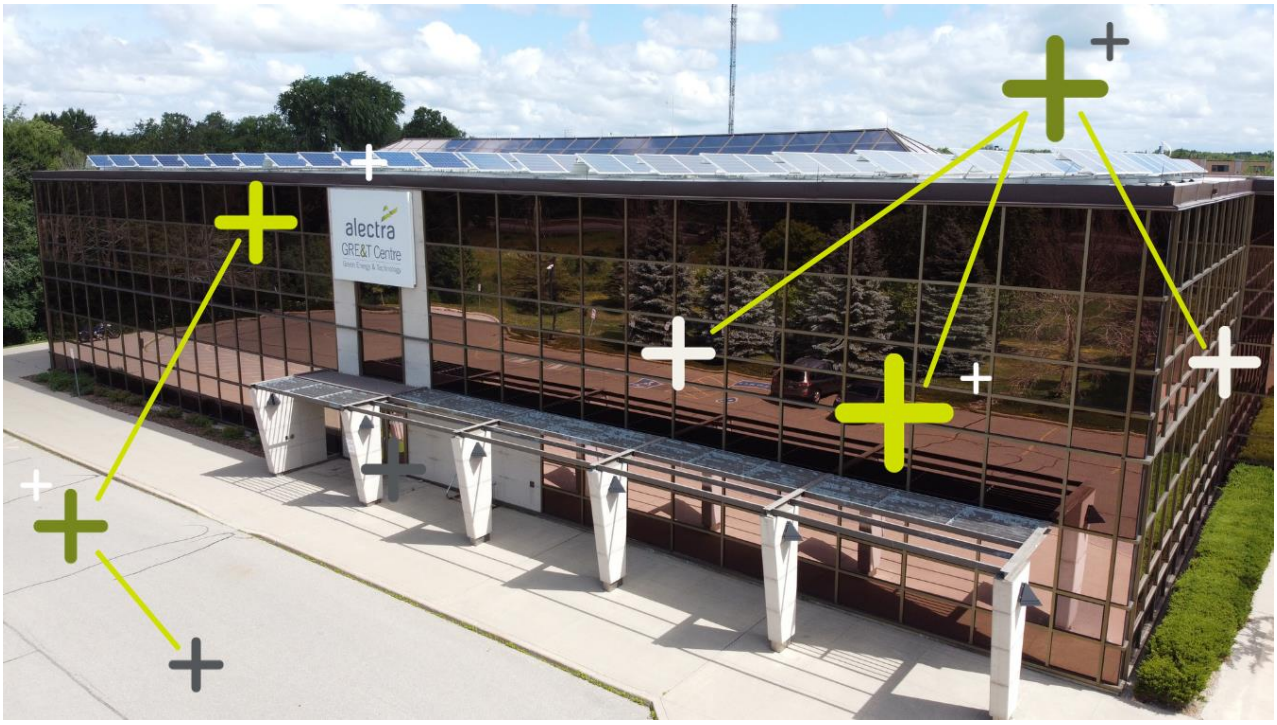
PATH TO NET-ZERO

Achieving Zero Emissions in Alectra's Southgate Office in Guelph, Ontario



PRESENTED BY

alectra
GRE&T Centre

Executive Summary

Alectra Utilities is committed to fulfilling the present and future needs of the customers and communities it serves, while safeguarding the environment and embracing innovation. As part of its unwavering dedication to sustainability, Alectra has set a target to achieve net-zero greenhouse gas (GHG) emissions by 2050, with a specific emphasis on curtailing emissions stemming from its fleet vehicles and building operations.

A prominent showcase of Alectra's commitment to advancing net-zero building solutions is the Southgate Office, situated at 395 Southgate Drive in Guelph, Ontario. Originally conceived by Guelph Hydro with a strong sustainability focus, the Southgate Office boasts a geothermal heating and cooling system that substantially diminishes carbon emissions by eliminating the need for natural gas consumption.

In 2022, Alectra established an ambitious objective: to transform the Southgate Office into Alectra's first net-zero carbon building. In doing so, Alectra aims to establish itself as a leader in both sustainability and the realm of innovative technology, while also demonstrating how other organizations can optimize their energy usage and implement net-zero strategies.

Net-Zero buildings, as defined by the Canada Green Building Council (CaGBC), are energy-efficient structures that produce or procure carbon-free renewable energy to offset annual carbon emissions from operations.

Realizing the objective of transforming Southgate Office Alectra's first net-zero carbon building by the end of 2023 required extensive collaboration among various teams within Alectra - Facilities, Sustainability and the GRE&T Centre. The resulting plan encompassed a blend of strategies - fuel switching, onsite energy generation, and incorporation of premium carbon offsets to counterbalance emissions associated with electricity consumption.

The facility received Zero Carbon Building (ZCB) status from CaGBC in August 2023.

This whitepaper captures the path taken to attain the net-zero status and Alectra aims to raise awareness regarding the critical imperative of emissions reduction in building operations.

1. Introduction

Alectra Utilities is committed to meeting today's needs and the needs of future generations by empowering our customers, communities, and employees, protecting the environment, and embracing innovation. In 2021, Alectra set targets to reduce its corporate greenhouse gas (GHG) emissions and to achieve net-zero GHG emissions by 2050. While emissions from fleet vehicles make up the largest share of Alectra's emissions, building operations are a significant portion as well.

When Alectra's Green Energy & Technology (GRE&T) Centre was launched in 2019, the erstwhile Guelph Hydro building at 395 Southgate Drive in Guelph, Ontario (referred to as 'Southgate Office') was identified as an ideal candidate to demonstrate the pathways to, and effectiveness of, net-zero buildings*.

Zero-Carbon Building

A zero-carbon building is highly energy-efficient and minimizes greenhouse gas emissions from building materials and operations.

Alectra strives for leadership in its communities and within the utility sector. While Alectra is known for its charitable work, there's an opportunity to expand its sustainability leadership by engaging customers in electrification benefits.

The Southgate Office was originally designed by Guelph Hydro with a strong sustainability focus. Transforming Southgate into a net-zero building showcases Alectra's commitment to innovation, cost savings, and environmental responsibility. It also raises awareness about the urgency of emission reduction for building owners and operators.

In order to support the utility in reaching the above goals, the Facilities, Sustainability and GRE&T Centre teams collaborated on a plan to make Southgate Alectra's first net-zero Carbon building by the end of 2023. Many great initiatives have been undertaken up to this point to reduce emissions at the Southgate office; one of the biggest challenges with any decarbonization project at a facility will be the last mile.

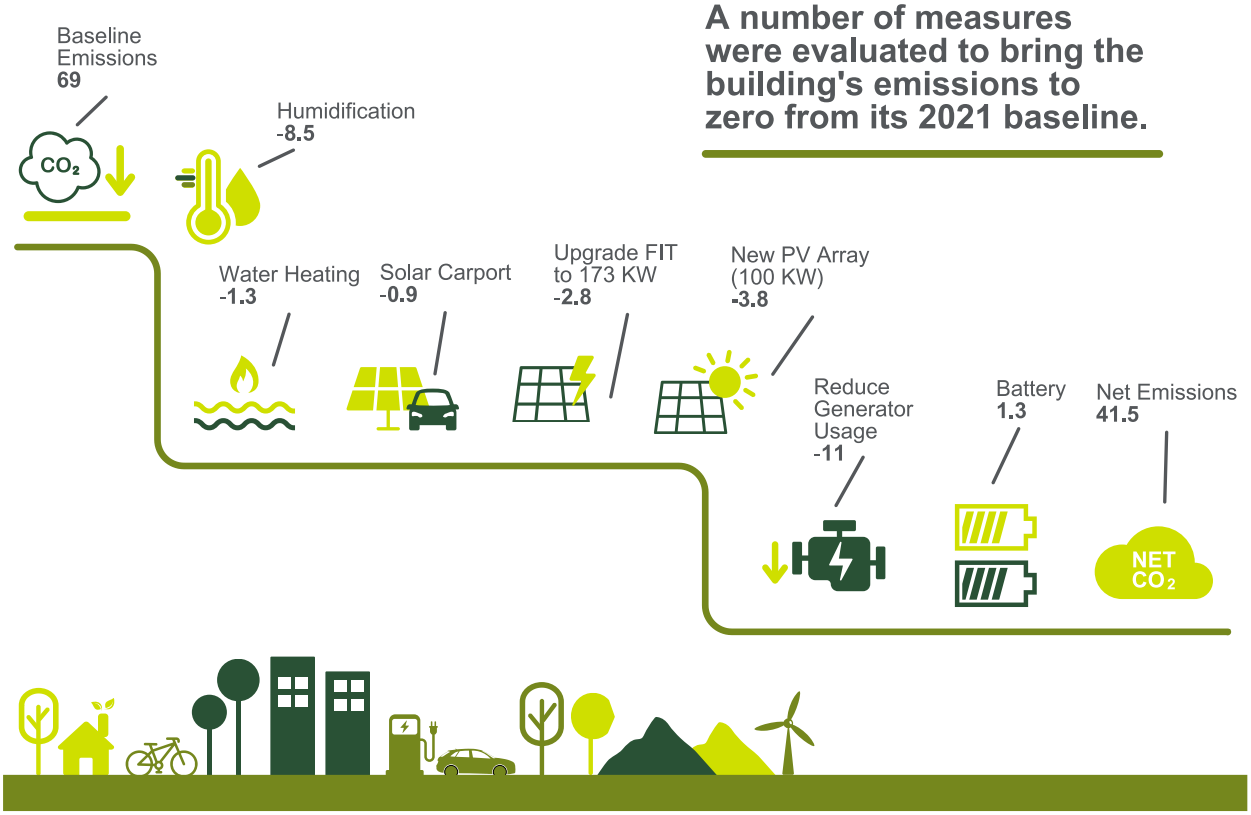
"Last Mile"

The final and most challenging phase of a zero-carbon project. The point where further emission reductions become difficult, expensive, or technologically complex.

In Ontario, there are emissions associated with electricity, so even if Southgate were fully electric, there would be a need to offset the emissions associated with electricity usage on site.

After careful analysis of building energy usage and carbon sources and a market scan of various technologies, certain factors were readily identifiable as easily attainable GHG reduction opportunities.

While several factors were evaluated, the goal of net-zero emissions for the building was a formidable challenge. It was determined this would be achieved using a mix of fuel switching, onsite generation, and high-quality carbon offsets.



GHG reduction opportunities and their contribution to emission reductions

DISCLAIMER: This analysis of GHGs for zero emissions certification was managed by the Alectra GRE&T Centre and may differ from Alectra's Corporate GHG reporting

2. What is a Net-Zero building?

Canada does not currently have a defined building code for net-zero buildings despite a net-zero emissions target being set for 2050 by the Government of Canada. However, the government has committed $150 million to develop the Canada Green Buildings Strategy, a national strategy for buildings to be net-zero by 2050. The Strategy will include the Codes Acceleration Fund to create a pathway to code alterations for existing buildings; create an incentive framework to support the transition away from fossil fuel heating; and develop a Low Carbon Building Materials Innovation Hub to promote the use of low carbon construction materials.

There are currently three different green building certifications in Canada:

- The Zero Carbon Building standard was released by the Canada Green Building Council (CaGBC) in 2017 and defines a Zero Carbon Building as highly energy-efficient, producing onsite (or procuring) carbon-free renewable energy in an amount sufficient to offset the annual carbon emissions associated with operations.
- Canada's Greenest Employers require employee-led initiatives overseen by senior leadership, environmental management programs (such as a green procurement policy) and certifications to validate the energy efficiency of the building (i.e.: LEED).
- Energy Star Certification requires a before and after comparison of energy efficiency measures implemented at the building in question and does not have targets for renewable energy or GHG reductions.

It was determined that Alectra would strive to achieve the Zero Carbon Building (ZCB) status offered by the CaGBC as that required the most robust emissions reporting and energy efficiency standards for certification. The ZCB also focuses mainly on building operations, which is widely regarded as a significant segment of carbon emissions in society.

The Southgate office has already achieved LEED certification as an energy and cost-efficient building and Alectra is determined to go further in its mission to decarbonize its operations.

3. Southgate Office: Pieces of the Net-Zero Puzzle

GEOTHERMAL

The Southgate office was constructed in two parts by legacy Guelph Hydro, with a focus on sustainability, environmental awareness, and innovation. The garage facility was built in 1995 and the office space was added in 2005. Both sections of the building were designed and constructed with a geothermal heating and cooling system with an eye on minimizing the overall environmental impact by significantly reducing carbon emissions through the avoidance of burning natural gas.

Geothermal Heating and Cooling

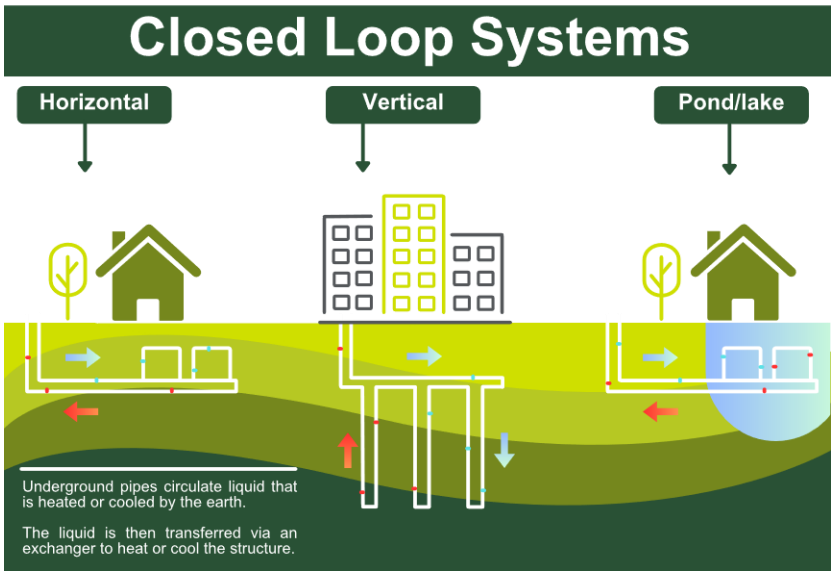
Geothermal heating and cooling systems work by taking advantage of the stable temperature of the Earth's subsurface. In general, the temperature below the surface of the earth remains constant throughout the year, typically between 6°C and 11°C in Ontario, according to the Ontario Geothermal Association.

The total area of the building is 93,055 square feet, with a little over half of that area belonging to the garage. The building envelope is made up of concrete panels over a steel structure and thermally insulated glass windows with aluminum frames.

How it works: The geothermal system at Southgate uses a vertical, closed-loop piping system that extends 300 ft. underground to transfer heat energy to and from the Earth. The piping system is filled with 53,000 liters of water (to transfer heat) and glycol (to keep the water from freezing), which circulates through the loop. The fluid in the closed-loop system circulates continuously between the ground and the heat pump, transferring heat to or from the ground, depending on the season.

The system includes 46 water-air heat pumps for typical, forced air heating and cooling, as well as 10 water-water heat pumps for radiant heating applications. During the colder seasons, the fluid absorbs heat from the ground as it circulates through the loop and carries it into the building. The heat from the ground is then transferred to the building's heating system through heat exchangers.

During the warmer seasons, the process is reversed. The fluid absorbs heat from the



Of the three prevalent closed loop geothermal system types, Southgate uses a vertical loop system

building's air conditioning system and carries it to the ground, where it is dissipated into the cooler earth.

The geothermal heating and cooling system at the Southgate office is a highly efficient and environmentally friendly way to regulate the temperature in the building. This one system greatly reduces greenhouse gas emissions and dependence on fossil fuels at the building, as shown in the analysis section of this document.

NATURAL GAS AND DIESEL

The building is home to one of Alectra's three control rooms, and therefore has a natural gas generator and a diesel generator to ensure uptime in the event of an outage. The diesel generator is used for quick response time while the natural gas generator ramps up. The natural gas generator represents a significant portion of the GHGs being emitted on site compared to the diesel generator due to the relative asset utilization.

Aside from the generator, the only other natural gas being burned on site is for water heating and building humidification purposes. Building humidification represents the vast majority of the remaining GHGs emitted from burning fossil fuels at Southgate, after the generator. A key focus of this case study will be decarbonizing the systems requiring natural gas and diesel as fuel sources.

RENEWABLE ENERGY AND BUILDING EFFICIENCY

Southgate also has a 100 kW Solar PV array on its rooftop as part of Ontario's Feed-In Tariff (FIT)* program. The system was installed in 2010 as part of a 20-year contract and the energy generated from this array is fed directly back to the grid and purchased by the Independent Electricity System Operator (IESO).

Solar PV array contributes to a cleaner electrical grid

The Building Automation System was implemented in 2019 and helps regulate the geothermal system by setting heating and cooling schedules for different rooms based on expected occupancy and time of day. It can alert the building maintenance staff when the equipment is operating outside of its normal set points and flag recurring issues.

The system is also capable of setting lighting schedules to increase energy efficiency. Additionally, as of the end of 2022, almost all the lighting in the building was transitioned to LED bulbs, equipped with dimmer switches and occupancy sensors.

*Feed-in Tariff program by the IESO paid owners of Solar projects for clean energy fed back into the grid, Alectra's Corporate GHG Reporting does incorporate FIT- related energy data.

4. Southgate: Analysis by the numbers

Southgate was performing well in terms of keeping its carbon footprint low as well as being energy efficient and could serve as a model for other buildings looking to reduce their emissions.

OPERATIONS AND LIFE-CYCLE ASSESSMENTS

Determining a true baseline for emissions at Southgate was challenging due to several factors. These include the effects of the pandemic, the gradual return to work, and recent upgrades in energy efficiency such as LED lighting.

Despite these challenges, it was essential to continuously monitor and track emissions to understand the impact of organizational activities on the environment and make informed decisions on reducing greenhouse gas emissions.

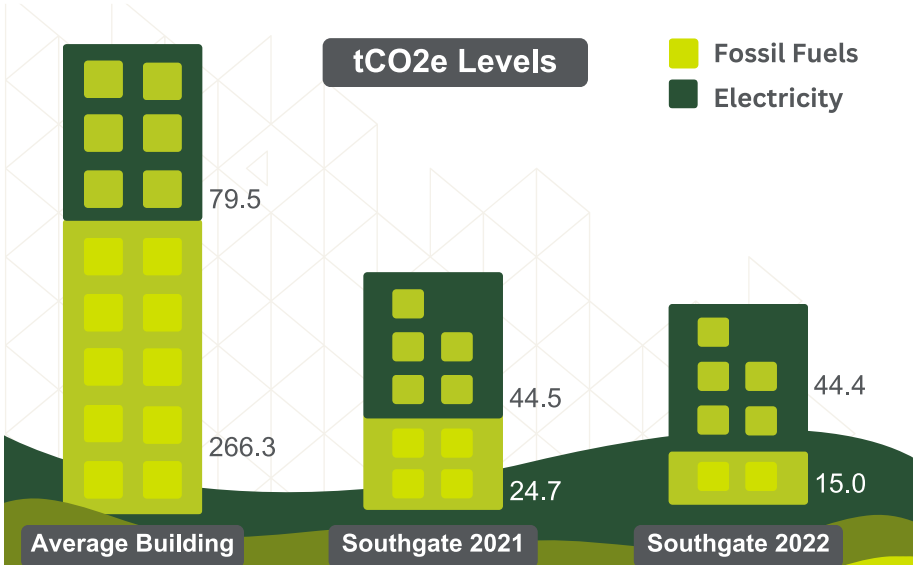
GHGs from electricity usage represent the largest carbon emitter at Southgate, due to the electricity required to operate the heat pumps in the geothermal system. Most buildings rely on natural gas for space heating, which greatly increases their carbon footprint and Southgate is able to avoid these emissions because of the geothermal system.

Small-Medium Commercial & Industrial (SM-C&I) Building

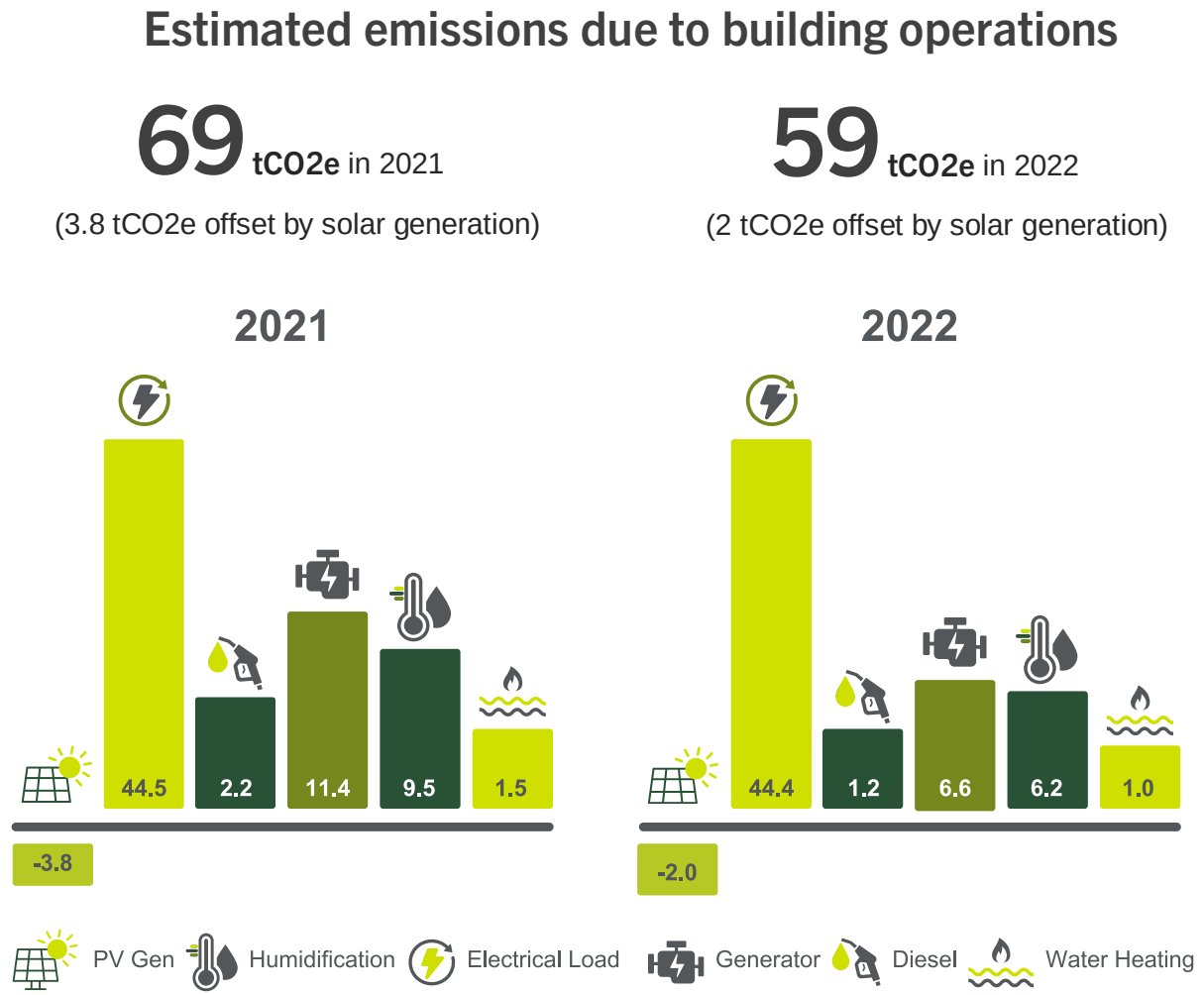
The City of Toronto's Net Zero Existing Buildings Strategy (2021) defines a Small-Medium Commercial & Industrial (SM-C&I) Building as a commercial, office, or industrial building ranging from 50,000 to 100,000 sq. ft.

In the case of Southgate, the majority of the GHG emissions come from electricity, making up more than two-thirds of their emissions. This contrasts to the average SM-C&I building where 77% of emissions come from natural gas and 23% from electricity.

Furthermore, Southgate emits less than a fifth of the emissions and consumes less than half of the equivalent energy of a comparable building.



Southgate Emissions (tCO2e levels) were considerably lower than emissions from that of comparable buildings



Breakdown of Emissions by Application Type

DISCLAIMER: This analysis of GHGs for zero emissions certification was managed by the Alectra GRE&T Centre and may differ from Alectra's Corporate GHG reporting

Going forward, Alectra needs to keep an eye on the electricity supply in Ontario. With the Pickering Nuclear Generating Station potentially coming offline at the end of 2026, the IESO may rely heavily on natural gas generators.

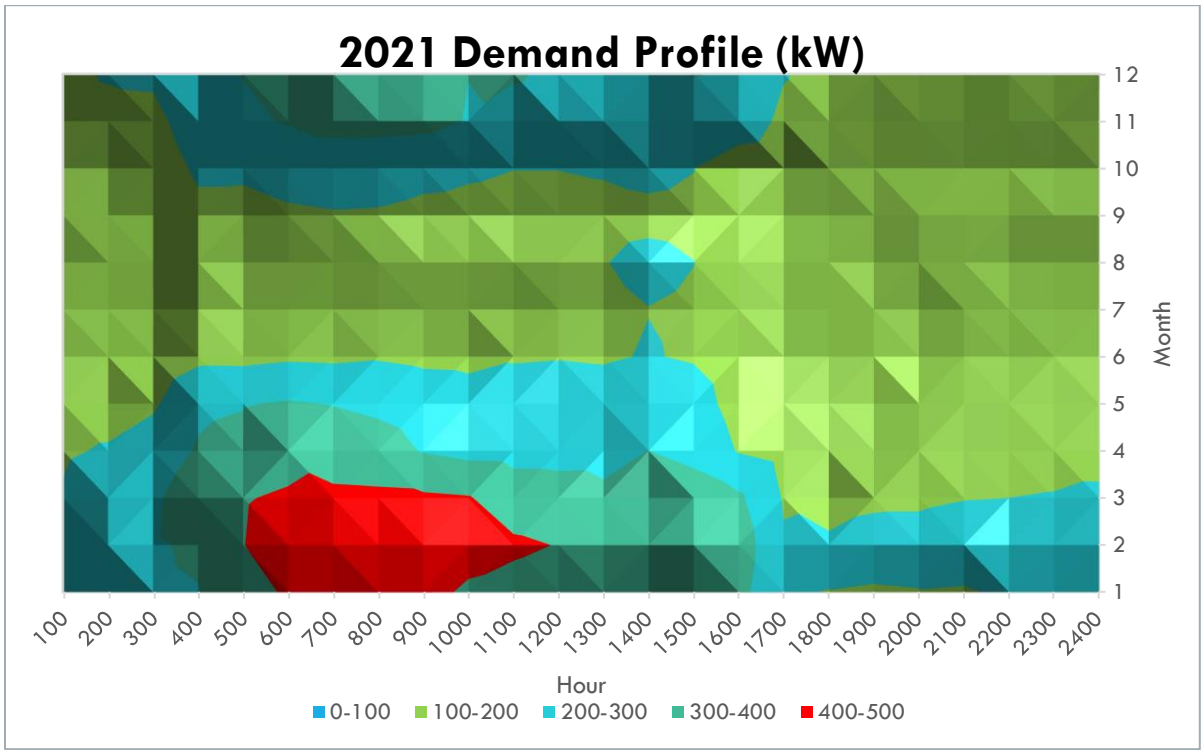
This will increase the emissions due to electricity usage at Southgate (and everywhere else in Ontario) and will need to be accounted for.

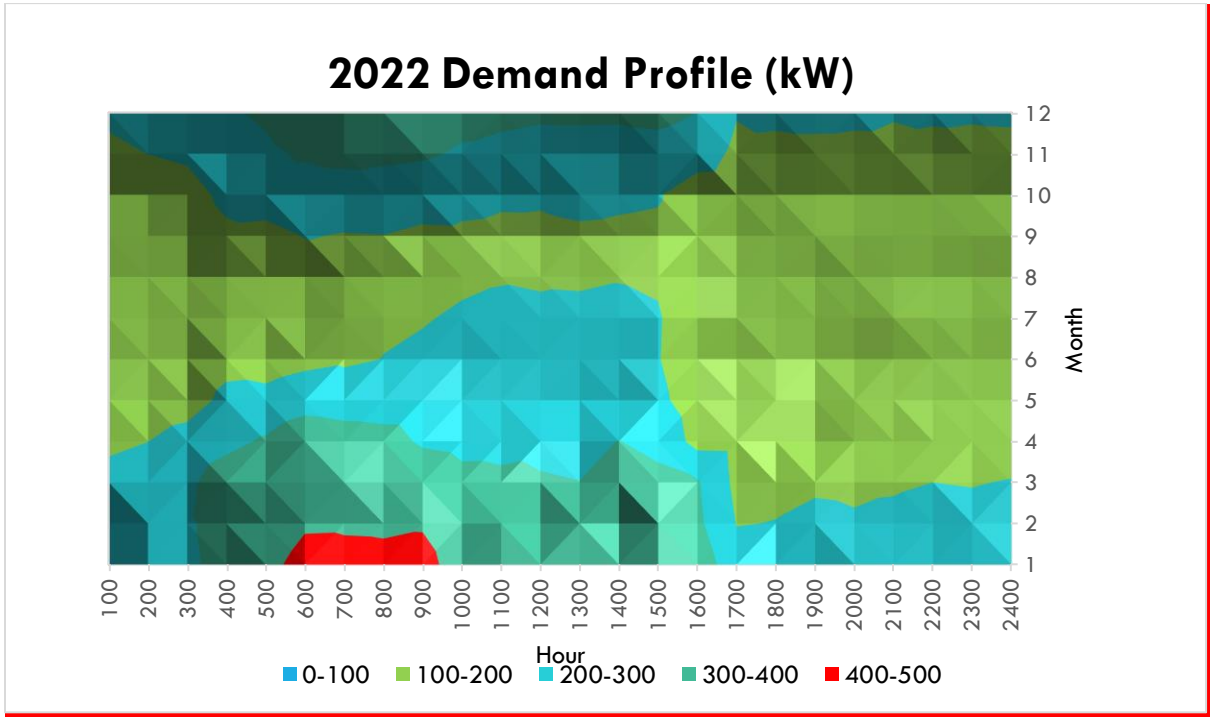
HOURLY USAGE

An analysis of the hourly energy data over 2021 and 2022 has shown that the peak power demand and energy consumption at the Southgate Office traditionally occurs in the mornings, during the winter months. This is most likely due to the heating requirements overlapping with

higher occupancy rates. Many employees at Southgate are service center professionals whose working hours are typically 7 AM to 3 PM.

The winter heating load tends to ramp down in the afternoon because of the relatively warmer daytime high temperatures.





Cooling loads during the summer months are much lower than the winter peak, indicating that the geothermal system expends less energy to cool the building to a comfortable temperature in the Summer than it does to heat the building in the Winter.

Fuel-switching

Converting from usage of one fuel source to another. In the case of decarbonization building systems, it is reducing consumption of natural gas, or other fossil fuels, and replacing it with electricity generated from relatively clean sources.

ENERGY MIX ANALYSIS

Between 2020 to 2022 the electrical load at Southgate has stayed fairly consistent. Southgate utilizes two natural gas meters: one tracks natural gas consumption for humidification and hot water heating, while the other serves the backup generator, ensuring uninterrupted power to the control room. This generator is considered critical to ensure uptime for the control room, but measures were explored to attempt to reduce the reliance on the natural gas generator.

Year	(MWh)	Building Natural Gas (m^3)	Generator Natural Gas (m^3)	Equiv. Electrical Energy of Natural Gas (MWh)
2020	1,440	6,658	2,249	92.3
2021	1,435	5,809	6,013	122.5
2022	1,433	3802	3,481	90.17

Table 1: Natural gas consumption at the building and the generator from 2020 to 2022

Table 1 shows the fluctuation in natural gas consumption at the building as well as from the generator. The building itself saw a 30% reduction in natural gas usage due to an increased reliance on more efficient water heaters. Generator usage tends to fluctuate based on need.

Fuel-switching was identified as the biggest opportunity for reducing GHG emissions at a relatively low cost. It is far cheaper to stop using natural gas than it is to begin generating clean energy on-site. This can be seen in the next section.

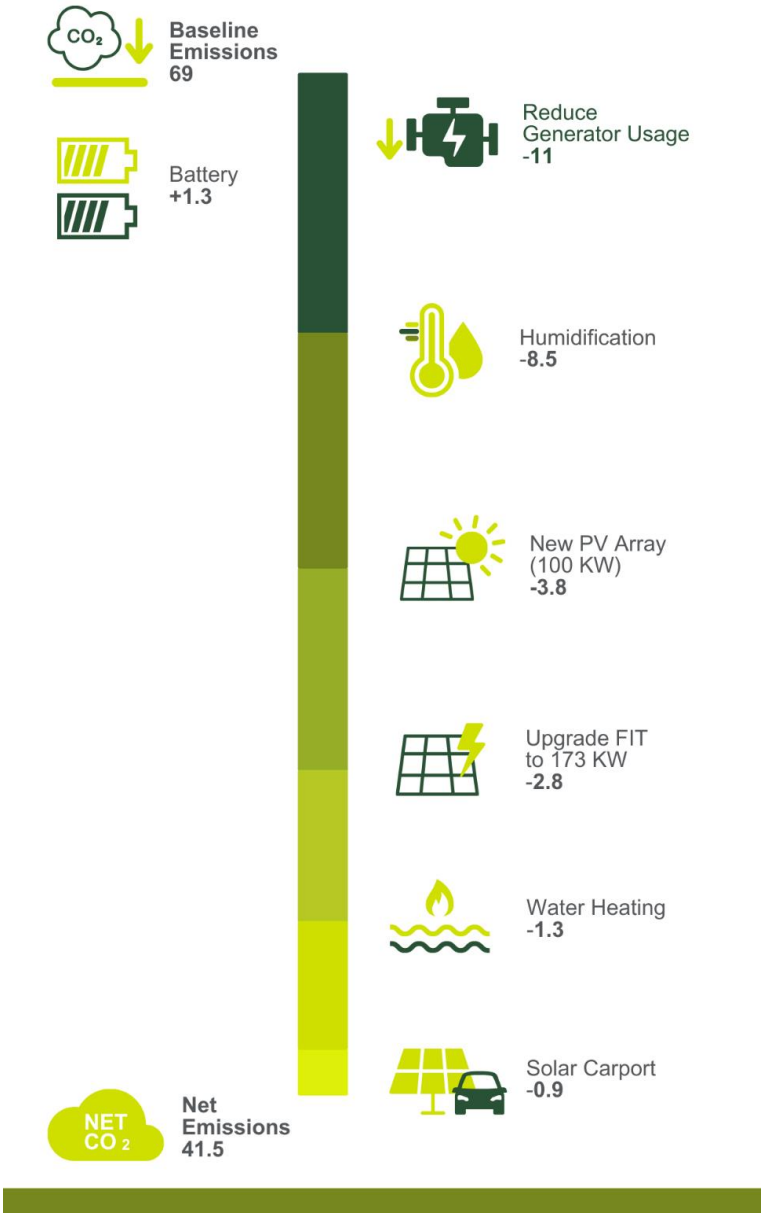
5. Pathways to Achieve Net-Zero

Different pathways were explored to achieve net-zero and they are outlined below. It must be noted that the carbon emission estimates are for operations only, and do not include the embodied carbon of each measure.

The net emissions are shown in Tables 2 – 5, factoring in the emissions associated with using electricity from the grid.

Embodied Carbon

Embodied carbon refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.



Southgate's 2021 emissions (69 tCO2e) were used as a baseline.

A number of measures (shown on the left) were explored to reduce emissions to as close to zero as possible, such as fuel-switching of water heating applications, reducing natural gas generator usage, and installing new Solar panels.

It was estimated that implementing all these solutions would see a reduction in emissions of approx. 27 tCO2e, resulting in over 41 tCO2e remaining.

This reinforces the idea that the last mile is difficult to decarbonize in the short term and may require Carbon Offsets to help reach net-zero status.

DISCLAIMER: This analysis of GHGs for zero emissions certification was managed by the Alectra GRE&T Centre and may differ from Alectra's Corporate GHG reporting

1. REDUCE RELIANCE ON GENERATOR

One of the larger ticket items at Southgate, in terms of emissions, is the generator. The most effective way to reduce the reliance on the generator while curbing emissions would be to install a large battery unit that can be charged up to provide backup power to the control room in the event of an outage. While avoiding the use of the generator could avoid emitting up to 11 tCO2e, the electricity associated with charging the battery results in emissions of a little over 1 tCO2e emitted annually.

There is also an opportunity to deploy the battery for grid services and peak-shaving applications. While this may help reduce the overall money spent on energy and avoid emissions from burning natural gas on site as well as using electricity when the electrical grid has a higher carbon intensity, this remains an expensive option that would reduce approx. 15% of the remaining emissions at Southgate.

The table below shows the impact, in terms of GHG reductions, as well as the estimated cost of implementing that measure.

	Annual tCO2e emitted
Avoid burning Natural Gas	-11.4
Battery Storage	1.3*
TOTAL	**-10.1**

Table 2: Impact in terms of GHG reductions

*Battery consumes electricity and helps offset building load, emitting GHGs indirectly by way of being charged from the grid supply

2: ELECTRIFY THE HUMIDIFICATION OF THE BUILDING

An interesting finding of the study was realizing that maintaining comfortable ambient conditions was one of the largest carbon emitters in the office's emissions profile. The emissions reductions for electrification of building humidification represents the second largest opportunity to reduce emissions even when factoring in the emissions associated with electricity usage. As of June 2023, The Facilities team has ensured that this building system has been electrified to further decrease the emissions at the Southgate facility.

	Annual tCO2e emitted
Humidification	-8.5

Table 3: Summary of GHG reductions associated with switching to electric humidification system

3 FUEL-SWITCHING FOR WATER HEATING

Water heating requirements at Southgate are quite low due to the relatively low building occupancy and limited applications where hot water is needed. The Southgate Office does not have any cafeteria cooking facilities, so the three highest needs for hot water are coffee machines, kitchenette dishwashers and handwashing.

	Annual tCO2e emitted
Water Heating - Fuel Switching	-1.3

Table 4: Summary of GHG reductions associated with switching to electric water heaters

4 UPGRADING OR ADDING SOLAR

Three Solar array options were evaluated, the first was an upgrade of the current Feed-in Tariff (FIT) project array. This project was installed approximately ten years ago and has a rated capacity of 100 kW. Solar panel technology has improved in that time and replacing the panels with higher-rated models would result in a 173 kW array.

The second option considered was to add an additional Solar array to the remaining space on the roof at the Southgate Office. This option assumes that a structural assessment of the roof would show that the additional weight of the array could be supported by the roof. Following that assumption, there would be space for an additional 100 kW array.

The third option was to install a solar carport at the Southgate office, similar to the one at the Alectra Head Office (2185 Derry Rd West, Mississauga), pictured below. While a solar carport would not generate as much clean electricity, the combination of some renewable energy generation paired with electric vehicle charging stations would help drive the decarbonization efforts of Alectra's employees. This would fall under Scope 3 emissions and would help drive Alectra's overall goal of achieving net-zero emissions by 2050.

Scope 1, 2 & 3 emissions

Scope 1 covers emissions from sources that an organization owns or controls directly – for example from burning fuel in fleet vehicles (if they're not electrically-powered).

Scope 2 are emissions that a company causes indirectly and come from where the energy it purchases and uses is produced. For example, the emissions caused when generating the electricity that are used to power buildings would fall into this category.

Scope 3 encompasses emissions that are not produced by the company itself and are not the result of activities from assets owned or controlled by them, but by those that it's indirectly responsible for up and down its value chain. An example of this is when we buy, use, and dispose of products from suppliers. Scope 3 emissions include all sources not within the scope 1 and 2 boundaries.

A solar carport, similar to that installed at Alectra's Derry Rd office, was considered

All the solar options were found to be relatively expensive compared to reducing the use of natural gas burning equipment, which helps to drive home the point that is it much easier and cost-effective to stop using natural gas than it is to begin generating clean energy on-site.

	Annual tCO2e emitted
Upgrade Solar (FIT)	-2.8
Add PV Array (100 kW)	-3.9
Solar Carport	-0.9

Table 5: Summary of GHG reduction impact of various Solar projects

5 THE LAST MILE

Implementing the above measures would be prohibitively expensive and still leave us with over 41 tCO2e of emissions. The most significant expenses related to reducing greenhouse gas emissions are the fuel-switching of building humidification and reducing the reliance on the natural gas generator. Based on quotes from various suppliers, the costs for electrifying hot water and humidification are relatively inexpensive for the amount of GHGs being reduced, with the most value seen in electrification of humidification.

This is why the Facilities Team had followed through on installing an electric humidifier in June 2023. Although reducing the reliance on the generator would significantly contribute to reducing emissions, it would also require expensive battery storage as an alternative, which would greatly increase the overall cost of the project. The control room requires 100% uptime, and the natural

gas generator helps to ensure grid reliability. However, part of the recommendation going forward is to introduce battery storage to rely on natural gas as little as possible.

Therefore, while there are feasible options available for reducing greenhouse gas emissions, it is crucial to consider the associated costs and weigh the benefits against the expenses. The most cost-effective way to move forward in the short term would be to purchase high-quality carbon offsets, in addition to taking some of the more cost-effective fuel-switching items. For context, attempting to reduce the remaining emissions with different types of onsite renewable generation would require large scale generation projects to be undertaken, as shown in Table 6.

	Size
Solar PV[1]	935 kW
Wind Farm[1]	91 residential windmills (5 kW each)
Hydrogen Fuel Cell[2]	500 kW, 5000 kWh
Offsets[3]	40 offsets (per tonne)

Table 6: Scale of renewable projects required to reduce the remaining emissions at Southgate

.

[1] Requires additional battery storage

[2] Hydrogen Conversion into Electricity and Thermal Energy by Fuel Cells: Use of H2-Systems and Batteries - ScienceDirect

[3] Business Carbon Offsets (terrapass.com); Offset by the tonne (less.ca)

6. Challenge – Pain Points

One of the challenges in transitioning an existing building to net-zero is gaining an understanding of the amount of GHGs being emitted on site. For us, this involved coordinating with different stakeholders to determine the amount of electricity, natural gas, diesel, and refrigerant being used in the building and for which applications. Understanding the electricity generation mix in Ontario and ensuring the use of accurate emission factors was crucial to properly accounting for GHG emissions for the Southgate Office.

Establishing a reliable baseline was difficult due to varying building capacity during lockdowns and work-from-home policies over the last few years. While things had begun to normalize through the end of 2022, more data will be needed for a baseline to be set. Information was gathered from a variety of stakeholders, including the Facilities, Metering and Sustainability teams, to aggregate the data and generate insights. As is usually the case with these types of initiatives, ensuring the data required to perform the requisite analysis is available and tracked is a challenge, providing opportunities to improve processes.

As clean as Alectra's Southgate Office is, achieving net-zero emissions is still challenging due to the 'last mile' effect. Southgate only emits 20% of the GHGs of a comparable-sized building largely thanks to its geothermal heating and cooling system. As mentioned above, avoiding the remaining emissions with renewable generation can be prohibitively expensive, which is why carbon offsets will be required to reach net-zero emissions.

The CaGBC requires that, if carbon offsets are required, the offsets must be verified by a recognized entity (i.e.: Green-e Climate) as high-quality offsets to ensure confidence in how the offsets were sourced.

7. Next steps

Going forward, the Net-Zero Southgate team will develop a reporting system for tracking GHGs and energy efficiency at the Southgate Office, which will be incorporated into the robust reporting system and model developed by the Sustainability team. This will help the utility maintain its status as a Zero Carbon Building for years to come. A transition plan to move away from onsite combustion of fossil fuels is also being considered, with plans being developed to replace the building humidifier and water heaters with electrified equipment. Carbon offsets will be sourced to negate the remaining building emissions.

Further studies need to be done to assess the reliance on the diesel and natural gas generators at Southgate and how best to deploy alternative clean energy solutions to decarbonize the redundancy options for the control room. This will include a detailed asset utilization rate for both generators, and how much power and energy are delivered when those generators are in use. It is not recommended to remove the natural gas generator, and more investigation needs to be done to determine the best ways to minimize the use of it.

Another recommendation is to install a Solar Carport at Southgate, which would aid in the adoption of electric vehicles and boost the amount of clean energy generated on-site. As mentioned above, this measure would result in the reduction of approximately 1 tCO2e. While this option won't greatly increase the amount of clean energy produced, there is still a lot of value in facilitating EV adoption and helping reduce Alectra's Scope 3 emissions.

Alectra has announced its Fleet Electrification Plan which includes the addition of more charging infrastructure in Southgate over the next 10 to 20 years. The plan involves electrifying 38 fleet vehicles at Southgate, which could add 500,000 kWh of energy to the annual load in the late 2030s. This infrastructure will need to be managed to ensure the building's peak demand doesn't increase substantially. In addition, Alectra recognizes the need for EV charging infrastructure for employees and visitors, highlighting the importance of providing accessible and convenient charging solutions for all.

To go above and beyond, it will be useful to conduct a study to understand the embodied carbon of the building when it was constructed. This will mean conducting a review of the major building materials used in the building (steel, concrete, etc.) and factoring in how much carbon was used in the production and transportation of those materials for construction. Following the same logic, embodied carbon will need to be taken into account when building retrofits are implemented.

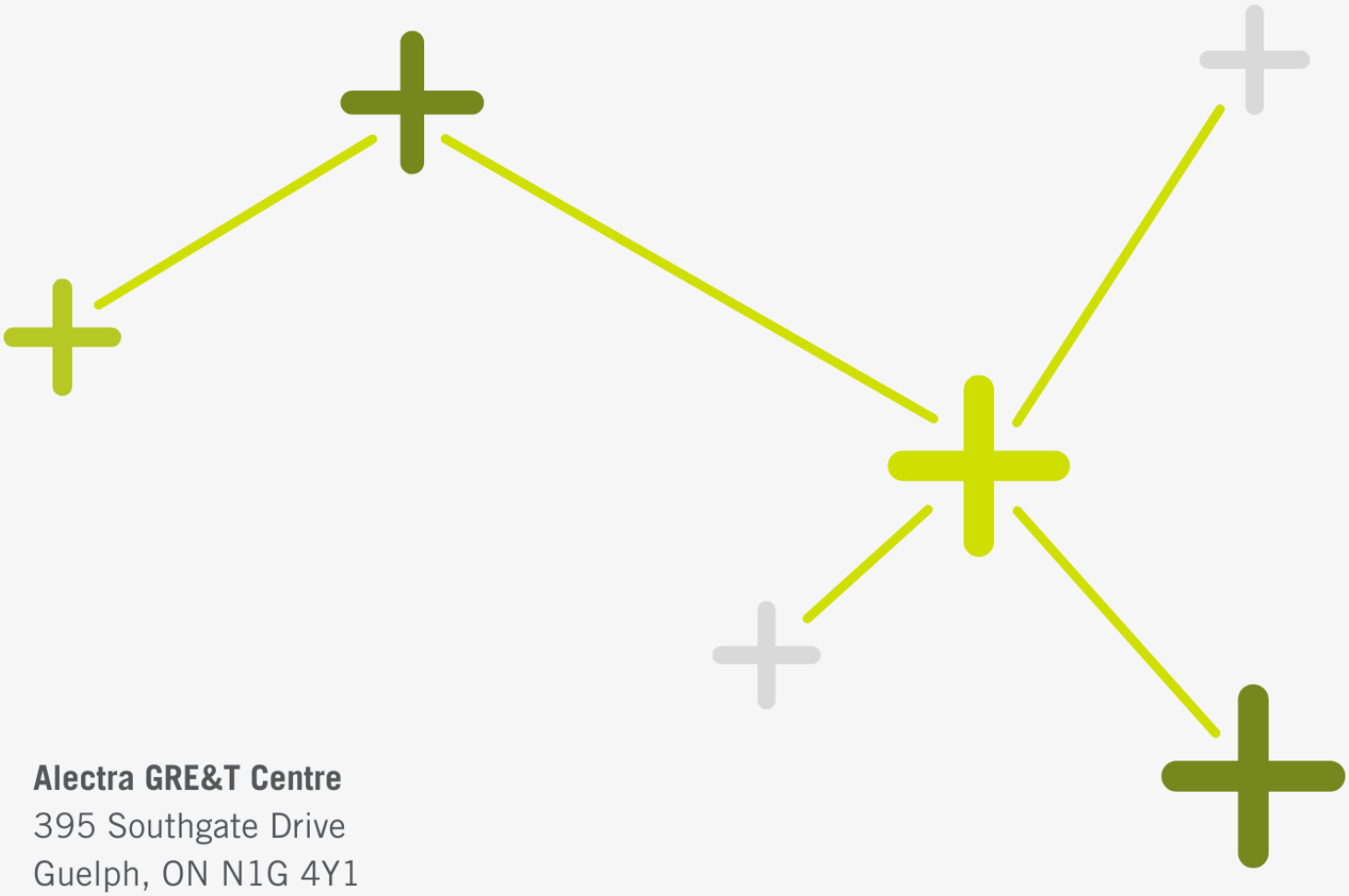
8. Checklist: Key Takeaways

- Find the data – data is key to understanding the starting point at the Facility, including energy usage, fuel mix and profile of where the GHGs are coming from. Work with the Alectra Sustainability team to confirm ongoing accurate data for the Southgate facility.
- Space heating is the largest carbon emitter in most commercial buildings, and the geothermal system at Southgate makes the building much cleaner than most. However, most existing buildings cannot implement a geothermal system and would require heat pumps as an alternative.
- Keep an eye on the electricity mix – one of the reasons Southgate is a relatively clean building is due to the electricity supply in Ontario. With the nuclear reactor potentially going offline in a few years, and an increased reliance on natural gas generators in the grid, building emissions may go up due to electricity usage. This will be particularly problematic with an increase in EV adoption.
- Keep an eye on future building codes. With the Federal Government developing the Canada Green Buildings Strategy, the standards for a clean, zero carbon building may be changing.
- An understanding of the electricity loading profile will help gain an understanding of where exactly the emissions due to electricity are coming from and how to avoid or minimize them.
- As far as GHG emissions reductions go, it is far more effective to stop burning natural gas (and switch fuel sources) than it is to start generating renewable energy onsite to offset the GHG emissions.
- Decarbonizing the 'last mile' without using carbon offsets is incredibly difficult due to relatively high costs and space requirements of onsite renewable energy projects.
- Sustainability initiatives, such as Net-Zero Carbon Buildings, require a coordinated effort from many different stakeholders within the organization. Take the time to get everyone involved in the decision-making process as well as potential plans for implementation.
- Don't forget about embodied carbon. Every piece of equipment – even renewable generation equipment – has emissions associated with it.
- Make sure the carbon offsets purchased to offset the remaining emissions are of high quality.

Alectra's vision is to be your trusted energy partner empowering a sustainable and brighter future

Alectra's mission is to provide innovative and reliable energy solutions which deliver lasting value for all

Alectra's GRE&T Centre is where great minds collaborate to power a better tomorrow



Alectra GRE&T Centre
395 Southgate Drive
Guelph, ON N1G 4Y1

@alectranews @AlectraNews @AlectraNews @AlectraNews Alectra Alectra GRE&T Centre