

6/1/2019



# Corporate Energy Management Plan for the Municipality of Brooke-Alvinston: 2019 Update

## Table of Contents

Introduction .....	2
2014-2019 Plan Target .....	2
Baseline .....	2
2014-2019 Results Summary.....	3
A Success Story.....	4
Energy Reduction Investments: July 2014 to June 2019.....	5
Additional Projects Unaccounted for in the numbers .....	6
Backup Generation.....	6
New Drivers to Energy Usage.....	6
Benefits of a Focus on Reduced Energy Consumption.....	7
Looking Forward: The Next 5 Years.....	7
Our Commitment for 2019-2024 .....	7
Financial .....	7
Outside Funding Sources.....	7
Project Proposals and Selection.....	8
Flexibility .....	8
Future Opportunities.....	8
Alvinston Arena and Community Hall .....	8
Fresh water booster station .....	8
Alvinston sewage plant blowers.....	9
Inwood Sewage Pumps .....	9
Alvinston Ball Park.....	9
Main office .....	9
Post Office .....	9
Solar Photovoltaic Electricity Net Metering and/or Solar Thermal Energy .....	9

## Introduction

This update is further to Brooke Alvinston's Conservation and Demand Management Plan July 1, 2014, and to comply with the below listed Ontario regulations which state as outlined below:

<https://www.ontario.ca/laws/regulation/r11397> - O. Reg. 397/11

<https://www.ontario.ca/laws/regulation/180507> - O. Reg. 507/18

*On or before July 1, 2019 and on or before every fifth anniversary thereafter, every public agency shall publish on its website and intranet site, if it has either or both, and make available to the public in printed form at its head office all of the information that is required to be published and made available under subsection (1), the Energy Consumption and Greenhouse Gas Emission Template that is required to be submitted and published on or before July 1 of that year and the following information:*

- ⇒ *A revised forecast of the expected results of the current and proposed measures.*
- ⇒ *A description of any proposed changes to be made to assist the public agency in reaching any targets it has established or forecasts it has made.*
- ⇒ *A description of current and proposed measures for conserving and otherwise reducing energy consumption and managing its demand for energy.*

## 2014-2019 Plan Target

In 2014, the Municipality of Brooke-Alvinston committed to work to reduce all O-Reg 397/11 reportable energy consumption by 2%/yr (10% over 5 years) vs 2012 usage.

## Baseline

Brooke-Alvinston's 2012 baseline O-Reg 397/11 reported energy consumption is summarized in **Table 1** below. Since streetlights use significant amount of energy, they have also been included for reference and context.

Table 1

Address	Description	Electricity Usage (kWh)	Natural Gas Usage (M <sup>3</sup> )	Approx. Total equivalent energy (*GJ)
3310 Walnut Street, Alvinston	Community Center-arena	444,031	42,323	3,218.1
3110 River Street, Alvinston	Wastewater Treatment	163,560	0	588.8
3236 River Street, Alvinston	Municipal Office	33,627	7,602	412.0
3188 Church Street, Alvinston	Water Pumping Station	77,880	0	280.4
3267 Nauvoo Road, Alvinston	Alvinston Firehall	19,576	2,903	181.6
3251 River Street, Alvinston	Alvinston Library	17,926	1,401	118.1
6504 James Street, Inwood	Inwood Library	not reported	1,110	42.5
3332 River Street, Alvinston	Sewage pump station	5,952	54	23.5
3251 Elgin Street, Alvinston	Town Shop	2,382	266	18.8
Alvinston Water Tower, Alvinston	Water Tower	not reported	0	NA
6479 Holmes St (Concession 5, Lot 3), Inwood	Sewage Pump Station	not reported	0	NA
7954 Brooke Line, Brooke	Public Works Yard & Buildings	not reported	not reported	NA
<b>Total</b>		<b>764,934</b>	<b>55,659</b>	<b>4,884</b>
Streetlights	Streetlights	125,865	0	453.1
<b>Total Combined</b>		<b>890,799</b>	<b>55,659</b>	<b>5,337</b>

\*1 GJ is equivalent to about 277.8kWh of energy.

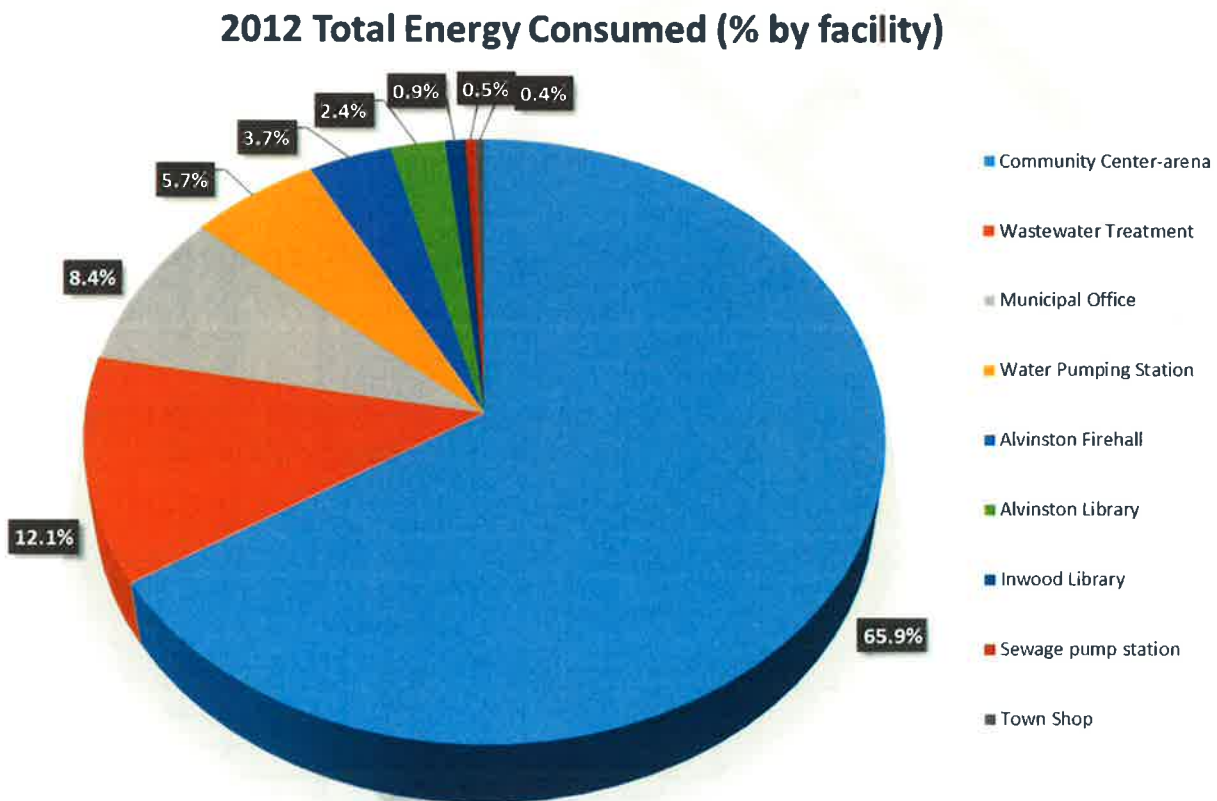
A few facilities were not reported, or only partially reported on in 2012, due to unavailability of data at the time of reporting. These facilities have been reported on in subsequent years.

**Figure 1** below shows that in reference year 2012, 86.4% of the total reported energy consumed was by the following top three energy consuming facilities.

- Community Centre / Arena (65.9%)
- Wastewater Treatment Plant (12.1%)
- Municipal Office (8.4%)

Outside of street lighting, these facilities are where the majority of conservation efforts were focussed in the last 5 years.

Figure 1



### 2014-2019 Results Summary

Due to the commodity cost and assistance from Bluewater Power, the focus of 2014-2019 was primarily on electricity savings (avoided costs). It is estimated that the Municipality of Brooke-Alvinston will have achieved the following approximate levels of avoided energy usage between July 1, 2014 and July 1, 2019:

**Reportable Facilities**

- 96,262kWh/yr (347GJ/yr) electricity reduction at O-Reg. reportable facilities
  - 13% reduction in annual O-Reg. reportable *electricity* vs. 2012 baseline
  - **7.1%** reduction in annual O-Reg. reportable *total energy* vs. 2012 baseline

**Street Lights**

- 81,117 kWh/yr electricity reduction via street lighting LED retrofits
  - Equivalent to more than 11% of the Brooke-Alvinston's O-Reg. reportable 2012 electricity consumption or 6% of the total 2012 reportable energy consumption (including natural gas)

**Combined (Reportable Facilities + Street Lights together)**

- 177,379 kWh/yr (638.6GJ/yr) electricity reduction
  - 20% Total electricity reduction versus 2012
  - 12% Total energy reduction versus 2012

Of the figures above, the 7.1% reduction is measured against the 10% total reportable energy reduction targeted by Brooke-Alvinston. While this falls slightly short, it is important to take this in context of the overall energy reduction investments made by Brooke-Alvinston over the last 5 years. They can be seen in **Table 2** below.

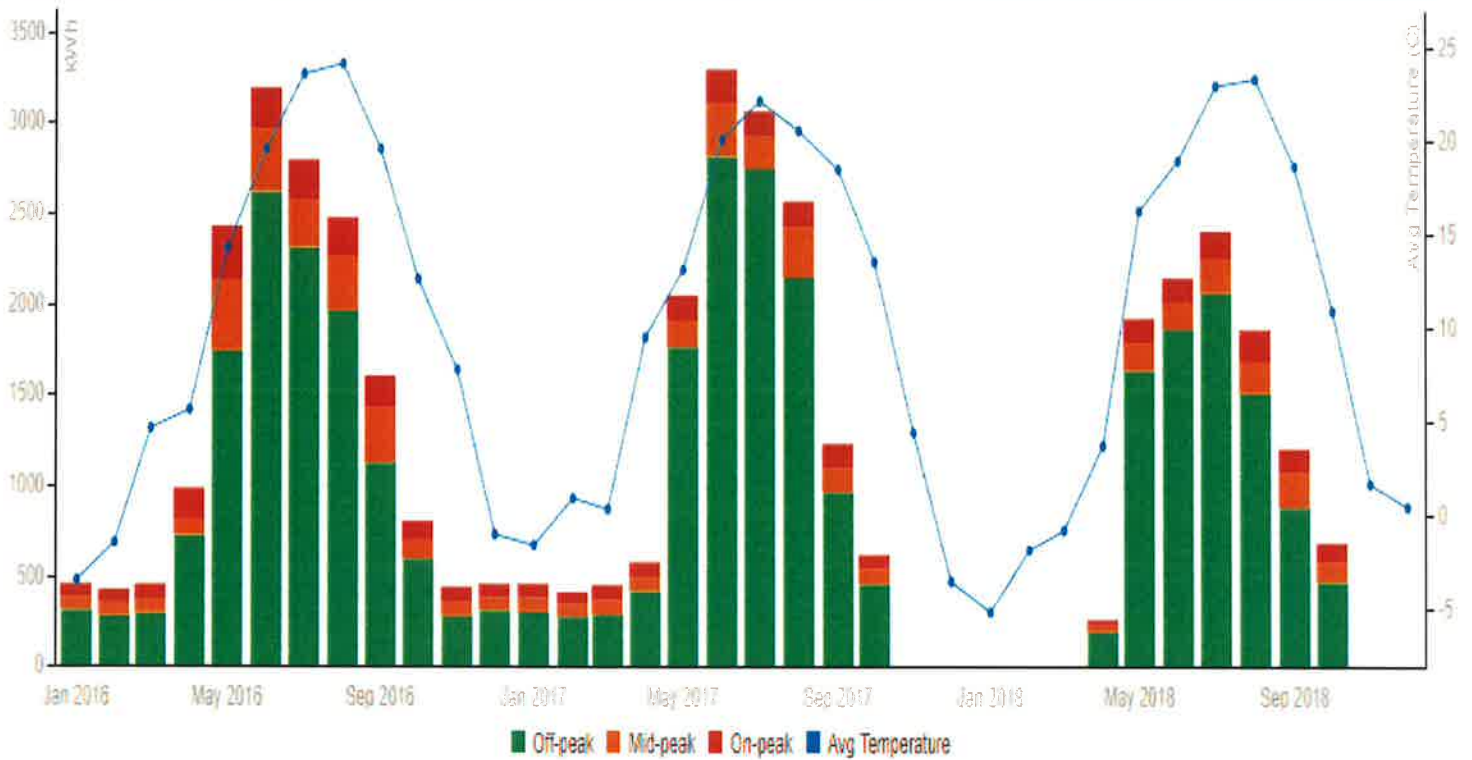
**A Success Story**

Not all energy efficiency improvements come from purchasing equipment or services. Often it's just the result of staff commitment to good energy habits – such as turning off the lights when last to leave the room. Sometimes successes come from staff going the extra mile to improve operational efficiency. One of the most interesting examples of such a success story over the last several years began at the end of the 2017 season at the 3310 Walnut Baseball Park. The Public Works Manager, with the help of Bluewater Power, noticed unexplained usage on hourly electric utility charts for this account. The Public Works Manager was able to reduce average annual consumption on site by about 5,740 kWh/yr or **35%** - all at **no** cost!

**Figure 2** below shows the usage-reduction that took place in 2018 compared to the two previous years. Persistent efforts to figure out and correct the cause of wasted energy usage played a key roll in making this happen. The municipality saved approximately **\$660/yr** in energy costs alone with this finding.

Over the last 5 years, more of a culture of conservation has developed in staff at the Municipality of Brooke-Alvinston and they are often on the lookout for ways to reduce wasted energy and operating costs.

Figure 2



### Energy Reduction Investments: July 2014 to June 2019

Table 2

Projects Completed 2014-2019

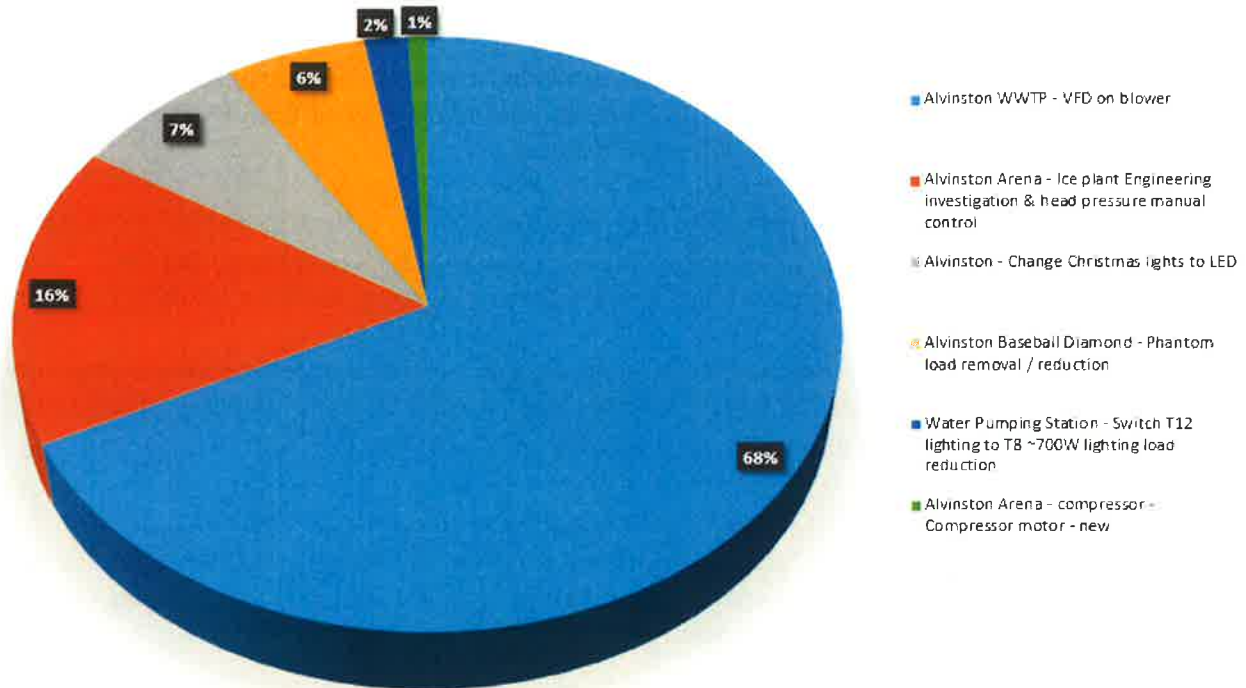
Location	Project	Approx Start Date	Approx Finish Date	Approx Cost	Incentives Received	Approx Electricity saved (kWh/yr)	Approx Energy saved (GJ/yr)
Alvinston WWTP	2 new blowers and VFD's	10-Jul-17	31-Dec-17	\$ 50,025.00	\$ 6,499.70	64,997	234.0
Alvinston Arena	Ice plant Engineering investigation & head pressure manual control	01-Jun-18	13-Jul-18	\$ 23,595.00	\$ 9,950.00	15,754	56.7
Alvinston	Change Christmas lights to LED	08-Nov-18	08-Nov-18	\$ 1,996.80	358.8	7,176	25.8
Alvinston Baseball Diamond	Phantom load removal / reduction	24-Oct-17	ongoing	\$ -	\$ -	5,740	20.7
Water Pumping Station	Switch T12 lighting to T8 ~700W lighting load reduction	28-Jan-14	28-Jan-14	\$ 1,459.00	\$ 1,459.00	1,825	6.6
Alvinston Arena - compressor	Compressor motor - new	17-Nov-17	17-Dec-17	\$ 3,255.00	\$ 177.00	770	2.8
TOTAL						96,262	347

% Electricity reduction vs 2012 reported	13%
% Energy reduction vs 2012 reported	7.1%

Figure 3 shows where most the reported energy savings came from in the last 5 years. It is clear to see the enormous impact of the Blower VFD and Arena ice plant optimization. Together they account for 84% of the Total estimated energy savings across 2012 reportable facilities.

Figure 3

### 2014-2019 Annual Reportable Energy Savings % Achieved vs. 2012 Baseline by Project



#### Additional Projects Unaccounted for in the numbers

Sometimes capital projects with a potential energy component cannot have the energy savings verified for technical or other resource challenges. Some examples of these projects that were completed in the last 5 years are listed below:

- 2015. Main office building: New Energy-Star rated windows & insulation upstairs in the main office building
- 2016. Arena: 1 new motor and VFD for compressors
- 2016-17. Brooke public works:
  - 2016 New radiant gas heaters on ceiling replacing old convection heaters.
  - 2017 New furnace & A/C in office (replacing old)
- 2018. Ballpark: Installed motion sensors on lights at washroom and canteen
- 2018. 3251 River St library: 2 x 2-lamp T12 fixtures were upgraded to LED

#### Backup Generation

In 2018, a new propane generator was installed at the Waste Water Treatment Plant. This replaced the old diesel generator which was moved to the shop at 7954 Brooke Line.

#### New Drivers to Energy Usage

In our growing / dynamic municipality, there are always going to be drivers to increased energy usage which will have an effect on the total billed and reported energy used outside the cope of measures taken to reduce consumption. Some of those factors which have been identified for Brooke-Alvinston are as follows:

- 2017-18 Municipal Office space conversions
  - 2017 - Empty space converted to part time employee & recreational meeting space
  - 2018 - Early years program started using space mornings/wk

- New environmental regulations are going to require UV (Ultraviolet) treatment system to be installed at the wastewater treatment plant in place of chlorination by December 31, 2020. This is anticipated to significantly increase energy usage on site in the future.

### Benefits of a Focus on Reduced Energy Consumption

There are the obvious direct quantitative benefits of, and resulting from, reduced energy consumption (such as lower energy bills). However there are qualitative “spin-off” benefits that have resulted from Brooke-Alvinston’s efforts to reduce energy consumption. Examples of this include the following:

- A greater staff awareness of energy usage and costs resulting in habits such as turning of lights when not required and being on the lookout for and reporting other energy / cost savings opportunities.
- Lifecycle costing (including energy costs) is more of a factor in purchasing decisions resulting in better long-term value in capital purchases.
- More advance planning and consultative involvement with Bluewater Power when making energy-using equipment and other changes so that decisions can be made using the best information available and applications can be made and approved for available electrical efficiency incentives.

### Looking Forward: The Next 5 Years

Brooke-Alvinston is proud to have made significant strides in terms of energy reduction over the last 5 years. Investments were made in projects which have combined verified and theoretical energy savings far exceeding the target we set out to achieve. We are proud of the work that has been done to achieve this.

### Lessons Learned

#### Our Commitment for 2019-2024

Looking forward to the next 5 years, Brooke-Alvinston commits to continue to actively look for ways to maintain energy reductions that have been achieved and to pursue further opportunities to reduce energy consumption and invest in renewables in an economically viable and responsible manner.

#### Financial

Brooke-Alvinston Council will deliberate in the 2020 budget, allocating additional monies into a reserve, earmarked to be used specifically for any individual or portfolio of renewable energy or energy. It is anticipated \$15,000 will be required to maintain momentum in energy efficiency and innovation in the Municipality of Brooke-Alvinston.

As things like simple LED lighting projects become implemented, and more sophisticated projects rise to the top of the opportunities list, the reserve money may also be used as required for items such as investigative engineering and sub-metering costs. These may sometimes be necessary to provide sufficient data for project consideration. All expenditures and projects must also otherwise meet with the satisfaction of Staff and Council. Through certain capital expenditures outside the scope of these funds, additional energy savings may also be accrued. Funds unused in any one year would be carried forward to the next, in order to have sufficient reserves to pay for desired projects with a higher cost.

#### Outside Funding Sources

Brooke-Alvinston will investigate and utilize utility grants and other sources of available funding when available, to assist with stretching the available funding to make the most of available opportunities and get the most value for the tax payer.



### Project Proposals and Selection

Project selection and preparation for Council consideration will be the responsibility of the Energy Committee, consisting of the below-listed staff, and as may change from time-to-time at the discretion of Council:

- Clerk-Administrator
- Treasurer
- Public works Manager

The Energy Committee or Council may choose to have representatives from Bluewater Power, or other staff or Council members as may be deemed beneficial. The Energy Committee will meet together at least twice a year to discuss and prioritize related matters and ensure project proposals are available for Council consideration at least once per year in time for budget deliberations and to ensure that Energy Reserves are being responsibly allocated. Council would still have final say on whether or not to proceed with any project.

### Flexibility

The benefits of an energy efficiency the tax-payers can and often do far exceed the simple direct economic impacts of the cost of energy. With that in mind, the Municipality of Brooke-Alvinston is committed to considering other factors outside of direct cost-of-energy impacts and simple payback when evaluating projects. Thus, any energy-related project may be considered if it makes sense for the community and is in alignment with Strategic Plan.

### Future Opportunities

The following is a short list of some specific areas for investigation and consideration of opportunities over the next 5 years. Staff have in some cases, already begun some of the initial investigations and further details may be on file. This is not an exhaustive list. The areas of opportunity will change over time as may be influenced by a variety of factors.

#### Alvinston Arena and Community Hall

- New flat-plate chiller
- Ice Pad lights
- Remainder of lights
- Occupancy sensors in washrooms / change rooms
- Cold water ice resurfacing
- Ice plant optimization (ongoing monitoring)
- VFD's on motors / brine pumps
- Standby controls on vending machines
- Balance of mechanicals – A/C, furnace, dehumidifier
- Building Energy Modelling
- BAS & Energy Monitoring upgrades
- Thermostat controls / smart thermostats throughout facility – particularly on upper level

#### Fresh water booster station

- Investigate possible bypass of this plant
  - Was built in 1974 when Alvinston's water used to come from the Sydenham River. No longer technically required to provide sufficient water pressure to Alvinston.
  - Potential energy reduction is about 108,000kWh/yr
    - Greater energy savings potential than all combined non-street-lighting projects completed from 2014-2019
    - Cost savings on electricity, maintenance and inspections

#### Alvinston sewage plant blowers

- Install sub-meters on blowers
- Possible improved controls by measurement of dissolved oxygen content
- Continual monitoring and commissioning through smart communications / controls
- Sub metering of new UV system
- Ensure controls of new UV system in place to minimize / optimize run-time

#### Inwood Sewage Pumps

- Pump motors are circa 2008 and may be a candidate for some efficiency upgrades
  - To investigate options

#### Alvinston Ball Park

- Lighting (possible LED and/or controls)

#### Main office

- Lighting to LED
- Lighting controls

#### Post Office

- Lighting to LED
- Lighting controls

#### Solar Photovoltaic Electricity Net Metering and/or Solar Thermal Energy

For several years, Brooke-Alvinston has been unable to participate in solar PV projects due to capacity issues on the feeders and transformers to Alvinston from Hydro One. At the time of writing this document, there is over 5442kW of capacity for solar on the Wanstead M1 feeder. Thus, previous capacity issues are not currently a barrier to Brooke-Alvinston implementing solar photovoltaic electricity generation. However, due to a Hydro One safety limit calculation, that limits connected electricity generator capacity based on a % of connected load, the limiting factor is now the connected load. Thus, it is at capacity, and there are no upgrades available that will allow more generation to be connected.

That said, should loads someday greatly increase in Brooke-Alvinston, with the enormous roof space and electricity usage on-site, the **Alvinston Arena** would be an excellent location and candidate for further investigation for solar PV generation and Net Metering.

Further investigation would be needed to determine whether the **Alvinston WWTP**, located directly on Hydro One's broader network, would run into similar load-limited restrictions. If not, this may be an excellent location for net metering due to the high usage and sturdy flat roof. The limited roof space would permit only a fraction of the site's total energy usage to be eliminated from the bills, but this would require proportionally lower investment to get started and still be a benefit to the taxpayer and to the environment.