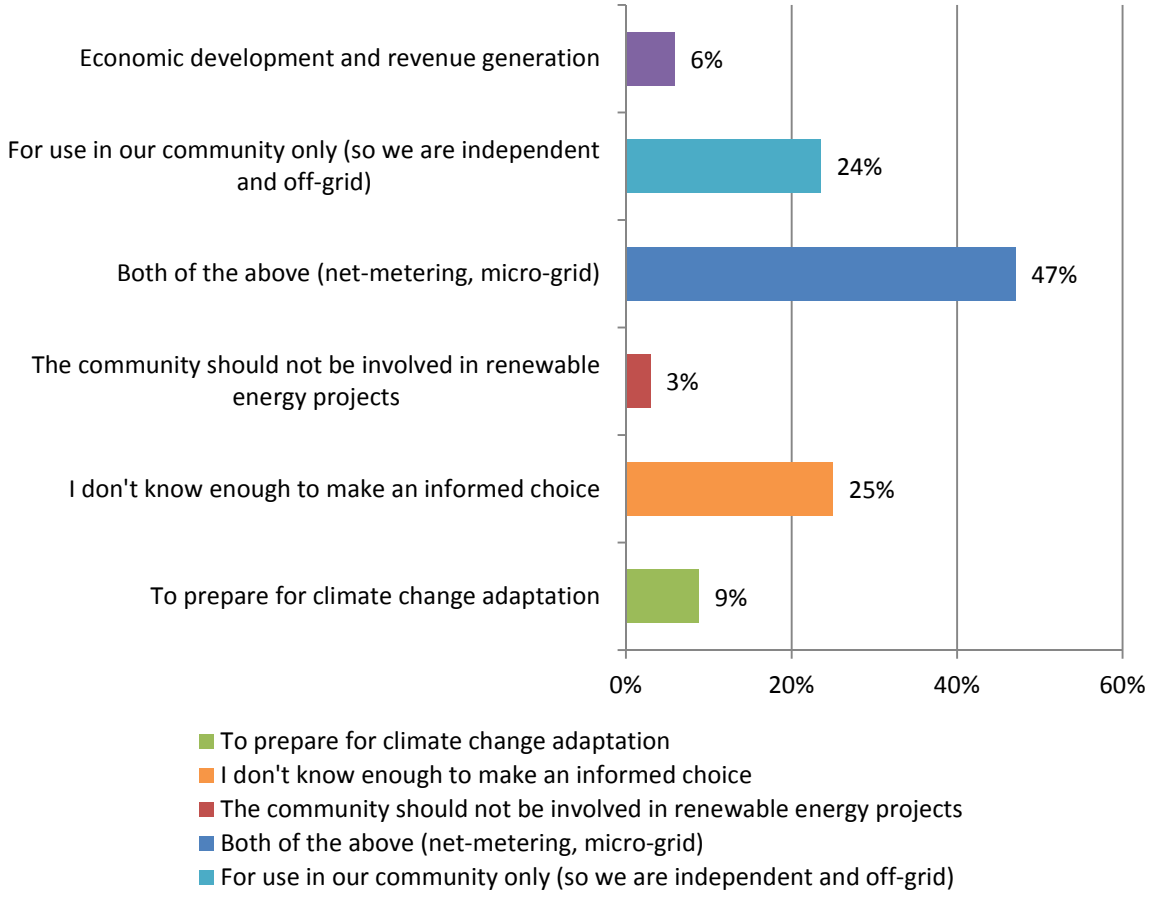


This question was answered by 68 participants, and skipped by none.

QUESTION 14:

If our community commits to renewable energy projects, it should be for;

About 47% of respondents who answered this question want to use renewable projects for both economic development and to generate electricity for use within the community. About 24% of respondents believe that renewable energy projects should be pursued for use within the community only, and 6% of respondents believe that projects should be pursued for economic development purposes only. About 9% of participants indicated that renewable energy projects should be pursued to prepare for climate change. About 25% of respondents indicated that they do not know enough to make an informed decision. About 3% of participants do not think the community should be involved in renewable energy projects



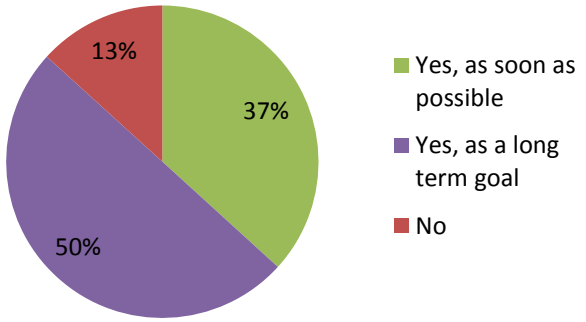
This question was answered by 68 participants, and skipped by none.

QUESTION 15:

The community should move towards increased or total energy independence.

About 87% of respondents believe that the community should move towards increased energy independence. About 50% of respondents believe that this should be a long term goal, with 37% believing this should be done as soon as possible.

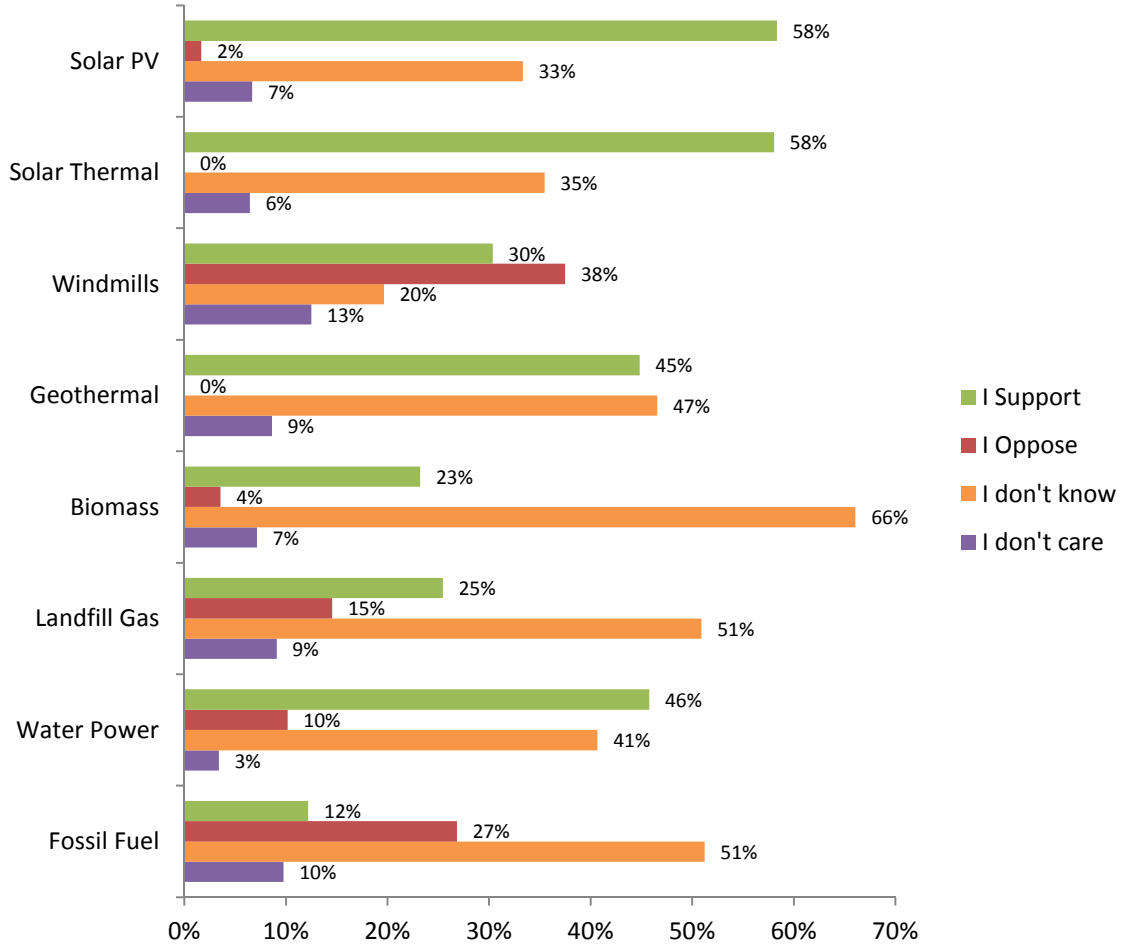
This question was answered by 68 participants, and skipped by none.



QUESTION 16:

Please place a check mark for each choice.

Many participants indicated that they don't know enough to make an informed decision (20% to 66% for various categories) about the listed renewable energy technologies. Solar photovoltaic, solar thermal, water power, and geothermal technologies were the most supported, with 58%, 58%, 46%, and 45% of respondents indicating support of these technologies, respectively. The most opposition received by respondents was towards windmills (38% of respondents), fossil fuels (27% or respondents), landfill gas (15% of respondents), and waterpower (10% of respondents). It is important to note that there was no opposition towards solar thermal and geothermal technologies from survey respondents, and opposition towards solar photovoltaic and biomass were very low (2% and 4% of respondents, respectively).

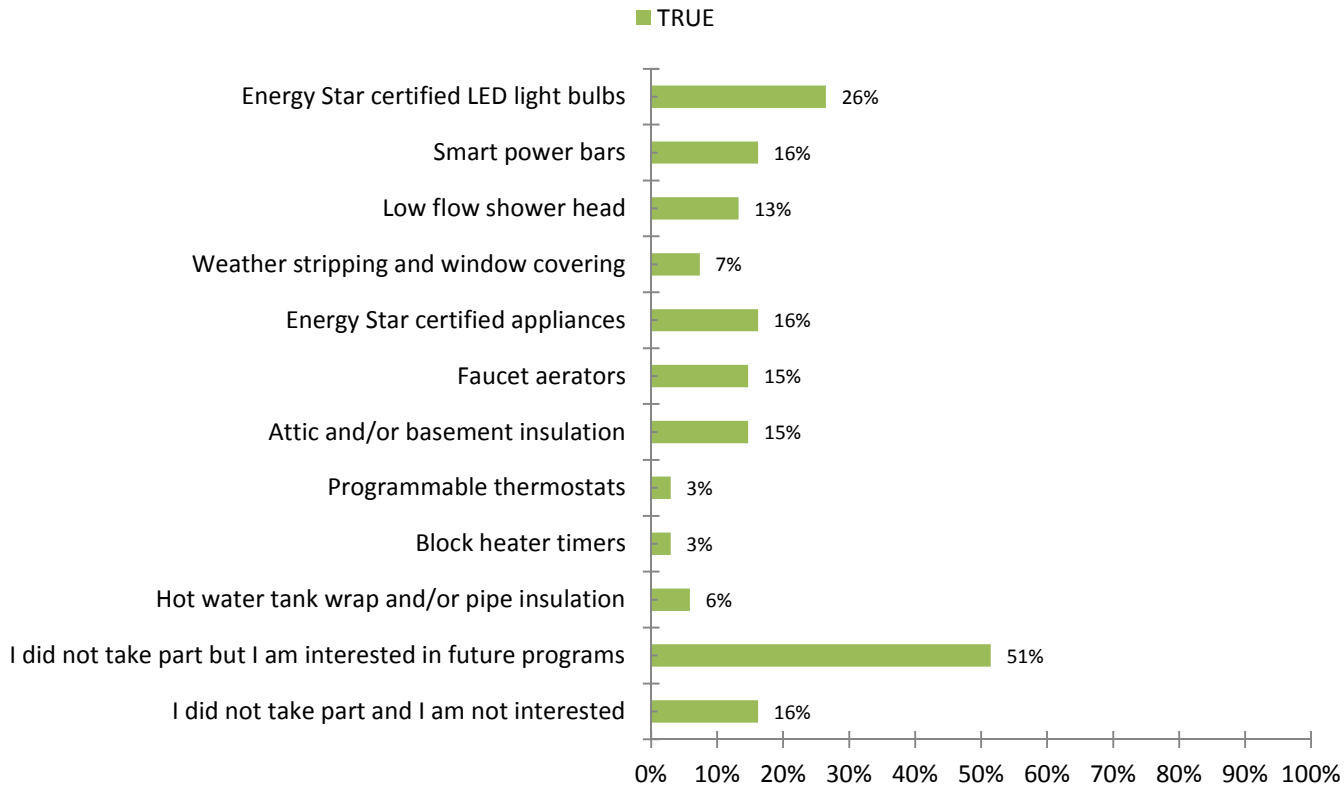


This question was answered by 68 participants, and skipped by none.

QUESTION 17:

I took part in the 2015 Aboriginal Conservation Program and I received the following: (please check all that apply)

Inferred from the data, it appears that only about 33% of respondents participated in the ACP program. About 51% of survey respondents did not take part in the ACP program, but are interested in future programs. Additional information can be seen in the table below.



This question was answered by 68 participants and skipped by none.

QUESTION 18:

I took part in the 2015 Aboriginal Conservation Program and I had problems or issues with the following items I received;

This question was answered by only 6 participants. Individual responses included:

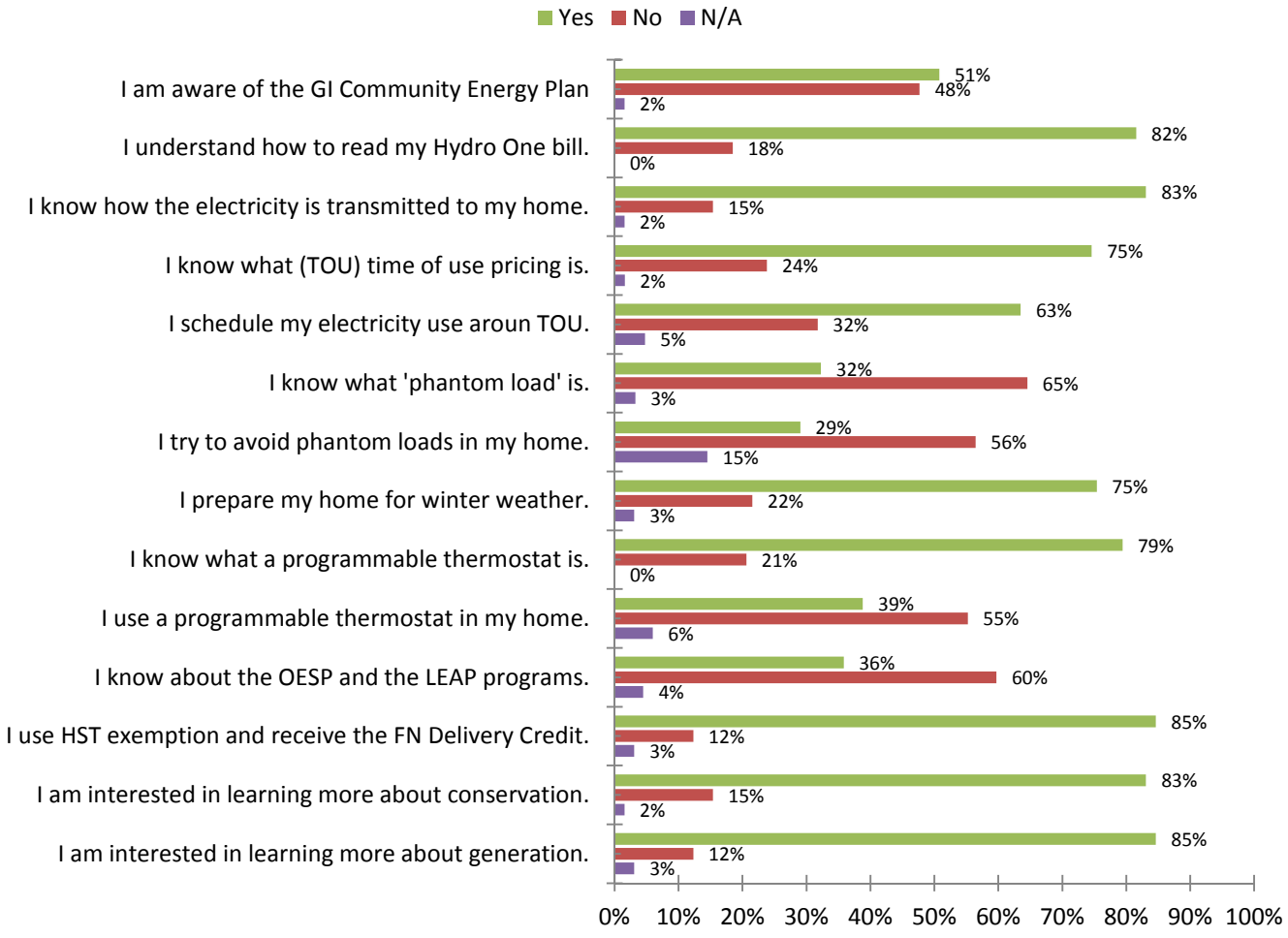
- Not being present in the community during the time the program was active;
- Disliking the lightbulbs provided as part of the program;
- The resident having their crawlspace sprayed with insulation, but developing mould as a result from a reduction in ventilation; and
- Complaints of the freezer being too cold.

Personal information has not been included in this summary to preserve confidentiality. This question was skipped, or answered N/A, by 62 participants.

QUESTION 19:

Please rank the following statements as Yes, No or N/A (not applicable)

Of the participants that responded to this question, only about 51% indicated that they are aware of the existing GI Community Energy Plan. Many residents are interested in learning more about both energy conservation and energy generation. Residents appear to have a fairly good understanding of many energy topics, although further education could be made and there is still room for improvement. This is especially true in regard to phantom loads and cost management programs such as OESP and LEAP. Encouraging the use of programmable thermostats in the residential sector would also be beneficial. Other important data gathered from this question is presented in the chart below.



This question was answered by 68 participants and skipped by none.

QUESTION 20:

If you want to receive updates and more information please provide the best way to stay in contact. Your information will be kept confidential.

This question was answered by all 68 participants. The information has been excluded in this summary to preserve confidentiality.

QUESTION 21:

Do you have any suggestions or things you would like included in the Community Energy Plan?

Individual responses to this question varied but included desires for:

- Self-sufficiency in energy/energy independence for the community;
- Community awareness and education in regards to energy, and the creation of a more energy conscious community;
- Increased renewable energy generation within the community, with specific references to solar PV technologies;
- Special consideration to the environment in relation to energy, and an overall reduction in the community's carbon footprint;
- Energy conservation in both the residential and band-owned sectors of the community;
- Development of an action plan/goals in relation to the Community Energy Plan;
- For GIFN to provide support for residential energy efforts (such as conservation measures, providing tank-less hot water heaters, etc.);
- For the Community Energy Plan to be of benefit to the community; and
- Job creation.

This question was answered by 33 participants, and skipped by 35.

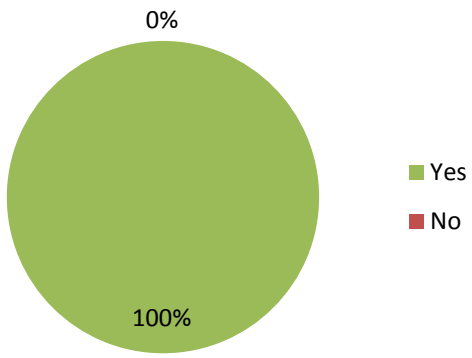
SEASONAL RESIDENCE ENERGY SURVEY SUMMARY

An analysis of the results of the Georgina Island First Nation (GIFN) Seasonal Residence Energy Survey is provided in this appendix. A total of 16 surveys were completed, although some questions were skipped by individual survey participants.

Survey results from participants that indicated they live at their homes within GIFN year round have been excluded (and assumed to be included within the results of the Year Round Residential Energy Survey).

QUESTION 1:

Are you a non-GIFN band member that owns/rents a home within GIFN?



All participants (100%) that completed this survey were non-GIFN band members that either own or rent a home within GIFN.

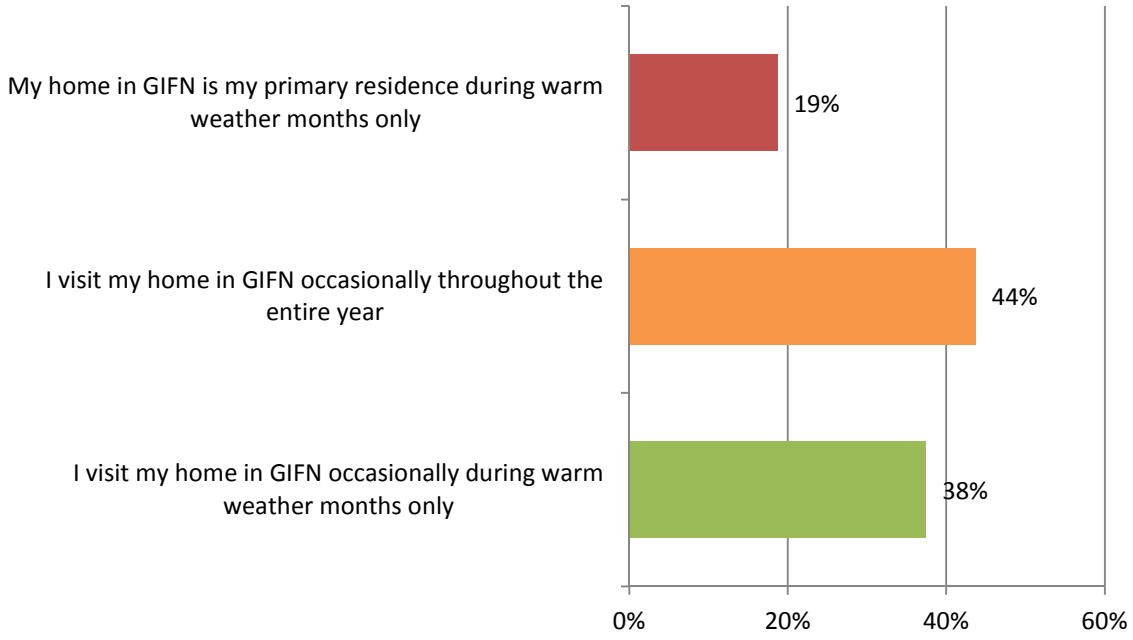
This question was answered by 16 participants and skipped by none.

QUESTION 2:

Which of the following best describes your residency in GIFN?

Based on the results of the survey, about 19% of respondents reside at their residence full-time during the summer months. The remainder of respondents only visit their home occasionally, with about 44% doing so year round and about 38% only during the warm weather months. Additional information can be found in the chart below.

This question was answered by 16 participants, and skipped by none.



QUESTION 3:

What is the total number of weeks (approximately) that you reside at your home in GIFN per year?

Individual responses varied from 2 weeks to 30 weeks per year. On average, cottagers use their residence within GIFN about 15.5 weeks per year (or about 30% of the time).

This question was answered by 16 participants and skipped by none.

QUESTION 4:

What is the approximate square footage of your home in GIFN?

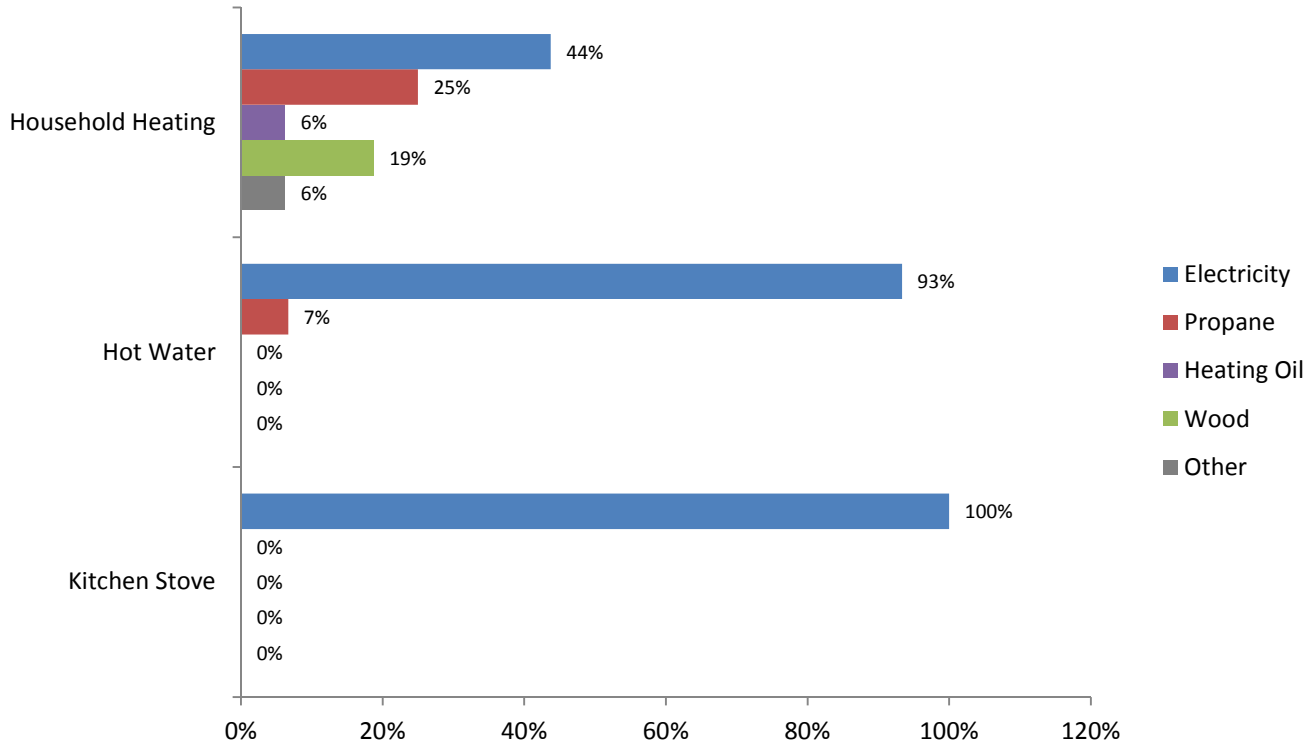
Individual responses varied between about 700 square feet to 2500 square feet. On average, seasonal residences have homes with approximately 1400 square feet.

This question was answered by 16 participants and skipped by none.

QUESTION 5:

What is the primary type of energy you use for the following in your home in GIFN?

Electricity, propane, and wood are used as the primary source of household heating by about 44%, 25%, and 19% of respondents, respectively. Electricity is used for water heating by the majority of households (93%) in the community. Additional information is available in the chart below.

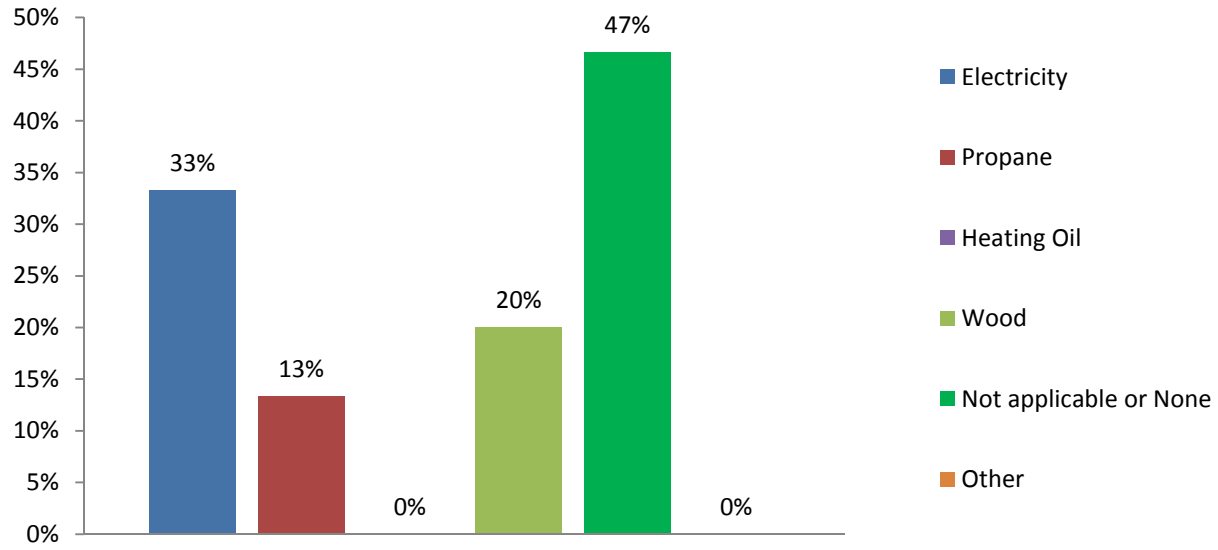


This question was answered by 16 participants and skipped by none.

QUESTION 6:

Please list any secondary types of energy you use in your home at GIFN. Choose all that apply.

About 47% of participants indicated that a secondary heating source is not applicable to them. Use of electricity, wood, and propane were indicated as secondary energy sources by about 33%, 20%, and 13% of respondents, respectively.

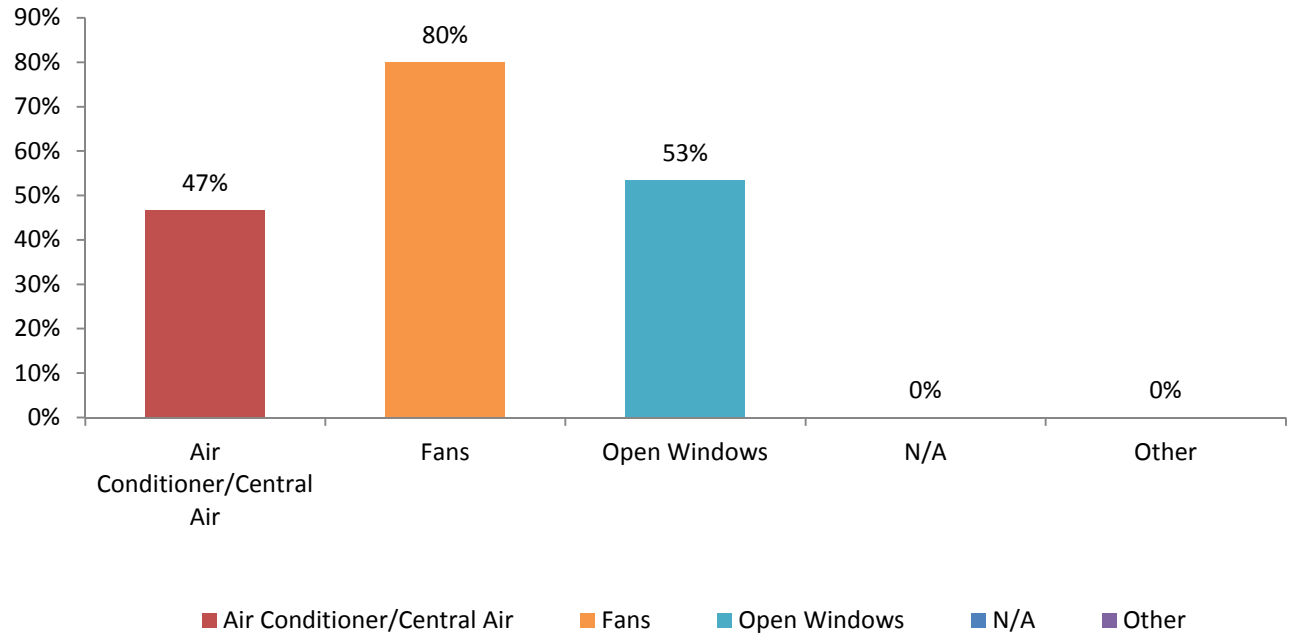


This question was answered by 15 participants and skipped by 1.

QUESTION 7:

How do you cool your home located in GIFN? Choose all that apply.

A breakdown of methods of home cooling by participants is shown in the table below.



This question was answered by 15 participants and skipped by 1.

QUESTION 8:

If you use wood as a heating source in your home in GIFN, how many face cords (8'x4'x16") do you use per year and what is the cost? Please skip if you do not use wood.

This question was answered by 4 participants. From these participants, it was found that the average annual wood consumption is approximately 1.5 face cords per year. Only one participant provided cost data ($400 per face cord), although it is anticipated that the respondent may have misunderstood the question (and provided cost per bush cord or cost per year).

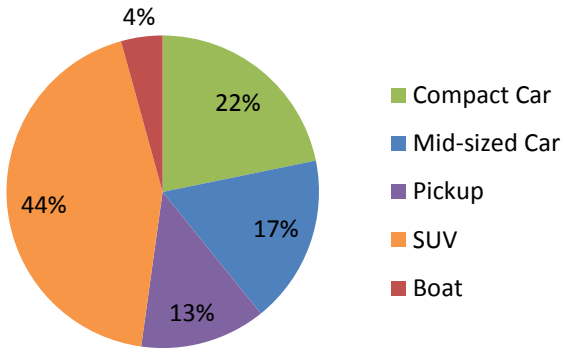
QUESTION 9:

Please list all road vehicles that use fuel that are associated with your home in GIFN.

This question is separated into three components. This question was answered by 14 participants, and skipped by 2. This question asked for a breakdown for each vehicle in the household. The results presented below have been adjusted to remove this breakdown per vehicle, and have been adjusted to exclude skipped responses.

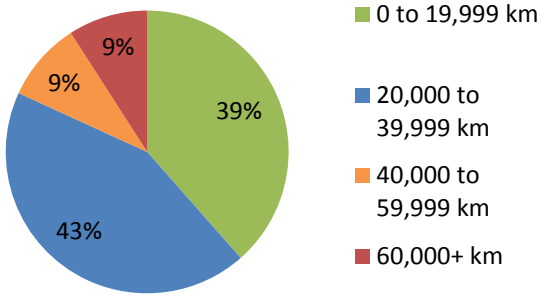
A: Please list all vehicles that use fuel. Cars, trucks, utility vehicles, boats, etc.

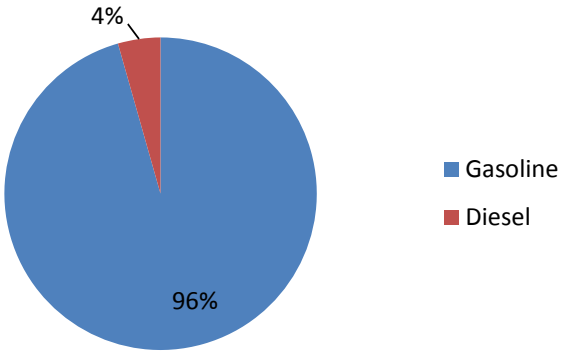
SUV's make up the greatest number of vehicles amongst respondents at about 44%. Compact cars, mid-sized cars, and pick-ups are owned by about 22%, 17%, and 13% of respondents, respectively. Boats were identified as a vehicle by about 4% of respondents.



B: Kilometers (km) driven annually? (0 to 19,999, 20,000 to 39,999, 40,000 to 59,999, 60,000+)

About 38% of participants drive less than 20,000 km annually. About 43% drive 20,000 km to 39,999 km annually. About 9% of respondents drive between 40,000 km to 59,999 km annually, and 9% of participants drive more than 60,000 km annually.





C: Fuel Type (gasoline, diesel, electric, hybrid)

Amongst participants that provided responses, about 96% indicated the use of gasoline vehicles. Diesel accounts for about 4% of vehicle fuel types among respondents.

Appendix B

Baseline Methodology, Future Projections, and Estimations

Electricity Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			kWh	GJ	kWh	GJ	kWh	GJ	kWh	GJ
1	Band Office	879 Chief Joseph Snake Road	78,990	284	79,309	286	81,812	295	81,023	292
2	Community Centre	893 Chief Joseph Snake Road	87,964	317	100,881	363	82,901	298	103,612	373
3	Public Skating Rink	738 Chief Joseph Snake Road	95,341	343	89,144	321	31,407	113	111,661	402
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	68,715	247	66,951	241	68,744	247	72,620	261
5	Fire Hall	234 Chief Joseph Snake Road	9,067	33	8,708	31	9,260	33	8,626	31
6	Police Station	217 Bear Road	19,121	69	16,268	59	16,133	58	14,921	54
7	Health Centre	812 Chief Joseph Snake Road	17,547	63	18,147	65	18,733	67	15,699	57
8	Child Care	84 Morning Road	20,151	73	19,005	68	18,322	66	19,029	69
9	Family Resource Building	116 Root Road	16,537	60	14,936	54	14,191	51	15,480	56
10	Church	867 Chief Joseph Snake	42,531	153	41,718	150	6,901	25	3,559	13
11	Public Works Building and Yard	208 Chief Joseph Snake	29,233	105	29,653	107	23,983	86	3,853	14
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	2,013	7	1,643	6	2,392	9	1,269	5
13	Trails Building	144 Hello Road	12,226	44	12,226	44	12,226	44	12,226	44
14	Landfill	110 Rabbit Road	3,287	12	17,220	62	20,625	74	16,855	61
15	Water Plant	829 Chief Joseph Snake	82,243	296	73,017	263	70,463	254	82,695	298
16	Streetlights	N/A	90,000	324	90,000	324	90,000	324	90,000	324
17	Aazhaawe Ferry	N/A	-	-	-	-	-	-	-	-
18	Band Vehicle Fleet	N/A	-	-	-	-	-	-	-	-
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			2,232,188	8,036	2,020,092	7,272	1,809,580	6,514	2,089,168	7,521
Aggregate Seasonal Residential			1,994,256	7,179	1,843,204	6,636	1,742,364	6,273	2,090,783	7,527
Aggregate Commercial			212,346	764	200,224	721	181,985	655	222,540	801

Notes:

All values from data supplied by Hydro One unless otherwise stated. See "GIFN Hydro Data_Master". Adjusted consumption used.

Estimate values for Trails Buidling and Streetlights - see "GIFN CEP Estimations and Calculations"

Aggregate Residential and Seasonal Residential values have been adjusted for number of residents within the community - see "GIFN CEP Estimations and Calculations"

Propane Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			L	GJ	L	GJ	L	GJ	L	GJ
1	Band Office	879 Chief Joseph Snake Road	10,287	263	9,038	231	13,140	335	4,876	124
2	Community Centre	893 Chief Joseph Snake Road	6,955	178	3,241	83	1,904	49	1,568	40
3	Public Skating Rink	738 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	5,155	132	3,296	84	1,903	49	4,680	119
5	Fire Hall	234 Chief Joseph Snake Road	2,333	60	3,672	94	1,581	40	6,233	159
6	Police Station	217 Bear Road	5,488	140	4,574	117	4,218	108	2,116	54
7	Health Centre	812 Chief Joseph Snake Road	6,027	154	3,894	99	4,725	121	1,721	44
8	Child Care	84 Morning Road	4,838	124	2,540	65	1,999	51	3,415	87
9	Family Resource Building	116 Root Road	-	-	-	-	-	-	-	-
10	Church	867 Chief Joseph Snake	-	-	6,576	168	5,750	147	3,988	102
11	Public Works Building and Yard	208 Chief Joseph Snake	3,370	86	2,819	72	2,980	76	2,272	58
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	2,341	60	711	18	-	-	1,900	49
13	Trails Building	144 Hello Road	97	2	4,393	112	1,084	28	1,022	26
14	Landfill	110 Rabbit Road	5,760	147	1,351	34	869	22	2,773	71
15	Water Plant	829 Chief Joseph Snake	119	3	270	7	-	-	-	-
16	Streetlights	N/A	-	-	-	-	-	-	-	-
17	Aazhaawe Ferry	N/A	-	-	-	-	-	-	-	-
18	Band Vehicle Fleet	N/A	-	-	-	-	-	-	-	-
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			125,306	3,199	97,365	2,486	61,306	1,565	118,162	3,017
Aggregate Seasonal Residential			48,812	1,246	45,115	1,152	42,646	1,089	51,174	1,306
Aggregate Commercial			4,618	118	4,618	118	4,618	118	4,618	118

Notes:

All values from data supplied by Budget Propane unless otherwise stated - see "GIFN Propane Data"

Estimate value for Public Works Garage - see "GIFN CEP Estimations and Calculations"

Aggregate Residential values calculated using a residential average from supplier data - see "GIFN CEP Estimations and Calculations"

Aggregate Seasonal Residential values estimated based on survey results and seasonal residential electricity consumption - see "GIFN CEP Estimations and Calculations"

Aggregate Commercial values calculated from data provided by Island View Business Centre. Several assumptions were made - see "GIFN CEP Estimations and Calculations"

Natural Gas Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			m3	GJ	m3	GJ	m3	GJ	m3	GJ
1	Band Office	879 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
2	Community Centre	893 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
3	Public Skating Rink	738 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
5	Fire Hall	234 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
6	Police Station	217 Bear Road	-	-	-	-	-	-	-	-
7	Health Centre	812 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
8	Child Care	84 Morning Road	-	-	-	-	-	-	-	-
9	Family Resource Building	116 Root Road	-	-	-	-	-	-	-	-
10	Church	867 Chief Joseph Snake	-	-	-	-	-	-	-	-
11	Public Works Building and Yard	208 Chief Joseph Snake	-	-	-	-	-	-	-	-
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	-	-	-	-	-	-	-	-
13	Trails Building	144 Hello Road	-	-	-	-	-	-	-	-
14	Landfill	110 Rabbit Road	-	-	-	-	-	-	-	-
15	Water Plant	829 Chief Joseph Snake	-	-	-	-	-	-	-	-
16	Streetlights	N/A	-	-	-	-	-	-	-	-
17	Aazhaawe Ferry	N/A	-	-	-	-	-	-	-	-
18	Band Vehicle Fleet	N/A	-	-	-	-	-	-	-	-
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			-	-	-	-	-	-	-	-
Aggregate Seasonal Residential			-	-	-	-	-	-	-	-
Aggregate Commercial			9,069	338	9,069	338	9,069	338	9,069	338

Notes:
Natural gas is only available on the mainland (Island View Business Centre is the only significant user in the community)
Aggregate Commercial values calculated from data provided by Island View Business Centre. Several assumptions were made - see "GIFN CEP Estimations and Calculations"

Fuel/Heating Oil Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			L	GJ	L	GJ	L	GJ	L	GJ
1	Band Office	879 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
2	Community Centre	893 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
3	Public Skating Rink	738 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
5	Fire Hall	234 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
6	Police Station	217 Bear Road	-	-	-	-	-	-	-	-
7	Health Centre	812 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
8	Child Care	84 Morning Road	-	-	-	-	-	-	-	-
9	Family Resource Building	116 Root Road	-	-	-	-	-	-	-	-
10	Church	867 Chief Joseph Snake	-	-	-	-	-	-	-	-
11	Public Works Building and Yard	208 Chief Joseph Snake	-	-	-	-	-	-	-	-
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	-	-	-	-	-	-	-	-
13	Trails Building	144 Hello Road	-	-	-	-	-	-	-	-
14	Landfill	110 Rabbit Road	-	-	-	-	-	-	-	-
15	Water Plant	829 Chief Joseph Snake	-	-	-	-	-	-	-	-
16	Streetlights	N/A	-	-	-	-	-	-	-	-
17	Aazhaawe Ferry	N/A	-	-	-	-	-	-	-	-
18	Band Vehicle Fleet	N/A	-	-	-	-	-	-	-	-
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			6,581	242	5,114	188	3,220	118	6,206	228
Aggregate Seasonal Residential			8,484	312	7,841	288	7,412	272	8,894	327
Aggregate Commercial			-	-	-	-	-	-	-	-

Notes:

No significant Fuel/Heating Oil Use in the Band Owned or Commercial Sectors

Aggregate Residential values estimated based on survey results and residential propane consumption - see "GIFN CEP Estimations and Calculations"

Aggregate Seasonal Residential values estimated based on survey results and seasonal residential electricity consumption - see "GIFN CEP Estimations and Calculations"

Wood Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			# of cords	GJ	# of cords	GJ	# of cords	GJ	# of cords	GJ
1	Band Office	879 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
2	Community Centre	893 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
3	Public Skating Rink	738 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
5	Fire Hall	234 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
6	Police Station	217 Bear Road	-	-	-	-	-	-	-	-
7	Health Centre	812 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
8	Child Care	84 Morning Road	-	-	-	-	-	-	-	-
9	Family Resource Building	116 Root Road	-	-	-	-	-	-	-	-
10	Church	867 Chief Joseph Snake	-	-	-	-	-	-	-	-
11	Public Works Building and Yard	208 Chief Joseph Snake	-	-	-	-	-	-	-	-
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	-	-	-	-	-	-	-	-
13	Trails Building	144 Hello Road	-	-	-	-	-	-	-	-
14	Landfill	110 Rabbit Road	-	-	-	-	-	-	-	-
15	Water Plant	829 Chief Joseph Snake	-	-	-	-	-	-	-	-
16	Streetlights	N/A	-	-	-	-	-	-	-	-
17	Aazhaawe Ferry	N/A	-	-	-	-	-	-	-	-
18	Band Vehicle Fleet	N/A	-	-	-	-	-	-	-	-
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			188	1,128	192	1,152	195	1,170	198	1,188
Aggregate Seasonal Residential			165	990	165	990	166	996	166	996
Aggregate Commercial			-	-	-	-	-	-	-	-

Notes:
All values in "face cords"
No significant wood use in the Band Owned or Commercial Sectors
Aggregate residential and seasonal residential consumption estimated based on survey results - see "GIFN CEP Estimations and Calculations"

Gasoline Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			L	GJ	L	GJ	L	GJ	L	GJ
1	Band Office	879 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
2	Community Centre	893 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
3	Public Skating Rink	738 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
5	Fire Hall	234 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
6	Police Station	217 Bear Road	-	-	-	-	-	-	-	-
7	Health Centre	812 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
8	Child Care	84 Morning Road	-	-	-	-	-	-	-	-
9	Family Resource Building	116 Root Road	-	-	-	-	-	-	-	-
10	Church	867 Chief Joseph Snake	-	-	-	-	-	-	-	-
11	Public Works Building and Yard	208 Chief Joseph Snake	-	-	-	-	-	-	-	-
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	-	-	-	-	-	-	-	-
13	Trails Building	144 Hello Road	-	-	-	-	-	-	-	-
14	Landfill	110 Rabbit Road	-	-	-	-	-	-	-	-
15	Water Plant	829 Chief Joseph Snake	-	-	-	-	-	-	-	-
16	Streetlights	N/A	-	-	-	-	-	-	-	-
17	Aazhaawe Ferry	N/A	-	-	-	-	-	-	-	-
18	Band Vehicle Fleet	N/A	46,402	1,608	42,168	1,462	53,490	1,854	32,711	1,134
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			516,257	17,893	525,476	18,213	534,695	18,533	543,914	18,852
Aggregate Seasonal Residential			538,266	18,656	539,489	18,699	540,713	18,741	541,936	18,784
Aggregate Commercial			-	-	-	-	-	-	-	-

Notes:

Value for Band Vehicle Fleet calculated based on annual costs - see "GIFN CEP Estimations and Calculations"

Aggregate residential and seasonal residential consumption estimated based on survey results - see "GIFN CEP Estimations and Calculations"

Aggregate commercial consumption assumed to be negligable

Diesel Consumption

Building #	Building Name	Address	Consumption 2014		Consumption 2015		Consumption 2016		Consumption 2017	
			L	GJ	L	GJ	L	GJ	L	GJ
1	Band Office	879 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
2	Community Centre	893 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
3	Public Skating Rink	738 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
4	Waabgon Gamig School/Library	830 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
5	Fire Hall	234 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
6	Police Station	217 Bear Road	-	-	-	-	-	-	-	-
7	Health Centre	812 Chief Joseph Snake Road	-	-	-	-	-	-	-	-
8	Child Care	84 Morning Road	-	-	-	-	-	-	-	-
9	Family Resource Building	116 Root Road	-	-	-	-	-	-	-	-
10	Church	867 Chief Joseph Snake	-	-	-	-	-	-	-	-
11	Public Works Building and Yard	208 Chief Joseph Snake	-	-	-	-	-	-	-	-
12	Aazhaawe Maintenance Building	110 Chief Joseph Snake	-	-	-	-	-	-	-	-
13	Trails Building	144 Hello Road	-	-	-	-	-	-	-	-
14	Landfill	110 Rabbit Road	-	-	-	-	-	-	-	-
15	Water Plant	829 Chief Joseph Snake	-	-	-	-	-	-	-	-
16	Streetlights	N/A	-	-	-	-	-	-	-	-
17	Aazhaawe Ferry	N/A	222,634	8,611	262,253	10,144	262,255	10,144	231,484	8,954
18	Band Vehicle Fleet	N/A	11,789	456	8,070	312	9,548	369	3,005	116
19	0	0	-	-	-	-	-	-	-	-
20	0	0	-	-	-	-	-	-	-	-
Aggregate Residential			22,845	884	23,253	899	23,660	915	24,068	931
Aggregate Seasonal Residential			21,924	848	21,974	850	22,023	852	22,073	854
Aggregate Commercial			-	-	-	-	-	-	-	-

Notes:

Value for Band Vehicle Fleet and Aazhaawe Ferry calculated based on annual costs - see "GIFN CEP Estimations and Calculations"

Aggregate residential and seasonal residential consumption estimated based on survey results - see "GIFN CEP Estimations and Calculations"

Aggregate commercial consumption assumed to be negligable

GJ Calculator

			Total Energy Use (GJ)				Annual Electricity Use (GJ)				Annual Propane Use (GJ)				Annual Natural Gas Use (GJ)				Annual Fuel Oil Use (GJ)				Annual Wood Use (GJ)				Annual Gasoline Use (GJ)				Annual Diesel Use (GJ)			
Sector	Building #	Building Name	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017
Community Owned Buildings	1	Band Office	547	516	630	416	284	286	295	292	263	231	335	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	Community Centre	494	446	347	413	317	363	298	373	178	83	49	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	Public Skating Rink	343	321	113	402	343	321	113	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4	Waabgon Gamig School/Library	379	325	296	381	247	241	247	261	132	84	49	119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	Fire Hall	92	125	74	190	33	31	33	31	60	94	40	159	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	Police Station	209	175	166	108	69	59	58	54	140	117	108	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	Health Centre	217	165	188	100	63	65	67	57	154	99	121	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8	Child Care	196	133	117	156	73	68	66	69	124	65	51	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	Family Resource Building	60	54	51	56	60	54	51	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	Church	153	318	172	115	153	150	25	13	-	168	147	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	Public Works Building and Yard	191	179	162	72	105	107	86	14	86	72	76	58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12	Aazhaawe Maintenance Building	67	24	9	53	7	6	9	5	60	18	-	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13	Trails Building	46	156	72	70	44	44	44	44	2	112	28	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14	Landfill	159	96	96	131	12	62	74	61	147	34	22	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	Water Plant	299	270	254	298	296	263	254	298	3	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16	Streetlights	324	324	324	324	324	324	324	324	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17	Aazhaawe Ferry	8,611	10,144	10,144	8,954	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,611	10,144	10,144	8,954
	18	Band Vehicle Fleet	2,064	1,774	2,223	1,250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,608	1,462	1,854	1,134	456	312	369	116
	19	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Community Owned (Aggregate)			14,453	15,545	15,438	13,489	2,430	2,444	2,045	2,351	1,347	1,184	1,025	933	-	-	-	-	-	-	-	-	-	-	-	-	1,608	1,462	1,854	1,134	9,067	10,456	10,513	9,070
Residential (Aggregate)			31,382	30,210	28,816	31,737	8,036	7,272	6,514	7,521	3,199	2,486	1,565	3,017	-	-	-	-	242	188	118	228	1,128	1,152	1,170	1,188	17,893	18,213	18,533	18,852	884	899	915	931
Seasonal Residential (Aggregate)			29,231	28,614	28,222	29,793	7,179	6,636	6,273	7,527	1,246	1,152	1,089	1,306	-	-	-	-	312	288	272	327	990	990	996	996	18,656	18,699	18,741	18,784	848	850	852	854
Commerical (Aggregate)			1,221	1,177	1,111	1,257	764	721	655	801	118	118	118	118	338	338	338	338	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL			76,287	75,546	73,587	76,276	18,410	17,072	15,487	18,200	5,910	4,939	3,797	5,375	338	338	338	338	553	476	390	554	2,118	2,142	2,166	2,184	38,158	38,373	39,128	38,769	10,799	12,205	12,280	10,855

Fuel Source	Unit	Conversion Factor (GJ)
Electricity	1 kWh =	0.0036
Propane	1 L =	0.02553
Natural Gas	1 m3 =	0.0373
Heating Oil	1L =	0.03672
Wood	1 cord =	18
Gasoline	1L =	0.03466
Diesel	1 L =	0.03868

Conversion Factors
Source:
https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html

Estimation 1 - Population and Housing Estimates

Population

Total Membership (2018)	823	From GIFN GIS Department
On-reserve Population (2018)	205	From GIFN GIS Department
Seasonal On-reserve Population (2018)	1154	Assuming Ontario average of 2.6 occupants per household, Ministry of Finance. From: https://www.fin.gov.on.ca/en/economy/demographics/projections/
Total Membership Growth Rate (per year)	2.7%	Total First Nation growth of 30.8% over 10 years. From: https://www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm
On-Reserve Population Growth Rate (per year)	1.2%	On-Reserve growth of 12.8% over 10 years. From: https://www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total Membership	**739**	**759**	**780**	**801**	**823**	**845**	**868**	**892**	**916**	**941**	**967**	**993**	**1,020**	**1,048**	**1,076**
Members On-Reserve - Georgina Island	194	196	198	201	203	206	208	211	213	216	219	221	224	227	229
Members On-Reserve - Snake Island	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Members On-Reserve - Fox Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Members On-Reserve - Total	**195**	**198**	**200**	**203**	**205**	**207**	**210**	**213**	**215**	**218**	**220**	**223**	**226**	**228**	**231**
Seasonal On-Reserve - Georgina Island	424	426	429	432	434	437	439	442	445	447	450	452	455	458	460
Seasonal On-Reserve - Snake Island	595	595	595	595	595	595	595	595	595	595	595	595	595	595	595
Seasonal On-Reserve - Fox Island	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
Seasonal On-Reserve	**1,144**	**1,147**	**1,149**	**1,152**	**1,154**	**1,157**	**1,160**	**1,162**	**1,165**	**1,167**	**1,170**	**1,173**	**1,175**	**1,178**	**1,180**

*Numbers may not add due to rounding

Housing

From GIFN GIS Department

	Total Year Round Homes (2018)	Total Cottages/ Seasonal Homes (2018)
Georgina	119	167
Snake	1	229
Fox	-	48
Total	**120**	**444**

Year Round Homes Growth Rate (Georgina Island Only)	2	Estimate from GIFN GIS Department
Cottages/Seasonal Growth Rate (Georgina Island Only)	1	Estimate from GIFN GIS Department

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Year Round Homes - Georgina Island	111	113	115	117	119	121	123	125	127	129	131	133	135	137	139
Year Round Homes - Snake Island	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Year Round Homes - Fox Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year Round Homes - Total	**112**	**114**	**116**	**118**	**120**	**122**	**124**	**126**	**128**	**130**	**132**	**134**	**136**	**138**	**140**
Cottages/Seasonal Homes - Georgina Island	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177
Cottages/Seasonal Homes - Snake Island	229	229	229	229	229	229	229	229	229	229	229	229	229	229	229
Cottages/Seasonal Homes - Fox Island	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Cottages/Seasonal Homes - Total	**440**	**441**	**442**	**443**	**444**	**445**	**446**	**447**	**448**	**449**	**450**	**451**	**452**	**453**	**454**

*Numbers may not add due to rounding

Estimation 2 - Residential (Year Round) Electricity Consumption

Find Average Consumption per Customer (kWh)
From Hydro One Data (see RFN Hydro Data_Master.xlsx)

	2014	2015	2016	2017
Year Round Residential Electricity Consumption (kWh)	2,311,909	2,090,972	1,887,579	1,982,939
Average Number of Customers	116	118	121	112
Average Consumption per Customer (kWh)	**19,930**	**17,720**	**15,600**	**17,705**

* "kWh Adjusted" used

Number of houses doesn't match data provided by community. Use average consumption per customer to adjust the total consumption to the applicable number of "residential units"

	2014	2015	2016	2017
Number of Residential Units	112	114	116	118
Adjusted Consumption for Residential Sector (kWh)	**2,232,188**	**2,020,092**	**1,809,580**	**2,089,168**

Estimation 3 - Residential (Year Round) Propane Consumption

Data provided from Budget Propane. See "GIFN Propane Data.xlsx" file.
All units in litres
Annual averages exclude data with no consumption

	2014	2015	2016	2017
Residential Unit 1 (L)	3,388	2,093	978	2,182
Residential Unit 2 (L)	2,415	1,725	930	2,280
Residential Unit 3 (L)	3,551	3,667	1,923	1,463
Residential Unit 4 (L)	1,147	745	-	2,529
Residential Unit 5 (L)	3,484	2,446	-	-
Residential Unit 6 (L)	-	-	1,454	2,602
Residential Unit 7 (L)	-	-	-	3,192
Residential Unit 8 (L)	-	-	-	3,276
Average	2,797	2,135	1,321	2,503

Number of houses doesn't match data provided by community. Use average consumption per customer to adjust the total consumption to the applicable number of "residential units"
From Year Round Residential Survey, 40% of community members use propane for home heating.

	2014	2015	2016	2017
Number of Residential Units Using Propane	45	46	46	47
Adjusted Consumption for Residential Sector (L)	**125,306**	**97,365**	**61,306**	**118,162**

Estimation 4 - Residential (Year Round) Heating Oil Consumption

From Estimation 3;
using Propane = 0.02553 GJ/L (https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html); and
Assuming a propane AFUE value of 87% for both space and water heating:

	2014	2015	2016	2017
Average Residential Propane Consumption (L)	2,797	2,135	1,321	2,503
Average Useful Consumption (GJ) - (AFUE Applied)	62	47	29	56

Water heating should be taken into account. From Year Round Residential Energy Survey (Q2), we have:

	Heating Oil
Propane Percentage Use - space heating (%H)	40%
Propane Percentage Use - water heating (%W)	8%

From NRCAN: Residential Sector - Energy Use Analysis (2015)
http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=AN&sector=res&juris=00&rn=11&page=0

Percent of energy used for space heating (%AH)	72%	
Percent of energy used for water heating (%AW)	29%	*these have been normalized assuming only space and water heating applications (i.e. only these are applicable to heating oil)

Using Equations C1, C2and C3 (see Equations section below), and rearranging:

CH = A*%M/((%W*%AW/%AH)+%H)
CW = A*%M/((%H*%AH/%AW)+%W)

	2014	2015	2016	2017
Heating Oil Consumption per Household (Space Heating) - GJ	57.5	43.9	27.2	51.5
Heating Oil Consumption per Household (Water Heating) - GJ	22.9	17.5	10.8	20.5

From Year Round Residential Energy Survey (Q2)
Conversions from (https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html)
AFUE values assumed as below:

	Heating Oil
Percentage Use (space heating)	3.0%
Percentage Use (water heating)	0.0%
AFUE	80.0%
Conversion Factor (GJ/L)	0.03672

Using Equation C2 (see section below)
TW = N*%W*CW
TH = N*%H*CH

Residential Heating Oil Consumption (entire residential sector)
Note: Conversion to Litres, AFUE applied

	TW				TH				Total			
	2014	**2015**	**2016**	**2017**	**2014**	**2015**	**2016**	**2017**	**2014**	**2015**	**2016**	**2017**
Number of Residential Units	112	114	116	118	112	114	116	118	112	114	116	118
Heating Oil (GJ)	-	-	-	-	242	188	118	228	242	188	118	228
Heating Oil (L)	-	-	-	-	6,581	5,114	3,220	6,206	**6,581**	**5,114**	**3,220**	**6,206**

Estimation 5 - Residential (Year Round) Wood Consumption

From Estimation 1:

Year	**2014**	**2015**	**2016**	**2017**
Houses	112	114	116	118

% of community using wood as primary source (from Year Round Residential Energy survey - Q4) 24%
Average number of face cords/year (from Year Round Residential Energy survey - Q4) 7

Year	**2014**	**2015**	**2016**	**2017**
Annual Residential Wood Use (face cords)	**188**	**192**	**195**	**198**

Estimation 6 - Residential (Year Round) Fuel Consumption

Find Breakdown of Vehicles Types within the Community
From Survey Results (from Year Round Residential Energy survey - Q8). Boats excluded.

Vehicle Type	**# of Responses**	**% Breakdown**
Compact Car	7	8%
Mid Sized Car	18	21%
Pickup	30	35%
SUV	31	36%

Find Average Number of Vehicles per Residents
From Survey Results (see Year Round Residential Energy survey - Q8)
Assuming that if the question was skipped by residents, the residence has no vehicles

Total Number of Vehicles	86
Total Number of Participants	62
Average Number of Vehicles per Residence	1.39

Estimate total number of vehicles in the community.
Assuming average number of vehicles per residence and vehicle type breakdown remain constant over 4 year period (2014 to 2017)

	2014	2015	2016	2017
Number of Residential Units	112	114	116	118
Compact Car (number of)	13	13	13	13
Mid Sized Car (number of)	33	33	34	34
Pickup (number of)	54	55	56	57
SUV (number of)	56	57	58	59
Total number of vehicles	155	158	161	164

Find Average km Driven Annually per Person
From Survey Results (see Year Round Residential Energy survey - Q8)

km Driven Annually	Avg of Range	# of Responses	Total km Driven
0 to 19,999 km	10,000	31	310,000
20,000 to 39,999 km	30,000	19	570,000
40,000 to 59,999 km	50,000	4	200,000
60,000 km +	60,000	15	900,000
Average km Driven Annually per Person:			28,696

Find Average Fuel Consumption for various Vehicle Types
From Fuel Efficiency Dataset provided by Natural Resources Canada (see Original MY2000-2014 Fuel Consumption Ratings (2-cycle).csv). Source: http://www.nrcan.gc.ca/energy/efficiency/transportation/cars-light-trucks/buying/7487
Average Gasoline Consumption of all vehicle types included in Fuel Efficiency Dataset presented in table below.
Compact car includes both "Compact and Subcompact". Mid Sized Car includes both "Mid-Sized and Full-Sized". Pickup includes "Pickup Truck - standard" only. SUV includes "SUV" only.
Diesel consumption based on average gasoline consumption. Calculated assuming amount of energy used for each vehicle type is constant (consumption varying based on energy content of fuels).
Energy content of fuels (gasoline and diesel) from: https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html

Vehicle Type	Average Gasoline Consumption (L/100 km)	Average Diesel Consumption (L/100 km)
Compact Car	9.4	8.4
Mid Sized Car	10.4	9.3
Pickup	13.9	12.5
SUV	12.1	10.8

Fuel Type	Energy Content
Gasoline	0.03466
Diesel	0.03868

From Survey Results (see Year Round Residential Energy Survey - Q8)

Fuel Type	# of Responses	% Breakdown
Gasoline	81	95%
Diesel	4	5%

Calculate annual consumption for each fuel type:

Gasoline:

	2014	2015	2016	2017
Compact Car (L)	32,504	33,084	33,665	34,245
Mid Sized Car (L)	92,473	94,124	95,775	97,427
Pickup (L)	205,989	209,668	213,346	217,024
SUV (L)	185,292	188,600	191,909	195,218
Total fuel consumption - gasoline (L)	516,257	525,476	534,695	543,914

Diesel:

	2014	2015	2016	2017
Compact Car (L)	1,438	1,464	1,490	1,515
Mid Sized Car (L)	4,092	4,165	4,238	4,311
Pickup (L)	9,115	9,278	9,441	9,603
SUV (L)	8,199	8,346	8,492	8,638
Total fuel consumption - diesel (L)	22,845	23,253	23,660	24,068

Estimation 7 - Missing Band-Owned Electricity Consumption

Streetlights

Number of streetlights in community: 90 — from ACRS report

Average Annual Consumption for HPS Lamps: 1,000 kWh
Average Annual Consumption for LED Lights: 250 kWh

From: https://www.serdp-estcp.org/News-and-Events/In-the-Spotlight/Intelligent-and-Energy-Efficient-LED-Street-Lighting

Assuming that the number of streetlights has remained constant from 2014 to 2018
Assuming no streetlights are LED.

	Annual Consumption (kWh)
All streetlights	**90,000**

Trails Building

Assuming that Trails Building and Child Care have similar electricity/propane usage
Propane data provided for both buildings from Budget Propane. See "GIFN Propane Data.xlsx" file.

	2014	2015	2016	2017
Child Care (L)	4,838	2,540	1,999	3,415
Trails Building (L)	97	4,393	1,084	1,022
Ratio of Propane Consumption (Child Care over Trails)	49.9	0.6	1.8	3.3

Electricity data provided for Child Care building only. See GIFN Hydro Data_Master.xlsx

	2014	2015	2016	2017
Child Care (kWh)	20,151	19,005	18,322	19,029

Applying ratio of propane consumption

	2014	2015	2016	2017
Trails Building (kWh)	404	32,870	9,935	5,695

Find Average

Average Trails Building Consumption	**12,226**

Estimation 8 - Missing Band-Owned Propane Consumption

Need to estimate propane consumption of the public works garage
Use known propane consumption of several buildings (with known square footage) to estimate propane use per square meter

From ACRS reports

Band Office footprint (m2)	621.7
Community Centre footprint (m2) - includes admin office	741.3
Firehall footprint (m2)	206.6

Data provided from Budget Propane. See "GIFN Propane Data.xlsx" file.

	2014	2015	2016	2017
Band Office Consumption (L)	10,287	9,038	13,140	4,876
Community Centre Consumption (L)	6,955	3,241	1,904	1,568
Firehall Consumption (L)	2,333	3,672	1,581	6,233
Average Consumption (L per m2)	29.7	24.8	26.3	20.0

Also from ACRS report, have the footprint of the public works garage to be: 113.5 m2
Applying this footprint to the average consumption above, get:

	2014	2015	2016	2017
Public Works Garage Consumption (L)	**3,370**	**2,819**	**2,980**	**2,272**

Estimation 9 - Band Owned Fuel Consumption

	2014	2015	2016	2017
Gasoline Prices (dollars per litre) - includes exemption	1.12	0.90	0.84	0.98
Diesel Prices (dollars per litre)	1.31	1.08	0.94	1.07

Source: Ontario.ca (https://www.ontario.ca/data/fuels-price-survey-information)
Use Southern Ontario Average
Tax exempt reduces by 14.7 cents/Litre (https://www.fin.gov.on.ca/en/engagement/index.html)

The following values have been provided by GIFN:

	2014	2015	2016	2017
Public Works	$ 26,209.70	$ 13,603.09	$ 14,184.18	$ 3,540.77
Gas charged to Band at Virginia Beach Marina	$ 36,413.58	$ 28,396.70	$ 31,598.55	$ 31,574.87
All Transportation (minus Ferry)	$ 4,814.10	$ 4,667.06	$ 8,255.60	$ -
Ferry	$ 291,205.02	$ 283,233.42	$ 245,733.28	$ 248,150.58
Total	$ 358,642.40	$ 329,900.27	$ 299,771.61	$ 283,266.22

*NOTE: Values for "All Transportation" and "Ferry" were both provided. "All Transportation" included the consumption of the "Ferry". Original "All Transportation" values are shown below:

All Transportation	$ 296,019.12	$ 287,900.48	$ 253,988.88	$ 248,150.58

Assuming the following:

	%Gasoline	%Diesel	
Public Works	50%	50%	*Assumption - public works vehicles have a higher percentage of diesel vehicles
Gas charged to Band at Virginia Beach Marina	95%	5%	* From Estimation 6
All Transportation (minus Ferry)	95%	5%	* From Estimation 6
Ferry	0%	100%	* Ferry uses diesel

Energy content of fuels (gasoline and diesel) from: https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html

Fuel Type	Energy Content (GJ/L)
Gasoline	0.03466
Diesel	0.03868

Using Equation set F2 (see Equations section below):

Etot = Eg + Ed

know from Equation F3, Etot = Eg/Pg, so:

Eg/Pg = Eg + Ed

also know from Equation set F2, Eg = VgECg and Ed = VdECd, so:
substituting and rearranging

Vd = (Vg/ECd)((ECg/Pg)-ECg), *equation A*

Similarly:

Vg = (Vd/ECg)((ECd/Pd)-ECd), *equation B*

now, substitute equation A into equation F1, and rearrange:

Vg = Ctot/((Cd/ECd)((ECg/Pg)-ECg)+Cg), *equation C*

Use equation C to calculate gasoline consumption each year
Note: Ferry gasoline consumption known to be 0.

	2014	2015	2016	2017
Public Works (L)	11,430	7,283	8,430	1,829
Gas charged to Band at Virginia Beach Marina (L)	30,888	29,961	35,726	30,882
All Transportation (minus Ferry) (L)	4,084	4,924	9,334	-
Ferry (L)	-	-	-	-
Total Gasoline (L)	**46,402**	**42,168**	**53,490**	**32,711**

Use equation A to find diesel consumption (knowing VG from the table above:
Note: use Vd = Ctot/Cd for Ferry (the 0% causes an error in equation A, but all consumption of ferry is diesel)

	2014	2015	2016	2017
Public Works (L)	10,242	6,526	7,554	1,639
Gas charged to Band at Virginia Beach Marina (L)	1,367	1,326	1,581	1,367
All Transportation (minus Ferry) (L)	181	218	413	-
Ferry (L)	222,634	262,253	262,255	231,484
Total Diesel (L)	**234,423**	**270,323**	**271,803**	**234,489**

Estimation 10 - Seasonal Residential Electricity Consumption

Calculate average monthly consumption of seasonal residences per year (See RFN Hydro Data_Master.xlsx)

	2014	2015	2016	2017
Average Monthly Consumption (kWh)	1,259	1,161	1,095	1,311

From Seasonal Residence Energy Survey (Q3), assume that the average time seasonal residences reside at cottages is: 30%

From Estimation 1, we have the anticipated number of seasonal residences
Using: Average Annual Consumption = Average Monthly Consumption * (12 months * % time at seasonal residence) * number of seasonal residences

	2014	2015	2016	2017
Seasonal Residences	440	441	442	443
Average Annual Consumption (kWh)	**1,994,256**	**1,843,204**	**1,742,364**	**2,090,783**

Estimation 11 - Seasonal Residential Propane and Heating Oil Consumption

Need to find "average" energy consumption per seasonal residence based on electricity consumption.

Start with data from Estimation 10. We have the monthly electricity consumption for the seasonal residential sector for 2014, 2015, 2016 and 2017. Multiply this by 12 to get annual consumption.

From: https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html
Converting to gigajoules, knowing that 1GJ = 277.8 kWh

	2014		2015		2016		2017	
	kWh	GJ	kWh	GJ	kWh	GJ	kWh	GJ
Average Household Electricity Consumption (annual)	15,108	54	13,932	50	13,140	47	15,732	57

For now, assume that all seasonal residential units heat, and that each is occupied year round (**this will be corrected towards the end of the estimation**)

	2014		2015		2016		2017	
	kWh	GJ	kWh	GJ	kWh	GJ	kWh	GJ
Seasonal Residents		440		441		442		443
Average Electricity Consumption (assuming all residents heat)	6,647,520	23,929	6,144,012	22,117	5,807,880	20,907	6,969,276	25,087

Next, find the total amount of energy (in GJ) used in homes that heat in the Seasonal Residential Sector (The total in the table above is for electricity use only).
Need to consider that not all residents heat with electricy. From Seasonal Residence Energy Survey Q5, we have:

	Electric
% of residents that heat space with electricity (%H):	44%
% of residents that heat water with electricity (%W):	93%

*% space heating adjusted to remove responses of "other"

From NRCAN: Residential Sector - Energy Use Analysis (2015)
http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=AN&sector=res&juris=00&rn=11&page=0

Household Consumption for Water Heating (%AW) 24% *Do not normalize (electricity has multiple applications)
Household Consumption for Space Heating (%AH) 61%

Using Equations C1, C2 and C3, and rearranging:
CW = A*%M/((%H*%AH/%AW)+%W)
CH = A*%M/((%W*%AW/%AH)+%H)

	2014	2015	2016	2017
Seasonal Residential Consumption (Water Heating - CW) assuming residents reside year round and all heat - GJ	11,756	10,866	10,271	12,325
Seasonal Residential Consumption (Space Heating - CH) assuming residents reside year round and all heat - GJ	29,536	27,299	25,805	30,966

Next, adjust the data in the table above to include only residents that heat with general occupancy rates (identified from survey)

From Seasonal Residence Energy Survey, Q2
The percentage of cottagers that use their GIFN seasonal residence as their:

Primary residence during warm weather months only = 19%
Occasional residence during warm weather months only = 38%
Occasional residence year round = 44%

Assuming that heating load for seasonal residences during summer months is negligable. The percentage of residents that are present during the heating season is: 44%
From Seasonal Residence Energy Survey (Q3), assume that the average time seasonal residences reside at cottages is: 30%

Using: Seasonal Residential Consumption (residents that heat only) = Seasonal Residential Consumption (assuming year round and all heat) * % residents present during heating season * % time spent at residence

	2014	2015	2016	2017
Seasonal Residential Consumption (Water Heating - CW) residents that heat only - GJ	1,552	1,434	1,356	1,627
Seasonal Residential Consumption (Space Heating - CH) residents that heat only - GJ	3,899	3,603	3,406	4,087

Next, estimate propane and heating oil consumption based off the results in the table above

From: https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html
Converting to gigajoules, knowing that 1GJ = 39.2L (propane) and 1GJ = 27.2L (heating oil)

From Seasonal Residence Energy Survey (Q5), we have:

	Propane	Heating Oil
% of residents that heat space with (%H):	25%	6%
% of residents that heat water with (%W):	7%	0%

*% space heating adjusted to remove responses of "other"

Using Equation C2 (see below), and known CW and CH values from above:

TW = N*%W*CW
TH = N*%H*CH
Total = TW + TH = %W*CW + %H*CH

Note - AFUE value for Propane and Heating Oil applied below:

Propane AFUE	87%
Heating Oil AFUE	80%

From: https://en.wikipedia.org/wiki/Annual_fuel_utilization_efficiency
The AFUE value for electricity was assumed to be 100%.

	Total Consumption							
	2014		2015		2016		2017	
	L	GJ	L	GJ	L	GJ	L	GJ
Propane	**48,812**	1,245	**45,115**	1,151	**42,646**	1,088	**51,174**	1,305
Heating Oil	**8,484**	312	**7,841**	288	**7,412**	273	**8,894**	327

Estimation 12 - Seasonal Residential Wood Consumption

From Estimation 1: number of houses in community:

Year	2014	2015	2016	2016
Seasonal Residences	440	441	442	443

% of community using wood (from Seasonal Residence Energy Survey - Q8)	25%
Average number of cords/year (from Seasonal Residence Energy Survey - Q8)	1.5

Year	2014	2015	2016	2017
Annual Seasonal Residential Wood Use (face cords)	**165**	**165**	**166**	**166**

Estimation 13 - Seasonal Residential Fuel Consumption

Find Breakdown of Vehicles Types within the Community
From Survey Results (from Seasonal Residence Energy survey - Q9). Boats excluded.

Vehicle Type	# of Responses	% Breakdown
Compact Car	5	23%
Mid Sized Car	4	18%
Pickup	3	14%
SUV	10	45%

Find Average Number of Vehicles per Residents
From Survey Results (see Seasonal Residence Energy survey - Q9)
Assuming that if the question was skipped by residents, the residence has no vehicles

Total Number of Vehicles	22
Total Number of Participants	16
Average Number of Vehicles per Residence	1.38

Estimate total number of vehicles in the community.
Assuming average number of vehicles per residence and vehicle type breakdown remain constant over 4 year period (2014 to 2017)

	2014	2015	2016	2017
Number of Residential Units	440	441	442	443
Compact Car (number of)	138	138	138	138
Mid Sized Car (number of)	110	110	111	111
Pickup (number of)	83	83	83	83
SUV (number of)	275	276	276	277
Total number of vehicles	605	606	608	609

Find Average km Driven Annually per Person
From Survey Results (see Seasonal Residence Energy survey - Q9)

km Driven Annually	Avg of Range	# of Responses	Total km Driven
0 to 19,999 km	10,000	8	80,000
20,000 to 39,999 km	30,000	9	270,000
40,000 to 59,999 km	50,000	2	100,000
60,000 km +	60,000	2	120,000
Average km Driven Annually per Person:			27,143

Find Average Fuel Consumption for various Vehicle Types
From Fuel Efficiency Dataset provided by Natural Resources Canada (see Original MY2000-2014 Fuel Consumption Ratings (2-cycle).csv). Source: http://www.nrcan.gc.ca/energy/efficiency/transportation/cars-light-trucks/buying/7487
Average Gasoline Consumption of all vehicle types included in Fuel Efficiency Dataset presented in table below.
Compact car includes both "Compact and Subcompact". Mid Sized Car includes both "Mid-Sized and Full-Sized". Pickup includes "Pickup Truck - standard" only. SUV includes "SUV" only.
Diesel consumption based on average gasoline consumption. Calculated assuming amount of energy used for each vehicle type is constant (consumption varying based on energy content of fuels).
Energy content of fuels (gasoline and diesel) from: https://www.neb-one.gc.ca/nrg/tl/cnvrsntbl/cnvrsntbl-eng.html

Vehicle Type	Average Gasoline Consumption (L/100 km)	Average Diesel Consumption (L/100 km)
Compact Car	9.4	8.4
Mid Sized Car	10.4	9.3
Pickup	13.9	12.5
SUV	12.1	10.8

Fuel Type	Energy Content
Gasoline	0.03466
Diesel	0.03868

From Survey Results (see Year Round Residential Energy Survey - Q8)

Fuel Type	# of Responses	% Breakdown
Gasoline	22	96%
Diesel	1	4%

Calculate annual consumption for each fuel type:

Gasoline:

	2014	2015	2016	2017
Compact Car (L)	335,568	336,331	337,094	337,856
Mid Sized Car (L)	297,014	297,689	298,364	299,039
Pickup (L)	297,728	298,404	299,081	299,758
SUV (L)	863,910	865,873	867,837	869,800
Total fuel consumption - gasoline (L)	1,794,220	1,798,297	1,802,375	1,806,453

Diesel:

	2014	2015	2016	2017
Compact Car (L)	13,668	13,699	13,730	13,761
Mid Sized Car (L)	12,098	12,125	12,152	12,180
Pickup (L)	12,127	12,154	12,182	12,209
SUV (L)	35,187	35,267	35,347	35,427
Total fuel consumption - diesel (L)	73,079	73,245	73,412	73,578

Apply the percentage of time cottagers reside within GIFN
From Seasonal Residence Energy Survey - Q3 30%

	2014	2015	2016	2017
Gasoline Consumption (L)	**538,266**	**539,489**	**540,713**	**541,936**
Diesel Consumption (L)	**21,924**	**21,974**	**22,023**	**22,073**

Estimation 14 - Commercial Natural Gas Consumption

Commercial Operations Identified include:

Island View Business Centre
Eagles Nest
Virginia Beach Marina
Georgina Island Marina
Island Grove Marina
East Point Marina

Assume that Marina's and Eagles nest are mainly seasonal, so propane/natural gas use is negligable.
Only focus on propane/natural gas consumption at Island View Business Centre

Start with Natural Gas use
Consumption Data provided by IV Business Centre (see Island View BC - Natural Gas Consumption)
All values in m3

	IVBC	Holder Law	Tobacco Trails
March 17/17 - April 17/17	66	62	83
April 18/17 - May 16/17	82	59	35
May 17/17 - June 15/17	10	9	12
May 17/17 - July 17/17	0	4	0
July 18/17 - August 17/17	0	0	0
August 18/17- September 18/17	2	0	0
September 19/17 - October 17/17	11	11	15
October 18/17 - November 15/17	26	18	38
November 16/17 - December 14/17	71	98	138
December 15/17 - January 16/18	146	122	250
January 17/18 - February14/18	94	121	183
February 15/18 - March 15/18	38	77	84
Total	546	581	838

Will assume the totals in the table above represent the average annual consumption.
From communication with IV Business Centre, the values above represent only about 1300 sq ft of 6000 sq ft

Percentage of total IV Business Centre Space: 22%

Annual IV Business Centre Consumption: **9,069** m3

Estimation 15 - Commercial Propane Consumption

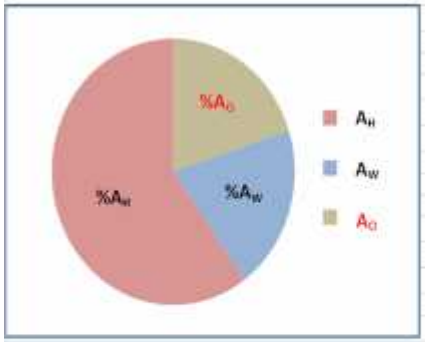
As with Estimation 14, assume that only the IV Business Centre has non-negligable commercial propane consumption.

Consumption Data provided by IV Business Centre (see Island View BC - Propane Consumption)
Only two buildings at IV Business Centre use propane

Front Shop - Annual Propane Consumption (L)	2,629
Back Shop - Annual Propane Consumption (L)	1,989
Total - Annual Propane Consumption (L)	**4,618**

Applicable Equations

Start with the energy average consumption of the entire residential sector as an aggregate (irregardless of fuel type), shown in the figure below.



$A = A_H + A_W + A_O$ ***Equation 1***

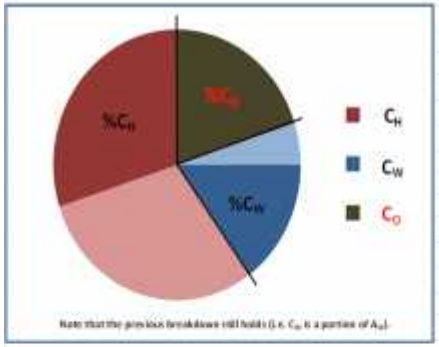
Where: A is the average consumption of the entire residential sector (in GJ)
A_H is the average consumption of the entire residential sector associated with space heating (in GJ)
A_W is the average consumption of the entire residential sector associated with water heating (in GJ)
A_O is the average consumption of the entire residential sector for "other" applications that aren't space or water heating (in GJ). This will only ever be electricity.

Based on this breakdown, the following equations are also applicable.

$A_H = \%A_H * A$ ***Equation 2***
$A_W = \%A_W * A$ ***Equation 3***
$A_O = [1 - (\%A_W + \%A_H)] * A$ ***Equation 4***

Where: $\%A_H$, $\%A_W$, and $\%A_O$ are the "normalized" percentages that space heating, water heating, and "other" applications are of residential consumption (A), respectively.
Average canadian values for $\%A_H$, $\%A_W$, and $\%A_O$ are provided by NRCAN.
Please note the values for $\%A_H$, $\%A_W$, and $\%A_O$ need to be "normalized" between applicable household uses.
Exclude A_O for all energy types except electricity. The equation will yeild a value for A that does not include A_O for all energy types except electricity.
Care must be taken to ensure that the correct value for A is used. This is typically not calculated. The equation will always yield correct values for A_H and A_W.

Next, look at energy consumption for a specific energy type within the residential sector.



Note that the previous breakdown still holds (i.e. C_O is a portion of A_O).

$C = C_H + C_W + C_O$ ***Equation 5***

Where: C is the average consumption of a specific energy type within residential sector (in GJ)
C_H is the average consumption of a specific energy type within the residential sector associated with space heating (in GJ)
C_W is the average consumption of a specific energy type within the residential sector associated with water heating (in GJ)
C_O is the average consumption of a specific energy type in the residential sector for "other" applications that aren't space or water heating (in GJ). Only electricity.

Based on this breakdown, the following equations are also applicable.

$C_H = \%C_H * A_H$ ***Equation 6***
$C_W = \%C_W * A_W$ ***Equation 7***
$C_O = A_O$ ***Equation 8***

Where: $\%C_H$ and $\%C_W$ are the percentage of residential units that heat space and water with the specific energy type. Values are typically gathered from survey results.
Again, care must be taken with respect to the use of C_O within the calculation for C. C_O is only ever applicable to electricity.

Substitute Equation 2 into Equation 6: $C_H = \%C_H * \%A_H * A$ ***Equation 9***
Substitute Equation 3 into Equation 7: $C_W = \%C_W * \%A_W * A$ ***Equation 10***
Substitute Equation 4 into Equation 8: $C_O = [1 - (\%A_W + \%A_H)] * A$ ***Equation 11***

Substitute Equations 9, 10 and 11 into Equation 5 and rearrange: $A = C/[(\%C_H * \%A_H * A) + (\%C_W * \%A_W * A) + ([1 - (\%A_W + \%A_H)] * A)]$ ***Equation 12***

Substitute Equation 12 into Equation 2: $A_H = (\%A_H * C)/[(\%C_H * \%A_H * A) + (\%C_W * \%A_W * A) + ([1 - (\%A_W + \%A_H)] * A)]$ ***Equation 13***
Substitute Equation 12 into Equation 3: $A_W = (\%A_W * C)/[(\%C_H * \%A_H * A) + (\%C_W * \%A_W * A) + ([1 - (\%A_W + \%A_H)] * A)]$ ***Equation 14***

Again, care needs to be taken with regards to "other" consumption when using these calculations (especially Equation 12). Equation 13 and 14 will always yeild correct answers (as long as "normalized" $\%A_H$ and $\%A_W$ are used.
Equations 13 and 14 provide aggregate consumption values for the entire community. Substitute A_H and A_W back into Equation 6 and 7 to find C_H and C_W.
Please note that the equations above do not include AFUE conversion factors. The equations above are based on "useful" energy, and AFUE values should be applied as required when working with the equations.

Residential Growth

Residential Energy Consumption per Energy Type

	2014	2015	2016	2017
Electricity Consumption (GJ)	8,036	7,272	6,515	7,521
Propane Consumption (GJ)	3,199	2,486	1,565	3,017
Natural Gas Consumption (GJ)	-	-	-	-
Heating Oil Consumption (GJ)	242	188	118	228
Wood Consumption (GJ)	1,128	1,152	1,170	1,188
Gasoline (GJ)	17,894	18,213	18,533	18,852
Diesel (GJ)	884	899	915	931
Total	**31,382**	**30,210**	**28,816**	**31,737**

Electricity Consumption Breakdown and Normalization

In this calculation, variations in annual temperature will be adjusted using HDDs.
HDD variations will only affect space heating applications. Two major assumptions will be made:
Electricity Consumption will consist of "space heating" consumption and "other" consumption
Propane, Natural Gas, Heating Oil and Wood consumption will be assumed to be used 100% for space heating

Note: these assumptions neglect appliance and water heating consumption for other energy types.
However, since appliance and water heating consumption make up a small portion of the overall energy consumption, overall accuracy will be minimally affected.

Known HDD Statistics (HDD from Udora Station http://climate.weather.gc.ca/historical_data/search_historic_data_e.html):

	2014	2015	2016	2017
Heating Degree Days	4,255	4,020	3,898	3,959
Average HDD for past 4 years:	**4,033**			

Estimate breakdown for electricity consumption

From NRCAN, space heating represents 60.7% of average household consumption.
http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=AN&sector=res&juris=00&rn=12&page=0
From Year Round Residential Energy Survey (Q2), about 52% of residents use electric space heating.

So:
Electricity Consumption - Space Heating = 60.7% * 52% * Electricity Consumption
Electricity Consumption - Other = (100% - (60.7% * 52%)) * Electricity Consumption

	2014	2015	2016	2017
Electricity Consumption - Space Heating (GJ)	2,536	2,295	2,056	2,374
Electricity Consumption - Other (GJ)	5,499	4,977	4,458	5,147

HDD Normalization = Consumption/HDD(year) * HDD average
Again, HDD normalization will only affect space heating (denoted in table below with *)

	2014	2015	2016	2017	Average
Electricity Consumption - Space Heating (GJ)*	2,404	2,303	2,127	2,418	2,313
Electricity Consumption - Other (GJ)	5,499	4,977	4,458	5,147	5,020
Propane Consumption (GJ)*	3,032	2,494	1,619	3,073	2,555
Natural Gas Consumption (GJ)*	-	-	-	-	-
Heating Oil Consumption (GJ)*	229	188	122	232	193
Wood Consumption (GJ)*	1,069	1,156	1,210	1,210	1,161
Gasoline (GJ)	17,894	18,213	18,533	18,852	18,373
Diesel (GJ)	884	899	915	931	907
Total	**31,011**	**30,230**	**28,985**	**31,864**	**30,523**

Residential Growth (Cont.)

Consumption per Household

Knowing housing and population statistics:

	2014	2015	2016	2017
Number of Residences	112	114	116	118
Population	195	198	200	203
Population per Household	1.74	1.73	1.73	1.72
Average Population per Household	**1.73**			

Finding average consumption per household:

	2014	2015	2016	2017	Average
Electricity Consumption - Space Heating (GJ)*	21.5	20.2	18.3	20.5	20.1
Electricity Consumption - Other (GJ)	49.1	43.7	38.4	43.6	43.7
Propane Consumption (GJ)*	27.1	21.9	14.0	26.0	22.2
Natural Gas Consumption (GJ)*	-	-	-	-	-
Heating Oil Consumption (GJ)*	2.0	1.7	1.1	2.0	1.7
Wood Consumption (GJ)*	9.5	10.1	10.4	10.3	10.1
Gasoline (GJ)	159.8	159.8	159.8	159.8	159.8
Diesel (GJ)	7.9	7.9	7.9	7.9	7.9
Total	**276.9**	**265.2**	**249.9**	**270.0**	**265.5**

Assuming that residential energy consumption (per household) will remain constant over the next 10 years - Business as usual Scenario

Residential Consumption Growth Factor (per household 0.0%

The calculation below assumes growth within both community population and housing.
Population grows faster than housing, as such, the population density per household will increase over time.
Assume that energy used for space heating is proportional to number of houses: Electricity - Space Heating, Propane, Natural Gas, Heating Oil, Wood
Assume that energy used for other purposes is proportional to the number of residents per household: Electricity - Other, Gasoline, Diesel
Note: Cooling was included in "Other" - only 1% of electricity, so effect on will be negligable

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Number of Households	120	122	124	126	128	130	132	134	136	138	140
Population	205	207	210	213	215	218	220	223	226	228	231
Housing Density Growth	0.98	0.98	0.98	0.97	0.97	0.97	0.96	0.96	0.96	0.95	0.95
Electricity Consumption - Space Heating (GJ)*	2,415	2,455	2,496	2,536	2,576	2,616	2,657	2,697	2,737	2,777	2,818
Electricity Consumption - Other (GJ)	5,165	5,227	5,291	5,355	5,419	5,485	5,551	5,619	5,687	5,755	5,820
Propane Consumption (GJ)*	2,669	2,713	2,757	2,802	2,846	2,891	2,935	2,980	3,024	3,069	3,113
Natural Gas Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Heating Oil Consumption (GJ)*	202	205	208	212	215	218	222	225	228	232	235
Wood Consumption (GJ)*	1,211	1,231	1,252	1,272	1,292	1,312	1,332	1,353	1,373	1,393	1,413
Gasoline (GJ)	18,881	19,110	19,341	19,575	19,812	20,051	20,294	20,540	20,788	21,040	21,276
Diesel (GJ)	932	944	955	967	978	990	1,002	1,014	1,027	1,039	1,051
Total Residential Sector Energy Use	**31,475**	**31,885**	**32,299**	**32,717**	**33,139**	**33,564**	**33,994**	**34,427**	**34,864**	**35,305**	**35,725**

Seasonal Residential Growth

Seasonal Residential Energy Consumption per Energy Type

	2014	2015	2016	2017
Electricity Consumption (GJ)	7,179	6,636	6,273	7,527
Propane Consumption (GJ)	1,246	1,152	1,089	1,306
Natural Gas Consumption (GJ)	-	-	-	-
Heating Oil Consumption (GJ)	312	288	272	327
Wood Consumption (GJ)	990	990	996	996
Gasoline (GJ)	18,656	18,699	18,741	18,784
Diesel (GJ)	848	850	852	854
Total	**29,231**	**28,614**	**28,222**	**29,793**

Electricity Consumption Breakdown and Normalization

In this calculation, variations in annual temperature will be adjusted using HDDs.
HDD variations will only affect space heating applications. Two major assumptions will be made:
Electricity Consumption will consist of "space heating" consumption and "other" consumption
Propane, Natural Gas, Heating Oil and Wood consumption will be assumed to be used 100% for space heating

Note: these assumptions neglect appliance and water heating consumption for other energy types.
However, since appliance and water heating consumption make up a small portion of the overall energy consumption, overall accuracy will be minimally affected.

Known HDD Statistics (HDD from Udora Station http://climate.weather.gc.ca/historical_data/search_historic_data_e.html):

	2014	2015	2016	2017
Heating Degree Days	4,255	4,020	3,898	3,959
Average HDD for past 4 years:	**4,033**			

Estimate breakdown for electricity consumption

From NRCAN, space heating represents 60.7% of average household consumption.
http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=AN&sector=res&juris=00&rn=12&page=0
However, from Seasonal Residence Energy Survey (Q2), only 44% of residents visit during months when significant heating is required (assume heating during warm weather months is insigificant)
So, 60.7% * 44% = 26.7%
From Seasonal Residence Energy Survey (Q5), about 44% of residents use electric space heating

So:
Electricity Consumption - Space Heating = 26.7% * 44% * Electricity Consumption
Electricity Consumption - Other = (100% - (26.7% * 44%)) * Electricity Consumption

	2014	2015	2016	2017
Electricity Consumption - Space Heating (GJ)	843	780	737	884
Electricity Consumption - Other (GJ)	6,336	5,856	5,536	6,643

HDD Normalization = Consumption/HDD(year) * HDD average
Again, HDD normalization will only affect space heating (denoted in table below with *)

	2014	2015	2016	2017	Average
Electricity Consumption - Space Heating (GJ)*	799	782	762	901	811
Electricity Consumption - Other (GJ)	6,336	5,856	5,536	6,643	6,092
Propane Consumption (GJ)*	1,181	1,156	1,126	1,331	1,199
Natural Gas Consumption (GJ)*	-	-	-	-	-
Heating Oil Consumption (GJ)*	295	289	282	333	300
Wood Consumption (GJ)*	938	993	1,030	1,015	994
Gasoline (GJ)	18,656	18,699	18,741	18,784	18,720
Diesel (GJ)	848	850	852	854	851
Total	**29,054**	**28,624**	**28,329**	**29,859**	**28,967**

Seasonal Residential Growth (Cont.)

Consumption per Household

Knowing housing and population statistics:

	2014	2015	2016	2017
Number of Residences	440	441	442	443
Population	1144	1147	1149	1152
Population per Household	2.60	2.60	2.60	2.60
Average Population per Household	**2.60**			

Finding average consumption per household:

	2014	2015	2016	2017	Average
Electricity Consumption - Space Heating (GJ)*	1.8	1.8	1.7	2.0	1.8
Electricity Consumption - Other (GJ)	14.4	13.3	12.5	15.0	13.8
Propane Consumption (GJ)*	2.7	2.6	2.5	3.0	2.7
Natural Gas Consumption (GJ)*	-	-	-	-	-
Heating Oil Consumption (GJ)*	0.7	0.7	0.6	0.8	0.7
Wood Consumption (GJ)*	2.1	2.3	2.3	2.3	2.3
Gasoline (GJ)	42.4	42.4	42.4	42.4	42.4
Diesel (GJ)	1.9	1.9	1.9	1.9	1.9
Total	**66.0**	**64.9**	**64.1**	**67.4**	**65.6**

Assuming that seasonal residential energy consumption (per household) will remain constant over the next 10 years - Business as usual Scenario

Seasonal Residential Consumption Growth Factor (per 0.0%

The calculation below assumes growth within both community population and housing.
Population grows faster than housing, as such, the population density per household will increase over time.
Assume that energy used for space heating is proportional to number of houses: Electricity - Space Heating, Propane, Natural Gas, Heating Oil, Wood
Assume that energy used for other purposes is proportional to the number of residents per household: Electricity - Other, Gasoline, Diesel
Note: Cooling was included in "Other" - only 1% of electricity, so effect on will be negligable

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Number of Households	444	445	446	447	448	449	450	451	452	453	454
Population	1,154	1,157	1,160	1,162	1,165	1,167	1,170	1,173	1,175	1,178	1,180
Housing Density Growth	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Electricity Consumption - Space Heating (GJ)*	816	818	819	821	823	825	827	829	830	832	834
Electricity Consumption - Other (GJ)	6,127	6,141	6,154	6,168	6,182	6,196	6,210	6,223	6,237	6,251	6,263
Propane Consumption (GJ)*	1,205	1,208	1,211	1,213	1,216	1,219	1,221	1,224	1,227	1,230	1,232
Natural Gas Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Heating Oil Consumption (GJ)*	301	302	303	303	304	305	305	306	307	307	308
Wood Consumption (GJ)*	1,000	1,002	1,004	1,006	1,009	1,011	1,013	1,015	1,018	1,020	1,022
Gasoline (GJ)	18,826	18,868	18,911	18,953	18,996	19,038	19,080	19,123	19,165	19,208	19,243
Diesel (GJ)	856	858	860	862	863	865	867	869	871	873	875
Total Seasonal Residential Sector Energy Use	**29,130**	**29,196**	**29,262**	**29,327**	**29,393**	**29,458**	**29,524**	**29,590**	**29,655**	**29,721**	**29,778**

Band Owned Growth

	2014	2015	2016	2017
Electricity Consumption (GJ)	2,430	2,444	2,045	2,351
Propane Consumption (GJ)	1,347	1,184	1,025	934
Natural Gas Consumption (GJ)	-	-	-	-
Heating Oil Consumption (GJ)	-	-	-	-
Wood Consumption (GJ)	-	-	-	-
Gasoline (GJ)	1,608	1,462	1,854	1,134
Diesel (GJ)	9,068	10,456	10,513	9,070
Total	**14,453**	**15,545**	**15,438**	**13,489**

Electricity Consumption Breakdown and Normalization

Known HDD Statistics (HDD from Udora Station http://climate.weather.gc.ca/historical_data/search_historic_data_e.html):

	2014	2015	2016	2017
Heating Degree Days	4,255	4,020	3,898	3,959
Average HDD for past 4 years:	**4,033**			

Based on building inventory, electric heating within the band-owned sector is negligable.
Limited information for water heating - contribution of water heating on total consumption won't be included in this calcualtion.
As a result, it will be assumed that HDDs will only affect Propane (denoted on table below with *)
HDD Normalization = Consumption/HDD(year) * HDD average

	2014	2015	2016	2017	Average
Electricity Consumption (GJ)	2,430	2,444	2,045	2,351	2,318
Propane Consumption (GJ)*	1,277	1,188	1,061	951	1,119
Natural Gas Consumption (GJ)*	-	-	-	-	-
Heating Oil Consumption (GJ)*	-	-	-	-	-
Wood Consumption (GJ)*	-	-	-	-	-
Gasoline (GJ)	1,608	1,462	1,854	1,134	1,514
Diesel (GJ)	9,068	10,456	10,513	9,070	9,777
Total Consumption	**14,383**	**15,549**	**15,473**	**13,506**	**14,728**

Consumption for Band Owned Sector

Band Owned Consumption Growth Factor 0.0%

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Sector Growth	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1
Electricity Consumption (GJ)	2,334	2,350	2,367	2,383	2,400	2,417	2,433	2,451	2,468	2,485	2,502
Propane Consumption (GJ)*	1,127	1,135	1,143	1,151	1,159	1,167	1,175	1,183	1,192	1,200	1,208
Natural Gas Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Heating Oil Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Wood Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Gasoline (GJ)	1,525	1,536	1,546	1,557	1,568	1,579	1,590	1,601	1,613	1,624	1,635
Diesel (GJ)	9,845	9,914	9,983	10,053	10,124	10,195	10,266	10,338	10,410	10,483	10,556
Total Band Owned Sector Energy Use	**14,831**	**14,935**	**15,039**	**15,144**	**15,250**	**15,357**	**15,465**	**15,573**	**15,682**	**15,792**	**15,902**

Note: Number of buildings includes a 0.7% annual growth as predicted by the NEB - affecting growth of the sector as a whole

Commercial Growth

	2014	2015	2016	2017
Electricity Consumption (GJ)	764	721	655	801
Propane Consumption (GJ)	118	118	118	118
Natural Gas Consumption (GJ)	-	-	338	338
Heating Oil Consumption (GJ)	-	-	-	-
Wood Consumption (GJ)	-	-	-	-
Gasoline (GJ)	-	-	-	-
Diesel (GJ)	-	-	-	-
Total	**882**	**839**	**1,111**	**1,257**

Electricity Consumption Breakdown and Normalization

Known HDD Statistics (HDD from Udora Station http://climate.weather.gc.ca/historical_data/search_historic_data_e.html):

	2014	2015	2016	2017
Heating Degree Days	4,255	4,020	3,898	3,959
Average HDD for past 4 years:	**4,033**			

Electric heating within the commercial sector is considered negligable.
Limited information for water heating - contribution of water heating on total consumption won't be included in this calcualtion.
As a result, it will be assumed that HDDs will only affect Propane and Natural Gas use (denoted on table below with *)
HDD Normalization = Consumption/HDD(year) * HDD average

	2014	2015	2016	2017	Average
Electricity Consumption (GJ)	764	721	655	801	735
Propane Consumption (GJ)*	112	118	122	120	118
Natural Gas Consumption (GJ)*	-	-	350	345	174
Heating Oil Consumption (GJ)*	-	-	-	-	-
Wood Consumption (GJ)*	-	-	-	-	-
Gasoline (GJ)	-	-	-	-	-
Diesel (GJ)	-	-	-	-	-
Total Consumption	**876**	**839**	**1,127**	**1,266**	**1,027**

Consumption for Commercial Sector

Commercial Consumption Growth Factor 0.0%

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Sector Growth	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1
Electricity Consumption (GJ)	740	746	751	756	761	767	772	778	783	788	794
Propane Consumption (GJ)*	119	120	121	121	122	123	124	125	126	127	127
Natural Gas Consumption (GJ)*	175	176	177	179	180	181	182	184	185	186	188
Heating Oil Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Wood Consumption (GJ)*	-	-	-	-	-	-	-	-	-	-	-
Gasoline (GJ)	-	-	-	-	-	-	-	-	-	-	-
Diesel (GJ)	-	-	-	-	-	-	-	-	-	-	-
Total Commercial Sector Energy Use	**1,034**	**1,041**	**1,049**	**1,056**	**1,063**	**1,071**	**1,078**	**1,086**	**1,094**	**1,101**	**1,109**

Note: Number of buildings includes a 0.7% annual growth as predicted by the NEB - affecting growth of the sector as a whole

Growth Summary

Breakdown by Sector

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Residential	31,382	30,210	28,816	31,737	31,475	31,885	32,299	32,717	33,139	33,564	33,994	34,427	34,864	35,305	35,725
Seasonal Residential	29,231	28,614	28,222	29,793	29,130	29,196	29,262	29,327	29,393	29,458	29,524	29,590	29,655	29,721	29,778
Band Owned	14,453	15,545	15,438	13,489	14,831	14,935	15,039	15,144	15,250	15,357	15,465	15,573	15,682	15,792	15,902
Commercial	882	839	1,111	1,257	1,034	1,041	1,049	1,056	1,063	1,071	1,078	1,086	1,094	1,101	1,109
Total	75,948	75,208	73,587	76,276	76,470	77,057	77,649	78,245	78,846	79,451	80,061	80,675	81,295	81,919	82,514

Breakdown by Energy Type

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Electricity	18,410	17,072	15,487	18,200	17,597	17,737	17,877	18,019	18,162	18,305	18,450	18,595	18,742	18,889	19,031
Propane	5,910	4,939	3,797	5,375	5,119	5,175	5,231	5,287	5,343	5,400	5,456	5,512	5,569	5,625	5,681
Natural Gas	-	-	338	338	175	176	177	179	180	181	182	184	185	186	188
Heating Oil	553	476	390	554	503	507	511	515	519	523	527	531	535	539	543
Wood	2,118	2,142	2,166	2,184	2,211	2,233	2,256	2,278	2,301	2,323	2,346	2,368	2,391	2,413	2,435
Gasoline	38,158	38,373	39,128	38,769	39,232	39,514	39,798	40,085	40,375	40,668	40,964	41,264	41,566	41,871	42,154
Diesel	10,799	12,206	12,280	10,855	11,633	11,715	11,798	11,882	11,966	12,050	12,135	12,221	12,308	12,395	12,482
Total	75,948	75,208	73,587	76,276	76,470	77,057	77,649	78,245	78,846	79,451	80,061	80,675	81,295	81,919	82,514

Breakdown by End Use

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Stationary	26,991	24,630	22,179	26,652	25,605	25,828	26,053	26,278	26,505	26,732	26,961	27,190	27,421	27,653	27,878
Transportation	48,957	50,579	51,408	49,624	50,865	51,229	51,596	51,967	52,341	52,719	53,100	53,485	53,874	54,266	54,636
Total	75,948	75,208	73,587	76,276	76,470	77,057	77,649	78,245	78,846	79,451	80,061	80,675	81,295	81,919	82,514

Yearly Growth (%)	0.8%			75,255	75,887	76,525	77,169	77,817	78,472	79,131	79,797	80,467	81,144	81,826	82,514
10 Year Growth	9.6%														

Yearly Average Electrical Demand (kW)

1 Watt = 1 Joule per second

Seconds per year: 31536000

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Average Demand	584	541	491	577	558	562	567	571	576	580	585	590	594	599	603

Electricity Peak Demand (kW)

From IESO: http://www.ieso.ca/Pages/Power-Data/Demand.aspx

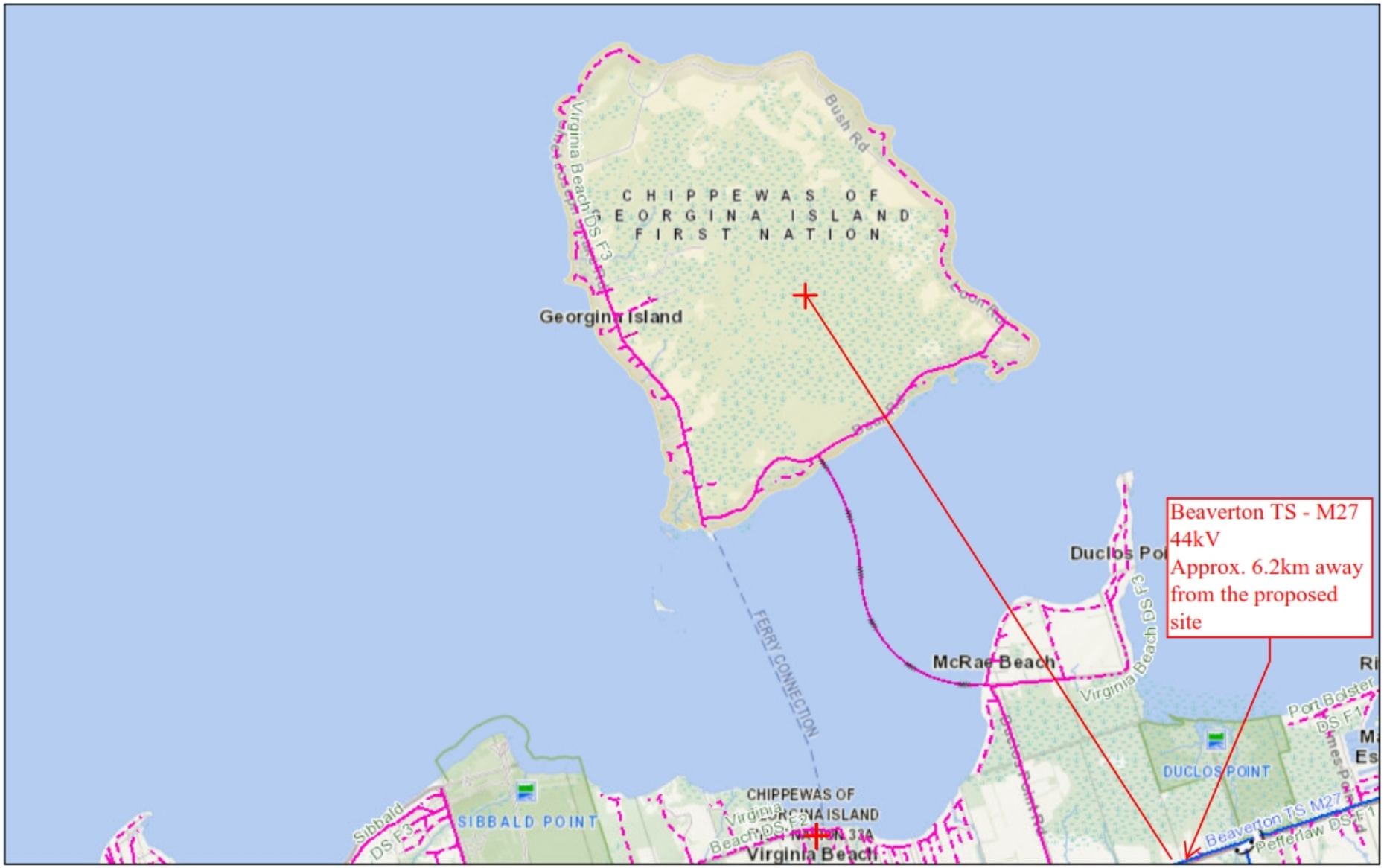
Assume that the current trend in peak vs average demand remains constant over next 10 years

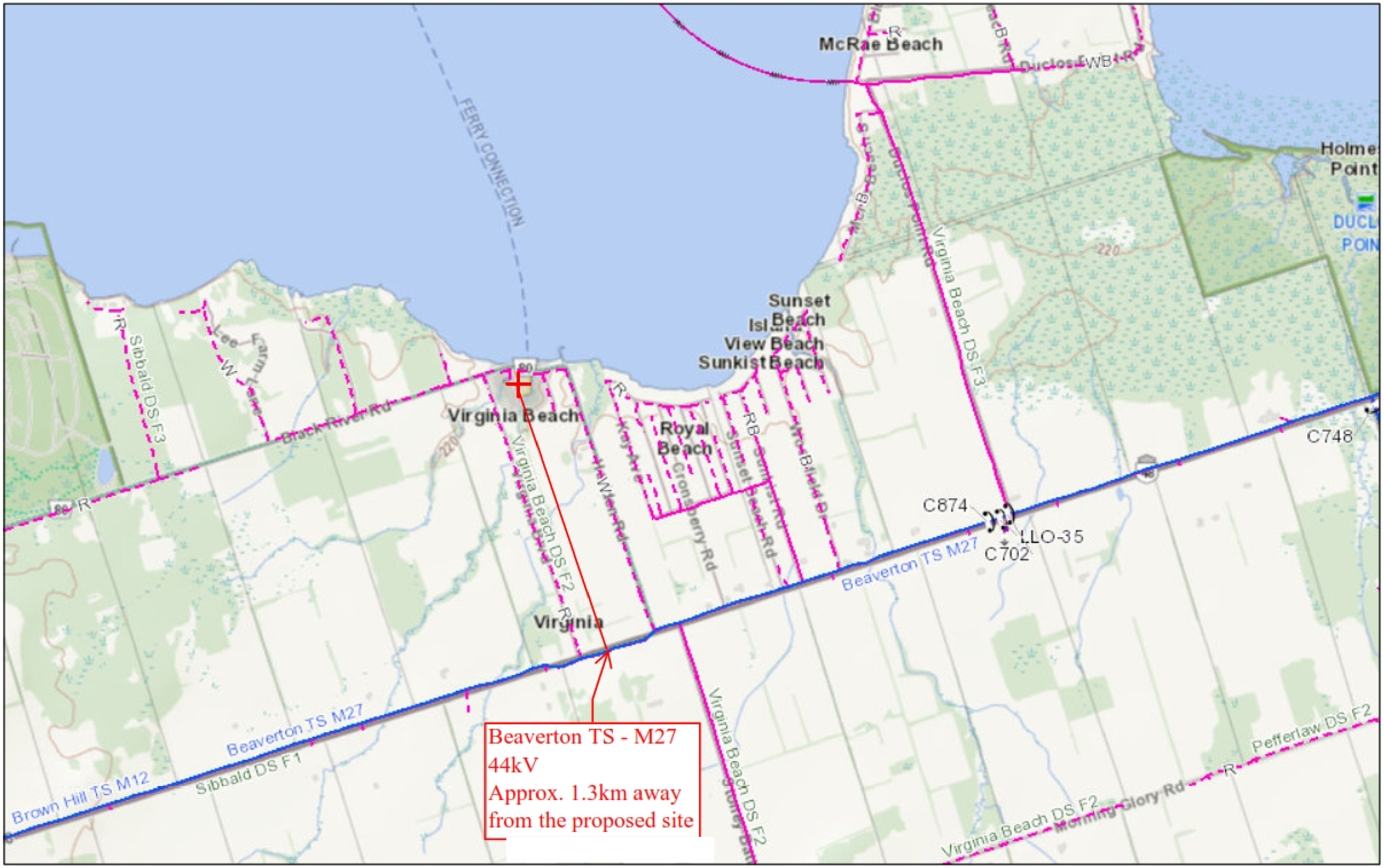
2016 Peak Extreme Weather Demand (MW)	24740	MW
2016 Normal Usage (TWh)	137	TWh
2016 Average Demand	15605	MW
Ratio of Peak vs Demand	159%	

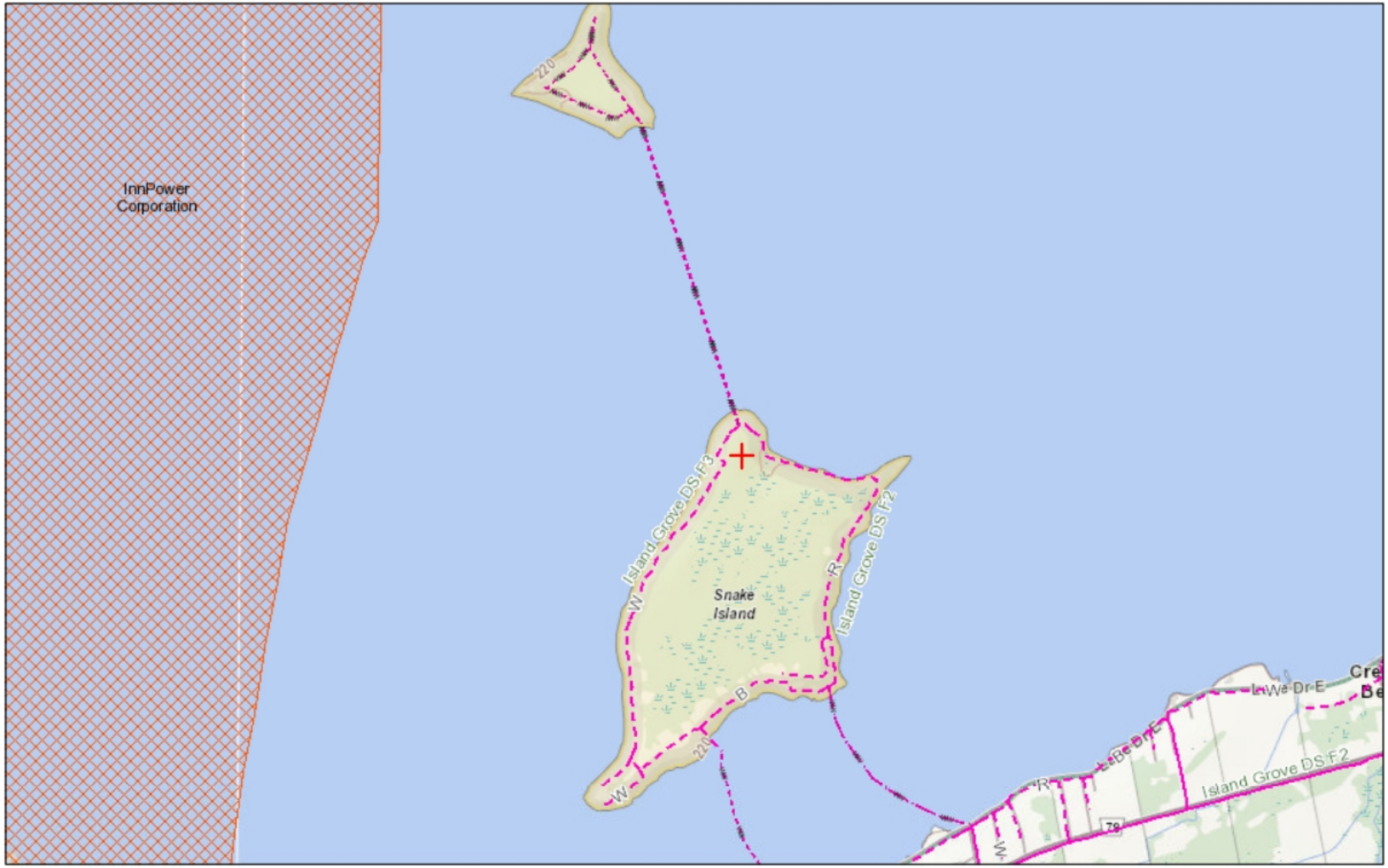
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Peak Demand	925	858	779	915	885	892	899	906	913	920	928	935	942	950	957

Appendix C

Hydro One Distribution Maps


CHIPPEWAS OF GEORGINA ISLAND FIRST NATION
Georgina Island
Bush Rd
Virginia Beach DS F3
Beaverton TS - M27
44kV
Approx. 6.2km away
from the proposed
site
McRae Beach
FERRY CONNECTION
DUCLOS POINT
SIBBALD POINT
Sibbald
DS F3
CHIPPEWAS OF
Virginia Beach
Virginia Beach DS F2
Port Bolster
DS F1
Beaverton TS M27
Pefferlaw DS F1


Beaverton TS - M27
44kV
Approx. 1.3km away
from the proposed site
McRae Beach
Virginia Beach
Virginia
Royal Beach
Sunset Beach
Sunkist Beach
Holmes Point
FERRY CONNECTION
Black River Rd
Sibbald DS F3
Virginia Beach DS F2
Virginia Beach DS F3
Beaverton TS M27
Brown Hill TS M12
Sibbald DS F1
Pefferlaw DS F2
C874
C702
LLO-35
C748


InnPower
Corporation
220
Island Grove DS F3
Snake
Island
Island Grove DS F2
B
220
W
R
Island Grove DS F2
78

LEGEND

SYMBOL	DESCRIPTION
	3ø PRIMARY (4.8/8.32 kV)
	2ø PRIMARY
	1ø PRIMARY
456LL7	OPENER & NUMBER
60	SWITCH, NUMBER & FUSE SIZE
	AIR BREAK SWITCH
	LOAD BREAK SWITCH
	RECLOSER, NUMBER, TYPE & SIZE
	RABBIT–STEP DOWN TRANSFORMER
	CAPACITOR
	METERING UNIT
	OPEN POINT
	UNDERGROUND CABLE
D.S. NAME	DISTRIBUTION STATION
S45 / 25	TEST POINT
R2345 150A	SINGLE REGULATOR & SIZE
R2345 2x150A	2–PHASE REGULATOR & SIZE
R2345 3x150A	3–PHASE REGULATOR & SIZE
2	SUBDIVISION REFERENCE NUMBERS

Appendix D

Analysis of Renewable Generation Opportunities

PRELIMINARY ASSESSMENT OF RENEWABLE OPPORTUNITIES

From the results of our *Year Round Residential Energy Survey*, approximately 97% of survey participants feel that it is important (69% very important, 28% somewhat important) for Georgina Island to invest in energy generation.

Please note that the assessment presented in the following sections focuses on renewable generation projects with the potential to be developed within our community, unless otherwise stated. Projects located outside of our community are potentially available, although assessments of resources, feasibility, and other criteria should be conducted on an individual basis.

1.0 MOTIVATIONS FOR RENEWABLE ENERGY

There are a number of reasons why a community might want to pursue the development of renewable energy. A description of these motivations is available in the table below.

Table 1 - Summary of Renewable Energy Generation Motives

Motivation	Description
Generate for Use – Energy Independence	To generate for our own use refers to projects that generate energy for use within our community, and can be accomplished by individual members or our community as a whole. Generating our own energy will also move us towards energy independence, meaning that we would no longer be fully reliant on buying our energy from others. There are many paths that a community can take to move towards energy independence.
Generate for Economic Development – Revenue Generation	Generation for economic development refers to a desire to produce and sell energy as a means of revenue generation for our community. In the case of electricity, it would not be used locally, but sold and distributed into the electricity grid. This option can be implemented by our community as a whole or by individual members within our community. It is also common for communities to partner with renewable energy developers on larger scale projects for economic development purposes.
Generate for Revenue Generation and Energy Independence	Electricity can also be generated for both economic development and our own use. 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.
Lower Environmental Impact	Renewable energy can also lower environmental impact. A shift towards renewable energy generation is very prominent in Ontario. This is largely due to the environmental benefits of using renewable energy in comparison to other forms of power generation, such as the burning of fossil fuels. The three major environmental benefits of renewable energy generations are: a reduced contribution to climate change; a reduction in human health and environmental impacts associated with the burning of fossil fuels; and a sustainable means of energy generation that does not deplete natural resources.
Enhanced Community Image	Development of renewable energy projects can help a community enhance its image, showcasing a commitment to the environment and a willingness to utilize new and emerging technologies.

The results from our *Year Round Residential Energy Survey* (Q14) indicate that about 47% of survey participants think that renewable energy projects should be developed for both energy independence and economic development purposes. Developing renewable energy projects solely for energy independence purposes was also preferred by about 24% of participants. In addition, from the *Year Round Residential Energy Survey* (Q15), about 87% of participants believe Georgina Island First Nation should move towards increased energy independence, reaffirming the energy goal outlined within the 2015 GIFN CEP.

Please note that only about 6% of survey participants indicated a desire for renewable energy generation development for economic development purposes. In addition, the lack of financial subsidy programs, such as the microFIT and FIT programs, which are no longer available, result in the pursuit of renewable energy development solely for economic purposes being a low priority at this point in time.

2.0 AVAILABLE CONNECTION OPTIONS

A summary of available connection types, along with their relation to energy independence and revenue generation motives, as well as requirement of grid capacity, are summarized in the table below.

Table 2 - Summary of Available Connection Types

Connection Type	Details	Energy Independence Application	Revenue Generation Application	Grid Capacity Required
Off-Grid	Electricity from a renewable source which is used locally and not supplied or sold to the grid. There are several benefits to choosing an off-grid generation system, the primary being the ability to gain energy independence. Except in remote locations, generating electricity off-grid renewable generation is typically more expensive than drawing from the grid due to unavailability of subsidy programs for the sale of electricity and cost of energy storage. Off-grid applications are available to both our community as a whole or individual members.	Yes	No	No
Feed-Only	All generated electricity is sold to the grid and none of it is used locally. Energy is generated only for economic development purposes. Feed-only applications are available to both our community as a whole or individual members. The availability of FIT and microFIT programs in Ontario have made feed-only projects more financially viable in the past, although these programs are no longer available.	No	Yes	Yes
Micro-Grid	A local energy grid with capability to disconnect from the traditional electricity grid and operate independently. Energy can be generated for both economic development and energy independence purposes. Micro-grids offer us a greater choice as consumers and reduce our dependence on major electricity providers. They also provide access to	Yes	Yes	Yes

	the electricity grid, serving as a backup for intermittent renewable energy sources such as wind and solar, eliminating the need for costly energy storage. Micro-grids are typically larger investments that would be made by the community as whole, or for use with multiple nation-owned buildings.			
Net-Metering	Offered by Hydro One to support renewable energy technologies. Customers who generate electricity primarily for their own use can send the excess electricity to Hydro One's distribution system for a credit that offsets their electricity costs. Net-metering projects are typically smaller in size and implemented by community members or for individual buildings.	Yes	Yes	Yes

Please note that the motivations of lowering environmental impact and enhancing community image are applicable to all renewable energy connection types.

As discussed above, our primary motivation for the development of renewable energy projects within our community is for the pursuit of greater energy independence. Although off-grid renewable applications should definitely be considered, the cost of off-grid renewable applications is typically high in comparison to other options, making them less practical. As a result, micro-grid and net-metering applications become the primary candidates for renewable energy project developments within our community. Additional information on net-metering and micro-grids can be found in Section 5.8 of this appendix.

3.0 GRID CAPACITY

Due to the nature of our community, which comprises of separate islands and mainland locations, there are several feeder lines that service our community.

Georgina Island and Virginia Beach are both serviced by the Hydro One owned Virginia Beach Distribution Station (DS). Georgina Island is serviced by the F3 feeder line, and Virginia Beach through F2 feeder line, which are both 8.32 kV. The upstream station for the Virginia Beach DS is the Beaverton Transmission Station (TS). Maps showing these feeder lines are available in Appendix G.

A preliminary analysis of grid capacity available in our community using Hydro One's Capacity Calculator[1] is available in the following table.

[1] *Hydro One. 2017. Available Capacity on Hydro One's Distribution System. Retrieved from: www.hydroone.com/business-services/generators/station-capacity-calculator*

Table 3 - Summary of Available Grid Capacity Within Georgina Island First Nation

Location	Station	Feeder	Estimated Available Capacity (MW)
Georgina Island	Virginia Beach DS	F3	2.5 MW
Mainland (Virginia Beach)	Virginia Beach DS	F2	2.5 MW
Snake Island/Fox Island/Mainland (Island Grove)	Island Grove DS	F2	2.5 MW
	Island Grove DS	F3	2.5 MW

Please note that capacity available of feeder lines may be cumulative. That is, acquiring capacity on one feeder may reduce available capacity on the other. Hydro One should be consulted for further clarification.

Based on this preliminary assessment, it appears that there is capacity for development of small and moderately scaled micro-grid and net-metering projects within our community. Please note that there are other factors which may need to be considered, such as generator projects already in queue to use this capacity. Any serious generation project would have to participate in a Hydro One Connection Impact Assessment prior to connection. This should be done as early as possible within the project development process to avoid investment prior to confirmation of an adequate connection for generation. Hydro One's generator connection process is outlined in detail online at: http://www.hydroone.com/Generators/Pages/default.aspx.

4.0 AVAILABLE TECHNOLOGIES

There are a number of renewable energy technologies that are available for development. To be feasible, each technology requires certain technical conditions, mainly access to adequate resources. In addition, our *Year Round Residential Energy Survey* included a question (Q16) to help gauge support and opposition for various technologies. The table below summarizes common renewable technologies based on technical feasibility and community acceptance.

Table 4 - Summary of Renewable Technologies

Technology Type	Technically Feasible	Community Acceptance*	Reasoning and Considerations	Consider for GIFN
Solar PV	Yes	High (85%)	Solar insolation is anticipated to be sufficient for our community. A more in depth analysis of sun conditions should be conducted. Due to this technology being technically feasible, and a high level of community acceptance, this technology should be considered within the community.	Yes
Solar Thermal	Yes	High (90%)	Solar thermal technologies do not generate electricity but can be used to reduce space and water heating requirements. There is adequate sunlight within our community for the use of this technology and community acceptance is high. An in depth cost-savings analysis should be conducted on a case-by-case basis to ensure that the use of solar thermal technology is practical for the given application.	Yes

Wind	Yes	Low (-9%)	Based on information from the Natural Resource Atlas by the Ontario Ministry of Natural Resources and Forestry[2], wind power resources are acceptable for the development of wind generation. Acceptable wind resources are available at low heights (10 to 30 meters above ground level) within the lake and near shorelines. Wind resources within land masses (such as the larger islands and mainland) are only available at higher heights (greater than 50 meters above ground). Although wind resources are acceptable, because community acceptance is low, this technology should not be considered at this time.	No
Geothermal	Yes	High (84%)	Geothermal heat pump applications are suitable for our community. This type of technology cannot be used to produce electricity, but can help reduce heating and cooling requirements. This technology is better suited for larger scale buildings. An in depth cost-savings analysis should be conducted on a case-by-case basis to ensure that the use of geothermal technology is practical for the given application. Community acceptance for this technology is high.	Yes
Biomass	TBD	Moderate (58%)	There is not enough feedstock within our community itself to operate a bioenergy facility. Importing feedstock from the surrounding area may be an option, although additional research would be required. Transportation to the island may also increase costs, and development considerations may be restricted to the mainland. The potential for development of bioenergy generation should be further assessed, however, due to moderate community acceptance and feedstock limitations, it should be given a lower priority at this point in time.	Yes (lower priority)
Landfill Gas	TBD	Low (22%)	A thorough assessment of the adequacy of landfills for generation utilizing landfill gas has not been conducted. Due to the low community acceptance of this technology, it should not be considered or further assessed at this time.	No
Water Power	Yes (outside of GIFN)	Moderate (60%)	Using the Natural Resource Atlas by the Ontario Ministry of Natural Resources and Forestry, no water resources suitable for typical hydroelectric generation (i.e. dam) are located within our community. There are approximately 7 identified sites with 1 to 10 MW of hydroelectric potential within approximately 15 km of Georgina Island. Development of hydroelectric generation should be considered, however, it should be given a lower priority than other opportunities. In addition, innovation water power renewable energy generation technologies should also be considered.	Yes (lower priority)
Fossil Fuel (Natural Gas)	Yes	Low (-30%)	Georgina Island First Nation has access to natural gas infrastructure (mainland only). However, due to the low community acceptance of this technology, electricity generation from natural gas should not be considered at this time.	No

**Community acceptance was calculated using Survey results, see Survey Question 24. Respondents could answer that they "support", "oppose", "don't care", or "don't know enough to make an informed decision". Community acceptance in the table above was calculated by taking the number of respondents that indicated "support", subtract the number of respondents that "oppose", all divided by the total of the number of respondents that "support", "oppose" or "don't care". Respondents that indicated "I don't know enough to make an informed decision" have been excluded.*

[2] *Ministry of Natural Resources and Forestry. 2017. Renewable Energy Atlas. Retrieved from: http://www.gisapplication.lrc.gov.on.ca/REA/Renewable.html?site=REA&viewer=REA&locale=en-US*

Based on the summary above, the most applicable renewable technologies for development in our community are solar PV, solar thermal, and geothermal. Water power and biomass technologies should also be considered, to a lesser extent. Please keep in mind that the technical feasibility described above is for preliminary purposes only. Development of any renewable technology would require further assessment.

5.0 OTHER CONSIDERATIONS

There are several other important considerations and information that should be taken into account when potentially developing renewable energy generation systems, which are listed below.

5.1 PROJECT LOCATION AND SIZE

This analysis has focused primarily on the development of renewable energy projects within our community, although projects could also be potentially developed outside of it.

5.2 PARTNERSHIPS

Additional opportunities for economic development may exist if consideration is given to partnerships with development companies seeking to locate renewable projects, either within or in close proximity to our community. Creating partnerships is a pillar of GIFN's economic development strategy. The GIFN community supports partnerships for commercial ventures, provided that the partners have "brand name recognition".

Renewable energy development companies may see partnership with a local First Nation as a way to develop a relationship with the local community, increase project marketing value, mitigate potential opposition to the project and increase the projects financial viability. Any potential partnerships should be thoroughly screened both technically and financially to ensure that they are in the best interest of our community.

5.3 FUNDING

Capital costs and payback periods for renewable energy projects vary significantly based on project size, technology used, and intended application. Due to the recent changes within Ontario, potential funding sources for the development of renewable energy projects is limited. Two of the most significant changes are:

- the discontinuation of the FIT and microFIT subsidy programs; and
- the cancellation of the Green Ontario Fund.

Funding for potential energy projects may be available from the IESO's Indigenous Energy Projects (IEP) program (see Appendix F). Additional sources of funding and incentives may also be available, and Georgina Island First Nation is encouraged to research potential opportunities.

Without funding, incentives, or subsidies, renewable energy projects are not always financially viable. Cost-saving analyses should be conducted on a project-by-project basis and potential projects should be carefully designed to increase financial viability to the greatest extent possible.

5.4 INNOVATION

New and innovative ideas and technologies related to renewable energy generation are available. It is recommended that Georgina Island First Nation consider these technologies. This includes potential opportunities for research and development of these technologies.

5.5 ENVIRONMENTAL APPROVALS

Renewable energy projects developed within Ontario require adherence to various environmental regulation and must obtain an environmental approval. The cost of obtaining an environmental approval, including conducting the necessary preliminary studies, can have a substantial impact on the capital cost of a project and influence the project schedule.

Projects developed within a First Nation territory are not necessarily subject to these approvals. However, research should be completed to determine if any regulations must be followed or if any approvals must be obtained. This should be completed as early into the development process as possible.

5.6 EXISTING RENEWABLE ENERGY DEVELOPMENT

As described briefly in Section 2.6.3 of the GIFN CEP update, Georgina Island already has existing solar photovoltaic systems operating within the community. The operation of these systems, including their output, can be used to as an educational tool within our community. In addition, the operation and financial characteristics of these systems can be used as a basis for any potential renewable generation systems developed in the future.

In addition, GIFN began investigating the possibility of constructing a wind farm on Georgina Island (Pukwis Community Wind Farm) in 2007. Although the project did not move forward, it did demonstrate the community's interest in renewable energy projects.

5.7 RENEWABLE ENERGY EDUCATION

The values shown in Table 4 for community acceptance were gathered from our *Residential Community Energy Survey*, but exclude respondents that indicated that they do not know enough to make an informed decision on the topic, which ranged from 20% to about 65% of respondents for any given technology. This shows that education on renewable technology is needed within our community. Community acceptance may be increased through education, potentially making some technologies currently excluded from consideration available for development in the future.

5.8 NET-METERING AND MICRO-GRID CONNECTION FOR RENEWABLES

Net-metering and micro-grid connection types are available options for generation projects. These connection options are unique, as they allow generated electricity to be both used and sold to the grid as needed, with access to electricity from the grid also remaining available.

Net-Metering

A net-metering program is available to any Hydro One customer who generates electricity primarily for personal use from a renewable energy source. Excess electricity is sent into the distribution system for a credit, with excess credits carried forward. Electricity generation must use equipment with a total nameplate rating of 500 kW or less. More information can be found at: www.hydroone.com/Generators/Pages/NetMetering.aspx

Micro-Grid

A micro-grid is essentially a small scale electrical grid. It works similarly to large scale electricity distribution systems, but instead of delivering electricity to thousands of customers, it caters to smaller groups such as communities or neighborhoods. This allows customizable grids to make use of a mix of clean and renewable resources to generate electricity. Furthermore, micro-grid systems can operate independently from the traditional grid, but can still access it to potentially import/export electricity as needed, offering a degree of flexibility within the system.

6.0 SUMMARY OF RENEWABLE ENERGY OPPORTUNITIES

The points below summarize the findings of this appendix.

- About 47% of survey participants think that renewable energy projects should be developed for both energy independence and economic development purposes. Developing renewable energy projects solely for energy independence purposes was also preferred by about 24% of participants. In addition, about 87% of participants believe Georgina Island First Nation should move towards increased energy independence, reaffirming the energy goal outlined within the 2015 GIFN CEP.
- Although off-grid renewable applications should definitely be considered, the cost of off-grid renewable applications is typically high in comparison to other options, making them less practical. As a result, micro-grid and net-metering applications become the primary candidates for renewable energy project development within our community.
- Based on this preliminary assessment, it appears that there is capacity for development of small and moderately scaled micro-grid and net-metering projects within our community.
- The most applicable renewable technologies for development in our community are solar PV, solar thermal, and geothermal. Water power and biomass technologies should also be considered, to a lesser extent.

Appendix E

Actions Inventory and Implementation Table

Actions Inventory

Action ID/Subtask ID	Description	First Identified	Status	Comments (if applicable)
P1.0 - Community Energy Advisor				
P1.1 - Hire Energy Advisor	Create a part-time community energy advisor role. Hire and train a community member to understand and explain Hydro One electricity bills. This individual could also be trained more broadly in energy use and conservation, and become a resource to the community for energy reduction and saving ideas. The energy advisor will work to implement the CEP.	2015 CEP	Ongoing	GIFN hired a Community Energy Advisor for an 18 month work-term, starting September of 2017. Funding for this initiative was obtained through the IESO's ECB program. The work term of the Energy Advisor is anticipated to carry though the entire CEP. The IESO's CEC initiative has been awarded to fund this position for an additional 3 years, extending it to about mid-Q1 of 2022.
P1.2 - Apply for IESO Funding Programs	GIFN should apply to the IESO's CEC, ECB, and IEP programs for funding towards various energy initiatives within the community.	2018 Update	Complete	The submission deadline for the next intake for the various IESO programs occurred in November, 2018.
P1.3 - Energy Advisor Training	The Community Energy Advisor (or other GIFN staff) should apply to participate in various training programs, including: - 20/20 Catalyst program, to participate in training designed to support the development of clean energy projects in First Nation communities; - Energy Manager Training, provided by the British Columbia Institute of Technology (or equivalent); and - Relay Curriculum Training, to qualify the individual to deliver Relay Education licensed materials.	2018 Update	Planned	Funding for these initiatives is available through the IESO Education and Capacity Building (ECB) program. GIFN has applied to the ECB 6.0 program.
P1.4 - Justify Future Work term	Although potential funding sources to continue the Energy Advisor position should be sought, a justification for continuing the Energy Advisor position (without funding) should be developed.	2018 Update	Planned	
P2.0 - Investigation of Community Electricity Infrastructure				
P2.1 - Analyse Electrical Infrastructure	Have a professional provide a full analysis of the community's energy system to determine if issues of power quality exist within the community.	2015 CEP	Planned	
P2.2 - Evaluate Density Categorization	Investigate Hydro One density categorization process, as Hydro One is currently re-evaluating density categorizations across the province in 2015; this may result in a clearer understanding of why certain facilities or households at GIFN are categorized as they are, and may fix past errors in categorization.	2015 CEP	Planned	
Ombudsman Appeal	Consider making a formal appeal to the Ontario Ombudsman regarding issues with Hydro One. Prior to making such an appeal, the community should compile an assortment of specific, properly documented issues, covering all areas of concern.	2015 CEP	Postponed	Since the initiation of the Ontario Fair Hydro Plan, including the On-Reserve Delivery Credit, the burden of electricity pricing to community members has been (at least temporarily) alleviated. As such, it is suggested that this initiative be removed from the CEP for the time being. The initiative can be included again should electricity pricing become a significant issue within our community at a future date.
P3.0 - Investment in Renewable Energy				
P3.1 - Clean Investment Opportunities	It is recommended that if Georgina Island First Nation considers future investment for economic development purposes, that investments related to clean energy and the renewable sector be given consideration.	2018 Update	Ongoing	It is important that a risk analysis be completed that includes the impacts of the recent changes to the Green Energy Act. Investment opportunities should be considered on an as-needed basis.

P4.0 - Update Community Energy Plan				
P4.1 - Assess and Update CEP	It is recommended that a periodic review of our entire CEP occur. During this review, any changes to the plan can be updated within our CEP, including identification of new opportunities and revisions to the implementation plan.	2018 Update	Planned	First update completed. Funding for future updates is available to update our CEP through the IESO's Indigenous Community Energy Plan (ICEP) program.
P5.0 - Community Energy Committee				
P5.1 - Energy Committee Meetings	Quarterly energy committee meetings to discuss the Energy Plan and other energy related initiatives within or affecting GIFN.	2015 CEP	Ongoing	
E1.0 - Community Outreach Strategy				
E1.1 - Education	1) Distribute to community members the "Quick Guide to Your Hydro One Bill" and "Bright Ideas" pamphlets (created as part of the Community Energy Plan process) and the TOU peak-period fridge magnets. 2) Ensure residents are aware that Smart Meter data can be reviewed online by logging onto the Hydro One website with account information. 3) Distribute to community members and post on the community website the document called "10 Ways to Save Electricity And Lower Your Bill" that has been developed as part of this Plan. 4) Remind community workers to turn off lights and computers when not in use . 5) Create a culture of conservation in the community by holding a monthly competition to see who can conserve the most energy per month. 6) Purchase several simple plug-in energy meters to be signed out by community members, who can use them to learn about which appliances use the most energy in the home. 7) Provide community members with suggested actions that can be taken to avoid damage resulting from power quality issues. A list of actions can be found in Section 2.2.3 of the Hydro One Analysis (of the 2015 CEP). 8) Continue to collect and review Hydro One bills for accuracy; any error should be brought to the attention of the Hydro One First Nations and Metis Relations hotline (see above) for immediate resolution. 9) Communicate energy generation progress with community members, specifically relating to the 4 microFIT solar projects to be installed in the spring of 2015. 10) Ensure that all residents are aware of Hydro One's First Nations and Metis Relations team (toll-free 1877-955-1155) who are available to answer any community-related electricity questions, including review of electricity bills. Additional information is available online.	2015 CEP	Ongoing	Development of the Education component of the Community Outreach Strategy (including content). Education initiatives will be released periodically, with new content developed during the CEP update periods.

E1.2 - Website	1) Develop a section on our community website dedicated to energy and provide resources related energy education, conservation, and updates on energy generation. 2) Proceed with IESO's Aboriginal Conservation Program (recently approved), and post common findings and solutions on the community's website energy page. 3) Make the Hydro One Analysis report available on the community website, and keep a limited number of complimentary hard copies available in the Band office. 4) Post on the community website on ways to further reduce home energy use. Use online resources.	2015 CEP	Planned	
E1.3 - Power Quality	1) Continue to investigate power qualities issues in the community by using the Fluke Meter and document this data. 2) Implement a process to gather and document information regarding issues related to power quality and customer service. An "Energy Issues Report Form" has been developed and is included at the end of this Plan.	2015 CEP	Planned	
Energy Event	The 2015 CEP proposed an annual energy event to be held. This initiative has been updated to the inclusion of energy related display booths to be set up at various community events. This initiative is part of the ongoing "Community Outreach Strategy". In addition, annual Supplier Forum and Job Fair events have been proposed as separate events, which will be part of the overall "Training and Education" initiative.	2015 CEP	Abandoned	Has become part of the "Community Outreach Strategy" and "Supplier Forum and Job Fair" activities.
Hydro One Billing	Communicate to all community members that Hydro One is still in the process of creating it's new billing system, which still may have "glitches" leading to incorrect billings; Hydro One is aware of this problem and will resolve any issues brought to their attention.	2015 CEP	Abandoned	Hydro One's new billing system and bill layout have already been implemented.
Rural or Remote Rate Protection	Ensure that "Low Density Residential" customers are benefitting from the Rural or Remote Rate Protection (RRRP) program, as they are eligible for a credit of $28.50 per month. If community members are not receiving this credit and believe that they should be, they may use the contact information above to reach the appropriate representatives at Hydro One.	2015 CEP	Abandoned	The RRRP is automatically applied to customers who qualify.
E2.0 - Training and Education				
E2.1 - Youth Education	A suite of youth workshops, delivered by both Relay Education and Elephant Thoughts, relating to energy conservation and energy generation, should occur on an annual basis. In-classroom and extracurricular workshops (i.e. after school and/or summer camp) should be considered.	2018 Update	Planned	Funding for these initiatives is available through the IESO Education and Capacity Building (ECB) program. GIFN has applied to ECB 6.0. The Youth Education opportunity is expected to occur annually and consist of 1 round of in-class workshops and 1 round of summer camps, although timing is subject to change.
E2.2 - Dollars to Sense Workshop	Host a Dollars to $ense Energy Management Workshop, offered by Natural Resource Canada's Office of Energy Efficiency; six courses to choose from focusing on energy conservation and cost reduction.	2015 CEP	Planned	Funding for these initiatives is available through the IESO Education and Capacity Building (ECB) program. GIFN has applied to ECB 6.0.
E2.3 - Supplier Forum and Job Fair	GIFN should hold an annual energy supplier forum and employment fair events. The supplier forum will allow community members to ask questions and gather information from local energy suppliers and other energy-related organizations. The employment fair event will allow community members to become aware of employment opportunities within the energy sector.	2018 Update	Planned	

E2.4 - Department Meetings and Workshops	An annual, multi-department meeting and workshop should be held for GIFN staff and leadership. The meeting will allow staff and leadership to be informed of the energy related initiatives occurring within the community, and offer an opportunity to provide feedback. The workshops will provide an opportunity for staff and leadership to learn about various applicable energy topics.			
C1.0 - Residential Conservation Programs				
C1.1 - Bulk Purchases	Investigate possibility of the Band coordinating bulk purchase of large appliances on the part of community members, ensuring that new appliances are energy efficient.	2015 CEP	Planned	
C1.2 - Surge-Protected Power Bars	Develop and implement program to supply residents with surge-equipped power bars.	2015 CEP	Planned	
C1.3 - Wiring Inspection	Develop and implement a program to have household wiring inspected (funding may also be available).	2015 CEP	Planned	
C2.0 - Conservation in Band Owned Buildings				
C2.1 - Develop and Implement Green Procurement Strategy	Implement a Green Procurement Strategy for Band buildings. This would mean that any Band purchases of equipment or appliances must follow energy efficiency guidelines, such as all appliances must have the EnergyStar logo.	2015 CEP	Planned	
C2.2 - Energy Audits	Implement an energy audit program for Band-owned buildings, and complete audits on 2-3 Band owned buildings each year. Investigate funding sources for audits.	2015 CEP	Planned	
C2.3 - Energy Retrofits	It is recommended that the community work to improving efficiency within band-owned buildings based on the results of energy audits completed.	2018 CEP	Planned	Significant potential energy savings may be possible, and there are several incentive programs available which may increase the overall financial viability of retrofits.
C2.4 - Energy Efficiency Guidelines	Develop and implement guidelines to ensure a focus on energy efficiency in the construction of any future Band-owned buildings.	2015 CEP	Planned	
C3.0 - Streetlight Conversion				
C3.1 - Determine Ownership	Confirm ownership and maintenance responsibility for all streetlights in the community.	2015 CEP	Complete	GIFN owns streetlights
C3.2 - Streetlight Retrofit Potential	It is recommended that, once ownership is determined, that an analysis of completing a retrofit of all community streetlights to LED models be conducted and pursued if viable.	2018 Update	Planned	
C3.3 - LED Replacement Procedure	Replace streetlight bulbs as they burn out with energy efficient LED bulbs to reduce energy consumption	2015 CEP	Complete	An LED replacement procedure is already in effect.
C4.0 - GHG Considerations for Potential Bridge				
C4.1 - Incorporate Considerations	There are several considerations that should be made during the planning stages of the bridge in order to increase the potential for a reduction in GHG emissions in comparison to the Aazhaawe Ferry.	2018 Update	Planned	Incorporating GHG considerations for the potential bridge should occur on an as-needed basis, and will be dependent upon development of the potential bridge.

C5.0 - Reducing Transportation Energy				
C5.1 - Identify and Implement Measures	Identifying ways to reduce energy consumption associated with transportation in the residential and seasonal residential sectors should be a priority of our CEP moving forward. In addition, efficient vehicles (including hybrid and electric models) should be considered when replacement of administrative vehicles is required (and where hybrid/electric models are suitable).	2018 Update	Planned	
G1.0 - Energy Independence Demonstration Project				
G1.1 - Investigate Options and Feasibility	1) Work with Ontario Energy Matrix (our current solar PV supplier) to continue to investigate potential options for energy generation and gain support for use of renewable energy technologies in the community. 2) Complete a study to determine all feasible renewable energy options available to the community. Tap into IEOS incentive programs to fund the study	2015 CEP	Ongoing	A new renewable technology supplier has been identified (Switch). A preliminary analysis of renewable generation opportunities has been completed as part of this CEP update. However, further analysis, including financial viability, is required.
G1.2 - Develop Energy Independence Demonstration Project	Based on the findings, it is recommended that consideration for small to moderate scale net-metering and micro-grid demonstration projects, utilizing solar PV technology, be considered for band-owned facilities and band-owned residential units (such as multi-plexes).	2018 Update	Planned	
G2.0 - Residential Renewable Projects				
G2.1 - Complete Analysis on Existing Systems	Approach Ontario Energy Matrix to produce community specific sample analyses of potential residential renewable energy projects	2015 CEP	Ongoing	A new renewable technology supplier has been identified (Switch). The Community Energy Advisor is working with the technology supplier to determine feasibility of residential net-metering projects.
G2.2 - Use Residential Solar PV to Educate	It is recommended that this analysis continue, with the results used to educate residents on net-metering systems. If the results of the analysis show that these systems are financially viable, the results of the analysis should be used to encourage privately-owned solar PV net-metering systems in our residential sector.	2018 Update	Planned	
G3.0 - Natural Gas Infrastructure				
G3.1 - Consider Potential	With about 52% of residents within GIFN using electricity to heat, the potential to bring natural gas to Georgina Island should be further considered. It should also be noted that a natural gas distribution system exists on the mainland (the Island View Business Centre is a customer). The potential to incorporate a connection to this distribution system into a potential bridge design should also be examined.	2018 Update	Planned	It is recommended that feedback be sought from community members in relation to their views on potentially bringing natural gas to the community. Potential for Natural Gas Infrastructure should begin to be considered in 2020 to prepare for the ending of the Ontario Fair Hydro Plan in mid-2021. However, consideration should occur sooner if necessary to coincide with development of potential bridge.
G4.0 - Smart Energy Community Scorecard				
G4.1 - Participate in Scorecard Project	Georgina Island should agree to participate as a pilot community for the Smart Energy Community Scorecard.	2018 Update	Planned	This initiative is anticipated to require 12 to 14 days of human resource time until September 2019. It is anticipated that the Community Energy Advisor can take the lead on this initiative for Georgina Island First Nation.
G5.0 - Long Term Energy Independence				
G5.1 - Develop Plan and Implement	It is recommended that planning for increased energy independence within GIFN occur after completion of the demonstration projects.	2018 Update	Planned	

Action ID	Action	Subtask ID	Subtask	2018				2019				2020				2021				2022				2023				2024				2025				2026				2027				2028			
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
P1.0	Community Energy Advisor	P1.1	Hire Energy Advisor[1]																																											
		P1.2	Apply for IESO Funding Programs																																											
		P1.3	Energy Advisor Training																																											
		P1.4	Justify Future Workterm																																											
P2.0	Investigation of Community Electricity Infrastructure	P2.1	Analyse Electrical Infrastructure																																											
		P2.2	Evaluate Density Categorization																																											
P3.0	Investment in Renewable Energy	P3.1	Clean Investment Opportunities[2]																																											
P4.0	Update Community Energy Plan	P4.1	Assess and Update CEP																																											
P5.0	Community Energy Committee	P5.1	Energy Committee Meetings																																											
E1.0	Community Outreach Strategy	E1.1	Education[3]																																											
		E1.2	Website																																											
		E1.3	Power Quality																																												
E2.0	Training and Education	E2.1	Youth Education[4]																																											
		E2.2	Dollars to Sense Workshop																																											
		E2.3	Supplier Forum and Job Fair[5]																																											
		E2.4	Department Meetings and Workshops[5]																																											
C1.0	Residential Conservation Programs	C1.1	Bulk Purchases																																											
		C1.2	Surge Protected Power Bars																																											
		C1.3	Wiring Inspection																																											
C2.0	Conservation in Band Owned Buildings	C2.1	Develop and Implement Green Procurement Strategy																																											
		C2.2	Energy Audits																																											
		C2.3	Energy Retrofits																																											
		C2.4	Energy Efficiency Guidelines																																											
C3.0	Streetlight Conversion	C3.2	Streetlight Retrofit Potential																																											
C4.0	GHG Considerations for Potential Bridge	C4.1	Incorporate Considerations[6]																																											
C5.0	Reducing Transportation Energy	C5.1	Identify and Implement Measures																																										
G1.0	Energy Independence Demonstration Project	G1.1	Investigate Options and Feasibility																																										
		G1.2	Develop Energy Independence Demonstration Project																																											
G2.0	Residential Renewable Projects	G2.1	Complete Analysis on Existing Systems																																											
		G2.2	Use Residential Solar PV to Educate																																											
G3.0	Natural Gas Infrastructure	G3.1	Consider Potential[7]																																										
G4.0	Smart Energy Community Scorecard	G4.1	Participate in Scorecard Project																																										
G5.0	Long Term Energy Independence	G5.1	Develop Plan and Implement																																										

The schedule presented above is an outline only, and should be updated as the CEP progresses.

Notes:
1 - The workterm of the Energy Advisor is anticipated to carry though the entire CEP. The CEC initiative has the potential to fund this position for an additional 3 years, extending it to mid-Q1 of 2022.
2 - Investment opportunities should be considered on an as-needed basis.
3 - Development of the Education component of the Community Outreach Strategy (including content) expected to occur in Q4 of 2018. Education initiatives will be released periodically, with new content developed during the CEP update periods.
4 - The Youth Education opportunity is expected to occur annually. Target near earth-day, but can be at any time.
5 - Supplier Forum, Job Fair, and Deparment Meetings/Workshops held annualy. Target near earth-day, but can be at any time.
6 - Incorporating GHG considerations for the potential bridge should occur on an as-needed basis, and will be dependent upon development of the potential bridge.
7 - Potential for Natural Gas Infrastructure should begin to be considered in mid-2020 to prepare for the ending of the Ontario Fair Hydro Plan in mid-2021. However, consideration should occur sooner if necessary to coincide with development of potential bridge

Appendix F

Funding Options and Available Programs

FUNDING PROGRAMS AND INCENTIVES

Obtaining funding for the implementation of our CEP is critical to its success. There are a number of funding programs and incentives that can be used to assist with the implementation of a CEP. These programs and incentives are described below.

Please note that the status of funding programs and incentives is constantly changing. In addition, this list is not all-encompassing. This list is meant to be a starting point for further research. Regularly checking the status of these programs and incentives, as well as actively searching for more, is necessary and encouraged.

1.0 IESO FUNDING PROGRAMS

There are several funding programs offered through the IESO specific for Indigenous communities. These programs include:

- the Indigenous Community Energy Planning (ICEP) program;
- the Education and Capacity Building (ECB) program;
- the Community Energy Champion (CEC) program; and
- the Indigenous Energy Projects (IEP) program.

A broad overview of these programs is available here:
www.ieso.ca/en/get-involved/indigenous-relations/funding-programs

1.1 INDIGENOUS COMMUNITY ENERGY PLAN PROGRAM

The Indigenous Community Energy Plan (ICEP) program, formerly the Aboriginal Community Energy Plan (ACEP) program, supports development of long term energy plans within First Nation communities to improve energy efficiency, reduce electricity consumption and assess opportunities for renewable energy solutions. The ICEP program offers funding to develop a new Aboriginal Community Energy Plan, or to update and existing plan.

Additional information:

www.ieso.ca/en/get-involved/funding-programs/indigenous-community-energy-plan-program/icep-overview

1.2 EDUCATION AND CAPACITY BUILDING PROGRAM

The Education and Capacity Building (ECB) program supports investment into education and training initiatives to increase the understanding and skills needed for managing and generating energy within First Nations communities and organizations. Projects such as awareness campaigns, material and course development, workshops and education programs, skills development, and innovation projects relating to the ECB program objective are supported by the ECB.

Additional information:

www.ieso.ca/en/get-involved/funding-programs/education-and-capacity-building-program/overview

1.3 COMMUNITY ENERGY CHAMPION PROGRAM

The Community Energy Champion (CEC) program provides support for First Nation and Metis communities and organizations to hire a designated energy related staff resource. This staff resource will help plan, implement, and evaluate energy-related priorities.

Additional information:

www.ieso.ca/en/get-involved/funding-programs/community-energy-champion-program/cec-overview

1.4 INDIGENOUS ENERGY PROJECTS PROGRAM

The Indigenous Energy Projects Program (IEP) provides funding support for supply-side solutions (i.e. generation and transmission). The IEP provides support for the assessment and development of renewable energy projects, partnerships, and innovative solutions.

Additional information:

www.ieso.ca/en/get-involved/funding-programs/indigenous-energy-projects-program/iep-overview

2.0 ASSISTANCE PROGRAMS

There are several programs available that offer financial support for individual home owners. These programs are described below.

2.1 ONTARIO ELECTRICITY SUPPORT PROGRAM

The Ontario Electricity Support Program (OESP) is available to low-income homes and will reduce the costs associated with electricity use in households by applying a credit amount to monthly energy bills. Annual income and number of people living in the home are used to assess eligibility. A higher level of assistance is offered to First Nations and Metis homes, electrically heated homes, or if a resident of the home requires medical devices which use a lot of electricity.

Additional information: https://ontarioelectricitysupport.ca/

2.2 LOW-INCOME ENERGY ASSISTANCE PROGRAM (LEAP)

The Low-income Energy Assistance Program (LEAP) was developed by the Ontario Energy Board (OEB). This is an emergency assistance program for low-income households who are behind on their electricity bill and are at risk of having their electricity disconnected. This emergency program offers up to $500 towards electricity and gas bills, dependent on the annual household income and the number of people living in the home. A higher level of assistance is offered if the home is heated using electricity.

Additional Information:

www.oeb.ca/rates-and-your-bill/help-low-income-consumers/low-income-energy-assistance-program

3.0 RESIDENTIAL PROGRAMS

The following incentives and programs are primarily applicable to the residential homes and individual community members.

3.1 AFFORDABILITY FUND

The Affordability Fund was established by the Government of Ontario, and is offered by local electric utilities and community services. The Affordability fund was established to help lower electricity use and associated costs in homes for residents that do not qualify for other programs (particularly due to household income exceeding limits for these other programs). Participants may qualify for free upgrades, including:

- ENERGY STAR® certified LEDs, appliances, power bars, faucet aerators, appliances, and heat pumps;
- A visit from a professional Home Energy Advisor and a custom Home Energy Plan; and
- Educational material.

There are three (3) levels of support available from the Affordability Fund. The level of qualification depends on household income and the cost of the average energy bill of the residence. Residents that rent or live in social or assisted housing may also qualify. However, residents that qualify for the Low-Income Energy Assistance Program (LEAP), the Ontario Electricity Support Program (OESP), or the Home Assistance Program (HAP) are not eligible for additional support through the Affordability Fund. Residents that participated in the First Nations Conservation Program (FNCP) are also ineligible. Please note that proof of income (usually in the form of income tax statements) is required for application to this program.

Additional information: www.affordabilityfund.org

3.2 HOME ASSISTANCE PROGRAM

The Home Assistance Program (HAP) was created by the Independent Electricity Systems Operator (IESO) and local electric utilities, and is offered by Green Saver. Participants that qualify for the HAP program may be eligible for free upgrades (including installation) of the following:

- Energy-saving light bulbs, programmable thermostats, and power bars;
- ENERGY STAR® certified refrigerators, freezers, dehumidifiers, window air-conditioners;
- Low-flow showerheads and faucet aerators; and

- Insulation and weatherproofing (if the home is electrically heated).

Qualification for the HAP program is dependent upon annual household income. Residents already receiving social assistance from various programs may also be eligible for participation in the HAP program.

Please note that the HAP program is very similar to the First Nations Conservation Program (FNCP), with the HAP program offered on an individual basis, and the FNCP offered community-wide for participating First Nation communities. Individual residents within a community that has already participated in the FNCP (formerly the Aboriginal Conservation Program or ACP), but did not participate, may be eligible for the HAP program. Please note that proof of income (usually in the form of income tax statements) is required for application to this program. Residents that participated in the Affordability Fund Program or the FNCP are not eligible.

Additional information: www.greensaver.org/consumer/homeassistance/

3.3 NEW HOME CONSTRUCTION

SaveONenergy`s New Home Construction initiative is available through local distribution companies (including Hydro One). The initiative offers incentives (up to $1,000) to home builders and renovators to aid in the construction of energy efficient homes. Under the new Home Construction Program, participants may be eligible for various incentives, including:

- Performance incentives to help the home achieve set EnerGuide ratings;
- Prescriptive incentives towards various energy efficient products for homes, such as ENERGY STAR® certified central air conditioners, ENERGY STAR® certified lighting and light fixtures, and lighting control products; and
- Custom incentives based on energy savings achieved within the home.

Qualification for the New Home Construction initiative is dependent upon the specifications of the new home or type of renovations being conducted.

Additional information: www.hydroone.com/saving-money-and-energy/residential/new-home-construction

3.4 HEATING AND COOLING INCENTIVE

SaveONenergy`s Heating and Cooling Incentive provides rebates (of up to $4,000) to help increase energy efficiency related to home heating and cooling. Rebates under the Heating and Cooling incentive are applicable to:

- High-efficiency furnaces;
- ENERGY STAR® certified central air conditioners;
- ECM circulator pumps;
- High-efficiency heat pumps; and
- Smart thermostats.

To be eligible for rebates, a participating contractor must be contacted, who will submit the application on the participants behalf.

More information: https://saveonenergy.ca/Consumer/Programs/HVAC-Rebates.aspx

3.5 POOL SAVER

The Pool Saver incentive is offered through the SaveONEnergy program, in combination with Hydro One and the Pool and Hot Tub Council of Canada. The Pool Saver incentive offers a rebate of up to $400 towards an energy efficient pool pump. To be eligible for the rebate, the pump must be purchased from a participating supplier. The rebate will be applied at the time of purchase.

More information: www.hydroone.com/saving-money-and-energy/residential/poolsaver

3.6 FIRST NATION CONSERVATION PROGRAM

The First Nations Conservation Program (FNCP) is offered by Hydro One. This program has been designed to help increase energy efficiency within First Nations homes. Through this program, homes within participating communities will be assessed for potential energy efficiency upgrades related to lighting and appliances. Potential upgrades include:

- Energy-saving light bulbs, programmable thermostats, power bars, and block timers;
- ENERGY STAR® certified appliances;

- Low-flow showerheads, faucet aerators, hot water tank wrap, and pipe insulation; and
- Insulation and weatherproofing (if the home is electrically heated).

This program is provided to First Nations residents on a community-wide basis. Individual residents should check to see if their community has or is planning to participate in the FNCP (formerly called the Aboriginal Conservation Program or ACP) and participate within the program. Individual residents within a community that has already participated in the FNCP, but did not participate, may be eligible for the HAP program (see above).

Additional information: www.hydroone.com/saving-money-and-energy/residential/first-nations-conservation-program

3.7 HOME RENO REBATE PROGRAM AND HOME ENERGY CONSERVATION PROGRAM

The Home Reno Rebate Program and Home Energy Conservation (HEC) Program are two similar incentive initiatives offered by Union Gas and Enbridge, respectively. These programs are delivered in partnership with the respective natural gas distribution company, the Province of Ontario, and SaveONenergy. Both of these programs offer similar rebates for items such as:

- Heating systems
- Insulation
- Water heaters
- Windows and doors
- Appliances
- Air source heat pump
- Central air conditioners

Potential participants must be located in the respective natural gas distributor`s distribution area to be eligible, complete an energy assessment by a certified energy advisor before and after renovations, and complete at least two eligible renovations.

Additional information (Union Gas): https://www.uniongas.com/residential/save-money-energy/home-reno

Additional information (Enbridge): https://enbridgesmartsavings.com/home-energy-conservation/incentives

4.0 COMMERCIAL PROGRAMS

4.1 AUDIT FUNDING

The Audit Funding program is offered by Hydro One, in partnership with SaveONenergy. The Audit Funding program provides funding that can cover up to 50% of the cost of an energy audit for commercial customers, which can help uncover potential energy conservation opportunities.

Audit funding through the program must be pre-approved. Auditors that complete the audit must meet specific criteria. Building owners and individual tenants of a building are both eligible for the Audit Funding program.

Additional Information: www.hydroone.com/saving-money-and-energy/business/audit-funding

4.2 PROCESS AND SYSTEMS UPGRADES

Hydro One offers three (3) separate incentive streams related to process and system upgrades to increase energy efficiency for industrial and large commercial customers. These include:

- Opportunity Accelerator – free assessment of the facility, included a prioritized project plan
- Engineering Studies – up to $50,000 for an in-depth analysis for preliminary and detailed studies and identification of energy saving opportunities
- Capital Incentives – up to 70% of project costs for initiatives such as increasing energy efficiency and facility modernization.

Facilities wishing to participate in Hydro One's process and system upgrades must be large industrial or commercial customers (such as manufacturing plants, hospitals, colleges, universities, etc.) to be eligible. Please note that funding for Monitoring and Targeting (M&T) of commercial facilities is also eligible under this program.

Additional Information:

www.hydroone.com/saving-money-and-energy/business/process-and-systems##eligibility

4.3 EMBEDDED ENERGY MANAGER

Hydro One's Embedded Energy Manager (EEM) program provides incentive based funding to hire a dedicated energy manager to oversee, manage, and implement energy-efficiency projects. The funding is performance based, meaning that funding is provided based on the amount of electricity saved per year ($40 per MWh, up to

$150,000 per year). Please note that cost savings as a result from reducing electricity consumption can also be significant.

The EEM program is suited for industrial facilities, large commercial buildings, institutions, and municipal buildings. Please note that to be eligible, participants must be able to save at least 1,000 MWh of electricity annually. Participants with five or more facilities across different service areas may be eligible to qualify for the Multi-Site Customer Energy Manager program, and receive an upfront payment of $40,000 to hire an energy manager.

More information: www.hydroone.com/saving-money-and-energy/business/energy-manager

4.4 MONITORING AND TARGETING

Hydro One and SaveONenergy provide funding for monitoring and analyzing energy consumption and performance for commercial customers. Monitoring and targeting initiatives can be funded under either the Retrofit Program or the Process and Systems Upgrades program. Eligible facilities include manufacturing facilities, commercial buildings, municipal buildings, apartment complexes, hospitals and healthcare facilities, schools, colleges, universities, greenhouses, and hotels.

Additional information: www.hydroone.com/saving-money-and-energy/business/monitoring-and-targeting

4.5 RETROFIT PROGRAM

The Retrofit Program is offered by Hydro One and SaveONenergy. Commercial customers can receive up to 50% off the cost of retrofitting older equipment to more energy efficient equipment. Under the program, there are two tracks – prescriptive and custom. The prescriptive track offers incentives for projects from a set list of measures. The custom track offers incentives for measures not covered under the prescriptive track. Eligible facilities include commercial buildings, institutional buildings, industrial facilities, agribusinesses, and multi-residential buildings.

Additional information: www.hydroone.com/saving-money-and-energy/business/retrofit-program

4.6 HIGH PERFORMANCE NEW CONSTRUCTION

Incentives are available to increase the energy efficiency of new construction from Hydro One and SaveONenergy. These incentives are based on the size of the project. Engineered and custom incentives are available. Agribusiness projects may qualify for prescriptive incentives. Potential participants must apply for

incentives within 60 days of applying for building permit.

Additional information:

www.hydroone.com/saving-money-and-energy/business/high-performance-new-construction##apply

4.7 SMALL BUSINESS LIGHTING

The Small Business Lighting program is offered by Hydro One and SaveONenergy. Qualifying participants may be eligible for up to $2,000 in lighting upgrades. Eligible participants include retail businesses, restaurants, bars, clubs, agriculture, and light industrial.

Additional information: www.hydroone.com/saving-money-and-energy/business/small-business-lighting

4.8 DEMAND RESPONSE

Demand Response is increasingly being recognized as an effective way to reduce the cost of power and the need to build additional electricity generation capacity. Demand Response can be incorporated into an overall energy cost management strategy.

Additional information: https://saveonenergy.ca/Business/Program-Overviews/Demand-Response.aspx

4.9 ENBRIDGE INCENTIVES

Enbridge offers a number of incentives and programs to help commercial customers save natural gas consumption. These include:

- Commercial Custom Retrofit Program;
- Fixed Incentive Program;
- Limited Time Boiler Incentive Campaign;
- Limited Time Double Incentive Campaign; and
- RunitRight Program.

Additional information:

www.enbridgegas.com/businesses/energy-management/industrial/programs/fixed-incentives.aspx

4.10 UNION GAS INCENTIVES

Union Gas offers a number of incentives and programs to help commercial customers save natural gas consumption. These include:

- Space Heating Incentives;
- Water Heating Incentives;
- Food Service Incentives;
- Custom Engineering Incentives; and
- Commercial Savings by Design.

Additional information: www.uniongas.com/business/save-money-and-energy

4.11 INDUSTRIAL ACCELERATOR PROGRAM

The IESO's Industrial Accelerator Program provides financial incentives to encourage investment in innovative processes and equipment to reduce electricity consumption. These incentives are geared towards large industrial users that are connected directly to the transmission grid.

Additional Information: www.ieso.ca/Pages/Participate/Industrial-Accelerator-Program/Default.aspx

4.12 NATURAL GAS GRANT PROGRAM

The Natural Gas Grant Program, offered by Infrastructure Ontario, supports natural gas expansion projects in municipalities and First Nations. Please note that the future of this program in relation to the cancellation of the Ontario Green Fund is not known at this time.

Additional Information: http://www.infrastructureontario.ca/NGGP/