

Energy Benchmarking Case Study

Greening Sacred Spaces
Ottawa - Webinar

Presenter: Steven Law, P. Eng.
Holy Trinity Anglican Church
(Thornhill, Ontario)

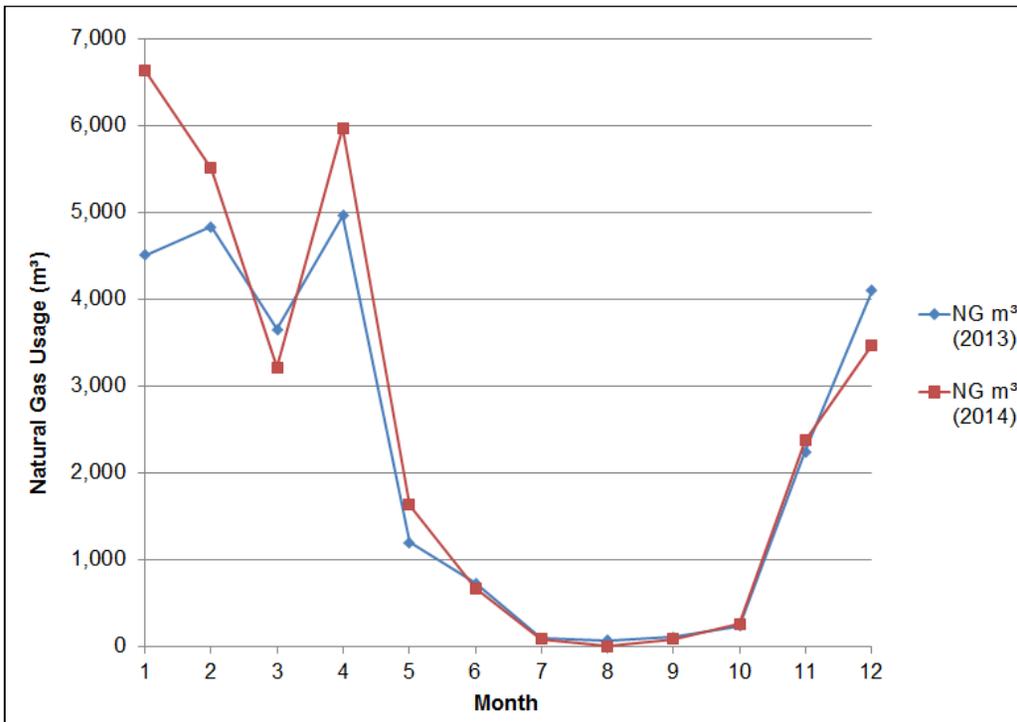
November 13, 2019



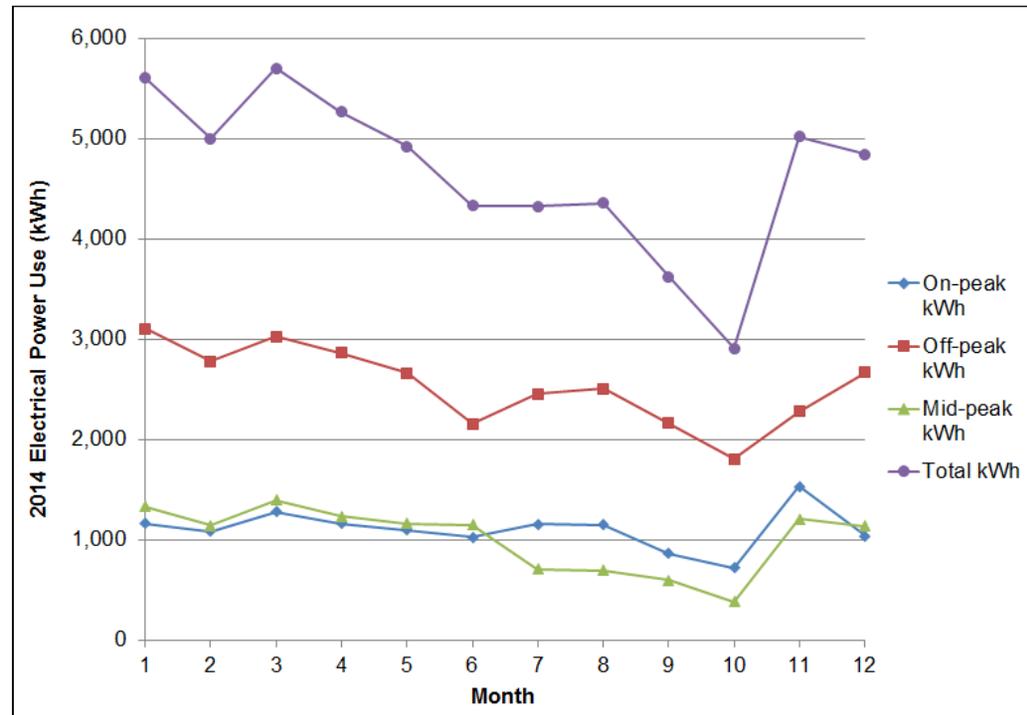
How did we get here? Let's start from the beginning

- “ In 2015, the local Diocese asked each parish to discuss climate change and commit to learn more, understand better and act responsibly and faithfully
- “ February 2015 Vestry Motion: That the parish supports the Diocese's advocacy ... for responsible and effective policy on climate change. Furthermore, that the Advisory Board investigates opportunities ... to reduce our local carbon footprint over the next year, and reports on results and recommendations for future action to the 2016 vestry
- “ We assembled a few volunteers for our “green team” one of which was our property manager (this is very important!)
- “ We worked to prepare a preliminary energy use data set (2013-2014) and a facility asset inventory with our property manager

2013-2014 Energy Consumption Monthly Trends



Natural Gas



Electricity

2015 Asset Inventory – Church (1 of 2)

- “ Wood frame construction with wood siding (Ontario Historical Designation)
- “ Originally built in 1830, expanded in 1840, and again in 1950 with the addition of the Sanctuary when the building was dismantled and moved to the new site on Brooke Street
- “ The building now has 4,400 ft² on each of the main floor and basement, plus 1,260 ft² in the balcony
- “ Wall insulation was upgraded to fibreglass in 1980
- “ Roof has approximately R20 loose fill insulation in the attic
- “ The windows are stained glass with external acrylic storm cover

2015 Asset Inventory – Church (2 of 2)

- “ The basement windows are double glazed vinyl windows (most upgraded with new windows in 2012)
- “ The furnaces are forced air gas (2 x 150 MBTU/hr) replaced in 2006 (80% efficiency)
- “ Air conditioners (2 x 2.5 Tons) are part of the air system (one condenser renewed in 2012). Air dampers are adjusted seasonally for maximum comfort. The heating/cooling functions are controlled by a programmable thermostat
- “ Fluorescent lighting in the basement, where there is a full day nursery school, was upgraded to electronic ballast
- “ Many pot lights in the Nave and Sanctuary are CFL's

2015 Asset Inventory – Rest of Building (1 of 2)

- “ Built in 1960 of cinder-concrete block construction basement with brick veneer on the above grade walls and a sloping wood beam cathedral ceiling in the Auditorium
- “ Total area of the hallway, rooms and Auditorium is 11,700 ft² on two levels
- “ Heating system is circulating hot water with baseboard fin fan radiators
- “ The gas fired boilers (2x 525 MBTU/hr) were replaced in 2006 (80% efficiency)
- “ Controller is a programmable indoor/outdoor temperature compensator
- “ The Auditorium lights were upgraded to 85 watt CFLs in 2010

2015 Asset Inventory – Rest of Building (2 of 2)

- “ The Auditorium has a supplemental fan heating system that blows air across a hot water radiator for distribution in the Auditorium. The Air Conditioner (2 x 3 Ton) is incorporated in this system (installed 1998, condensers were replaced in 2014). The system is controlled by a 7 day programmable thermostat
- “ The windows in the Auditorium have been upgraded in 1998 to double hung, double glazed wood frame
- “ The windows in all the other rooms (upper and lower floors) were upgraded to double hung, double glazed fibreglass frame in 2004
- “ The washroom exhaust fan system has a timer to control hours of operation
- “ Exterior security lights (one is LED) are on timers or electric eye

In 2016 we did a comprehensive **Green Audit**

- “ We applied for and received \$1,000 funding from Greening Sacred Spaces to conduct a **Green Audit** based on the emissions analysis and findings documented in 2015, for which we had to contribute an additional \$500 of our own funds
- “ A representative from Greening Sacred Spaces arrived on the morning of June 23, 2016 to lead the **Green Audit** in association with our green team
- “ We learned that our facility is relatively energy efficient compared to other local churches due to regular upgrades over the years
- “ We received a **Green Audit** Report from which we built our own project management system and began to pick the “low hanging fruit” with mostly volunteer efforts and limited funding

Green Audit Report

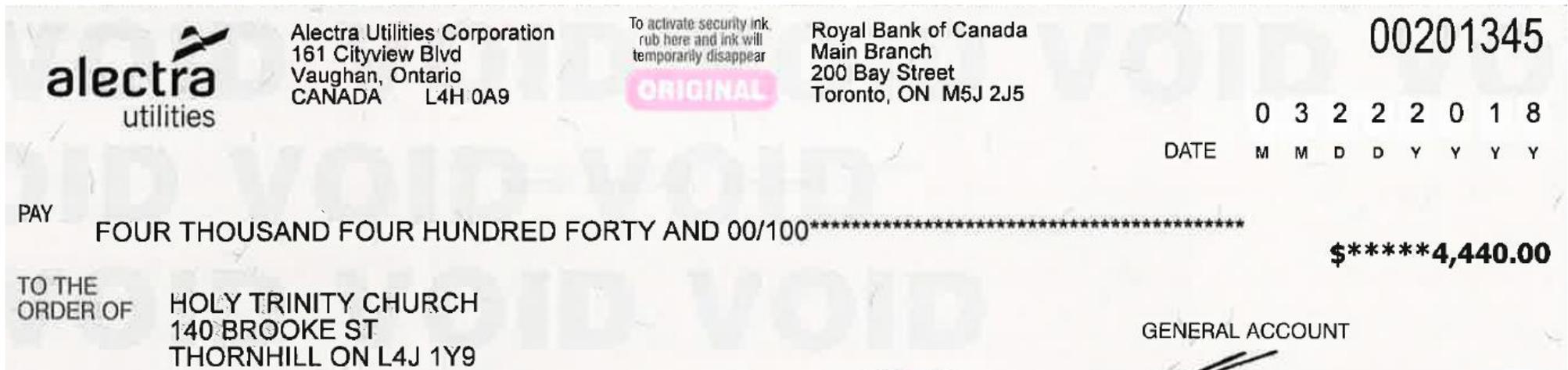
- ” The **Green Audit** Report included recommendations related to:
- Section 1 – Building Envelope (includes insulation, windows, doors, space heating, water heating, lighting, technology, appliances and renewable energy)
 - Section 2 – Water Efficiency (includes water usage, fixtures, faucets)
 - Section 3 – Kitchen and Washrooms (includes recycling, composting, waste management, dishes and cutlery)
 - Section 4 – Air Quality (includes furnace filters, ductwork, vacuuming, candles, cleaning products, scent free policy, smoking)
 - Section 5 – Property (includes pesticide and fertilizer use, storm water management, landscaping, gardening, parking and paving)
 - Section 6 – Renovations and Construction (future considerations)
 - Section 7 – Activities (includes financial, religious, secular)

Early “Low Cost” Projects (late 2016)

- “ Early work was a success for a very low cost due to tremendous effort by **Green Team** volunteers
- “ Several items were technically done already and are now confirmed
- “ Programmable thermostats locked and only adjusted by **Green Team**
- “ Replace light bulbs with LED – 8 bulbs in the choir area, 7 in the Nave lights, 8 in one chandelier and one in the Reception room
- “ Cover fan openings in the balcony rooms (no one knew these legacy openings existed - covers resulted in an energy savings)
- “ All exterior lights have timer or light sensors
- “ Door trim has now been upgraded on most doors

In 2017 we took on a big LED retrofit project

- “ Work package #1: replace 236 interior fluorescent and incandescent lights
- “ Work package #2: replace the 6 exterior security lights and the lights for the main altar stained glass windows
- “ Most fluorescent fixtures required changing the ballast to electronic



We also made our first effort at public outreach

“ In December 2017 we were featured in a full page write-up on page 7 in The Anglican to describe our **green team** projects!

PAGE 2

**Program revives
lay leaders**

PAGE 7

**Church reduces
carbon footprint**



PAGE 10

**Group supports
church secretaries**

The Anglican

THE NEWSPAPER OF THE DIOCESE OF TORONTO

A SECTION OF THE ANGLICAN JOURNAL

www.toronto.anglican.ca

DECEMBER 2017

Data analysis – what are our options?

Energy Star Portfolio Manager

You've heard it before: you can't manage what you don't measure. That's why ENERGY STAR Portfolio Manager was created. It's a free, online tool that NRCAN has adapted from the US EPA and which we are using to help you measure and track your faith building's energy consumption and greenhouse gas emissions. With your newly established ENERGY STAR Portfolio Manager account, you can monitor, rate and optimize your building's energy use – all in a secure online environment.

www.nrcan.gc.ca/energy/efficiency/buildings/energy-benchmarking/3691



- “ Analyzing energy and emission data is a chore for unpaid volunteers!
- “ Can we get someone else to do it??

Baseline Performance Report

Year Ending 2017

Faith Community: Holy Trinity Anglican Church

Address: 140 Brooke Street, Vaughan, Ontario, L4J 1Y9

Occupancy: 20%

Square Footage: 21700 ft²

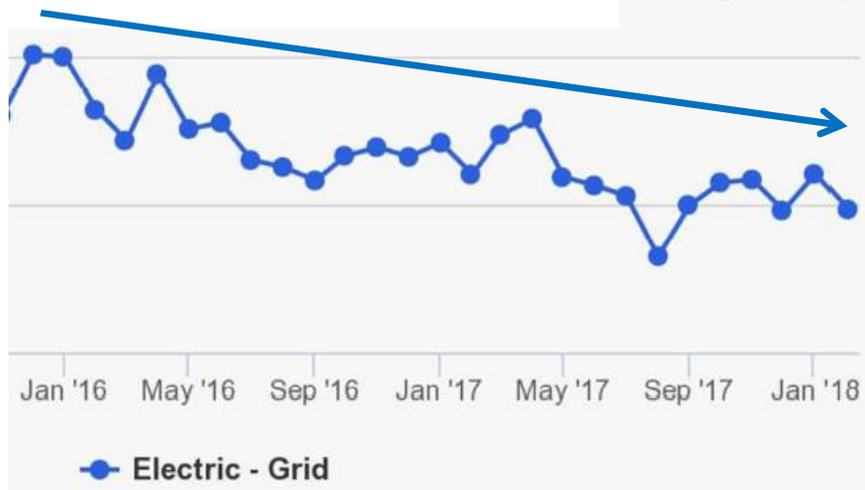
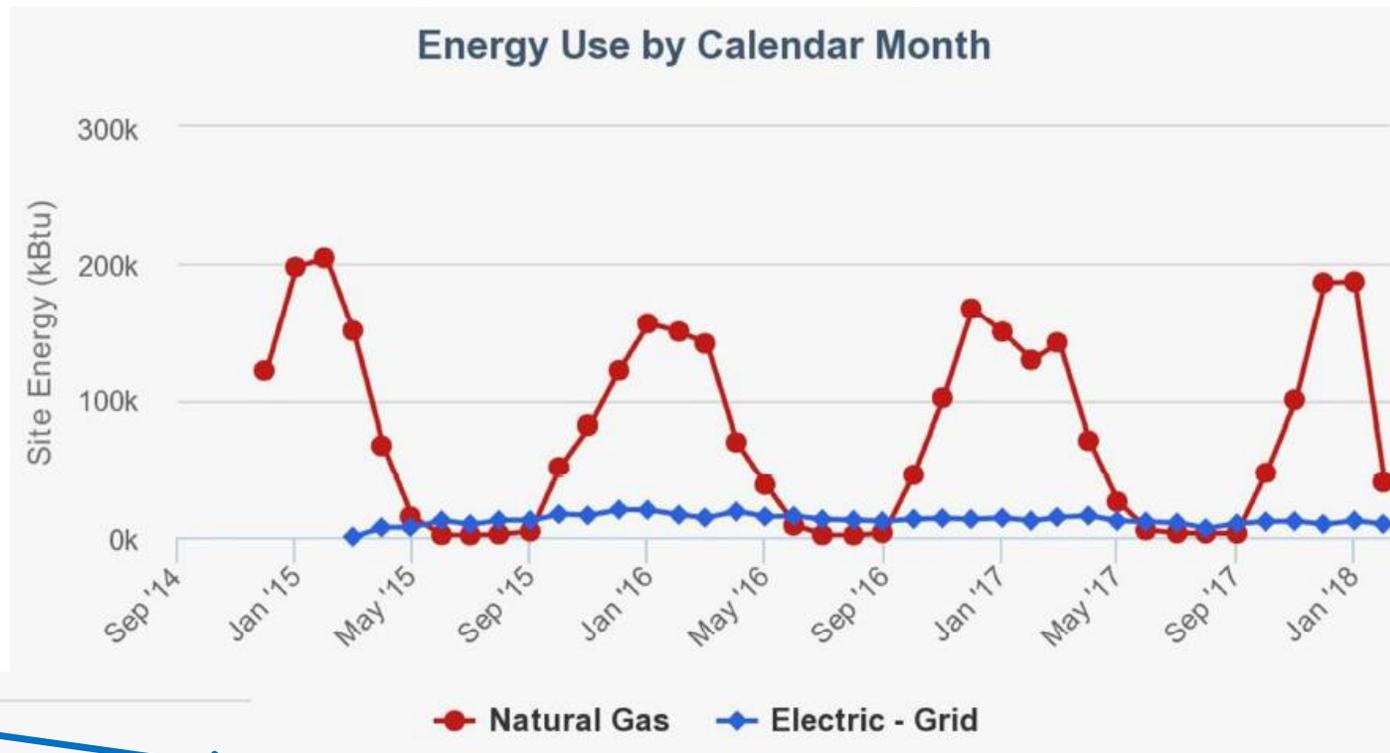
Year Built: 1830

Annualized Comparisons	2016 (Baseline Year)	2017	% Change 2017 vs. Baseline
Weather Normalized Site EUI (kBtu/ft ²)	53.8	49.8	-8%
Total Electricity (kWh)	52,021.6	40,890.4	-27%
Total Natural Gas (m ³)	24,789	24,236.7	-2%
Total Direct GHG Emissions (tonnes CO ₂ e)	48.2	46.8	-3%
Total Energy Cost (\$)	17,303.33	14,853.76	-16%

Comparison: Your Weather Normalized Site EUI 2016-2017

- “ In January 2018 we joined the Faith Building Energy Benchmarking Program
- “ Our first report was received in April 2018 and showed us the building’s weather normalized EUI (energy use intensity)
- “ The EUI expresses a building’s energy use as a function of its size
- “ It’s calculated by dividing the total energy consumed in one year by the total gross floor area of the building

“ Our energy use trends from the benchmarking report for electricity and natural gas show a reduction already!



“ In Ontario, the electric grid has relatively low GHG emissions, so the big prize will be to cut down on natural gas use for heating at some point in the future

And we did great in the 2018 award season!



ClimateWise
Business Network

**Evening of
Recognition**
2018

**Celebrating York Region Business
Sustainability Achievements**

Thursday, May 31, 2018, 5:pm-8:pm
GM Technical Centre, Markham, Ontario

2018
Faith & the Common Good
presented to
**Holy Trinity
Thornhill**



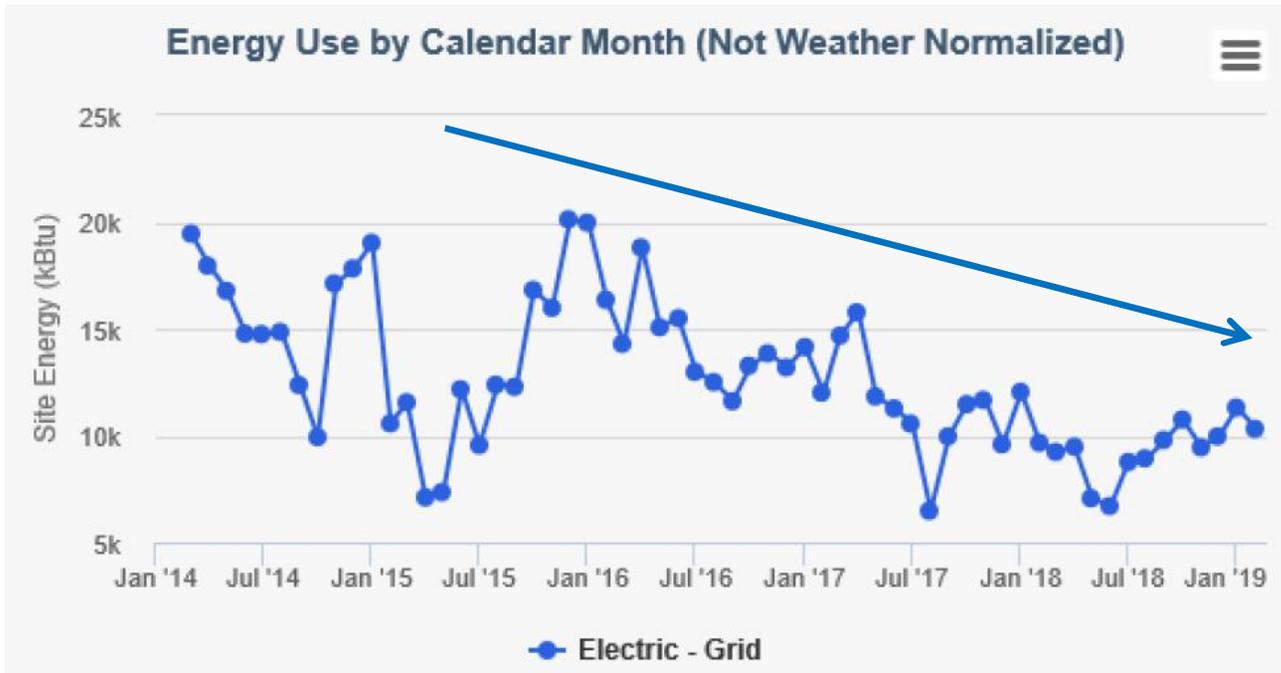
ClimateWise
Business Network

We then made our second effort at public outreach

“ ClimateWise organized an event for faith based communities and we hosted it at our parish

“ This webinar is based on the presentation that I gave at the event!

Event		
Stewardship for Faith Buildings		
Date+Time	Location	Name
Sunday, 16 September 2018 from 2:30 PM to 4:30 PM (EDT)	Holy Trinity Anglican Church, Thornhill 140 Brooke Street Thornhill, ON L4J 1Y9 Canada	Steven Law
Order Info		Payment Status
Order #803640211. Ordered by Steven Law on 1 August 2018 9:17 PM		Free Order
Type		
	General Admission	



“ We are now saving about \$3,500 each year on our electricity bills compared to our baseline back in 2016!

“ Our second report was received in 2019 and showed us that the LED lighting and other projects have had a major impact

“ Our electricity usage and associated costs to purchase electricity are much lower now

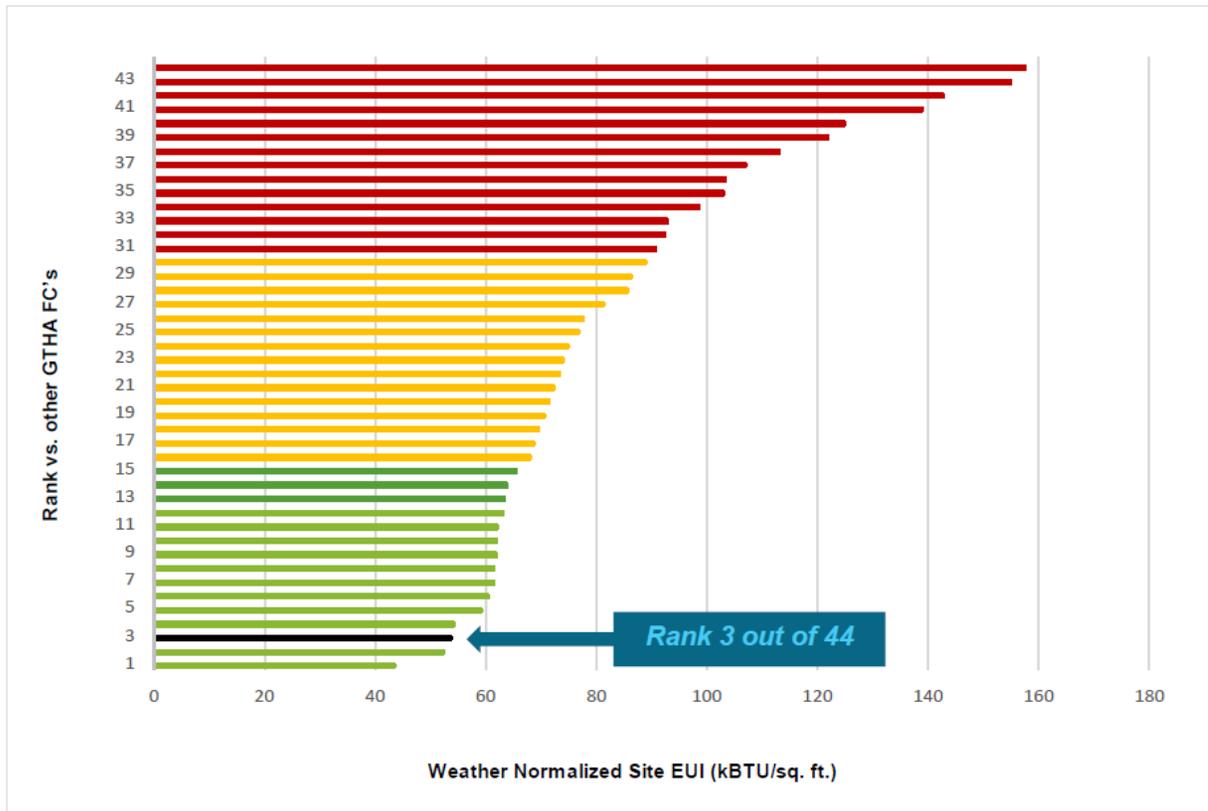
“ It is very helpful to have this information shown as a trend over time to help tell our story to the parish and others

Holy Trinity Anglican Church

Weather Normalized Site EUI Score: 53.6 kBTU/sq. ft.

Rank of GTHA Faith Communities: 3 out of 44

Each bar below in the graph below represents a single faith building's EUI score



“ New for 2019 is a ranking of faith communities in the annual report for the “Greater Toronto and Hamilton Area” (GTHA)

“ Our rank of 3rd out of 44 was a delightful surprise!

“ This has only encouraged us to do more, since the parish is more invested than before due to the tangible evidence the report provides to justify the funds spent to date

About the presenter:
Renewable Energy
training instructor



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Thanks for attending!