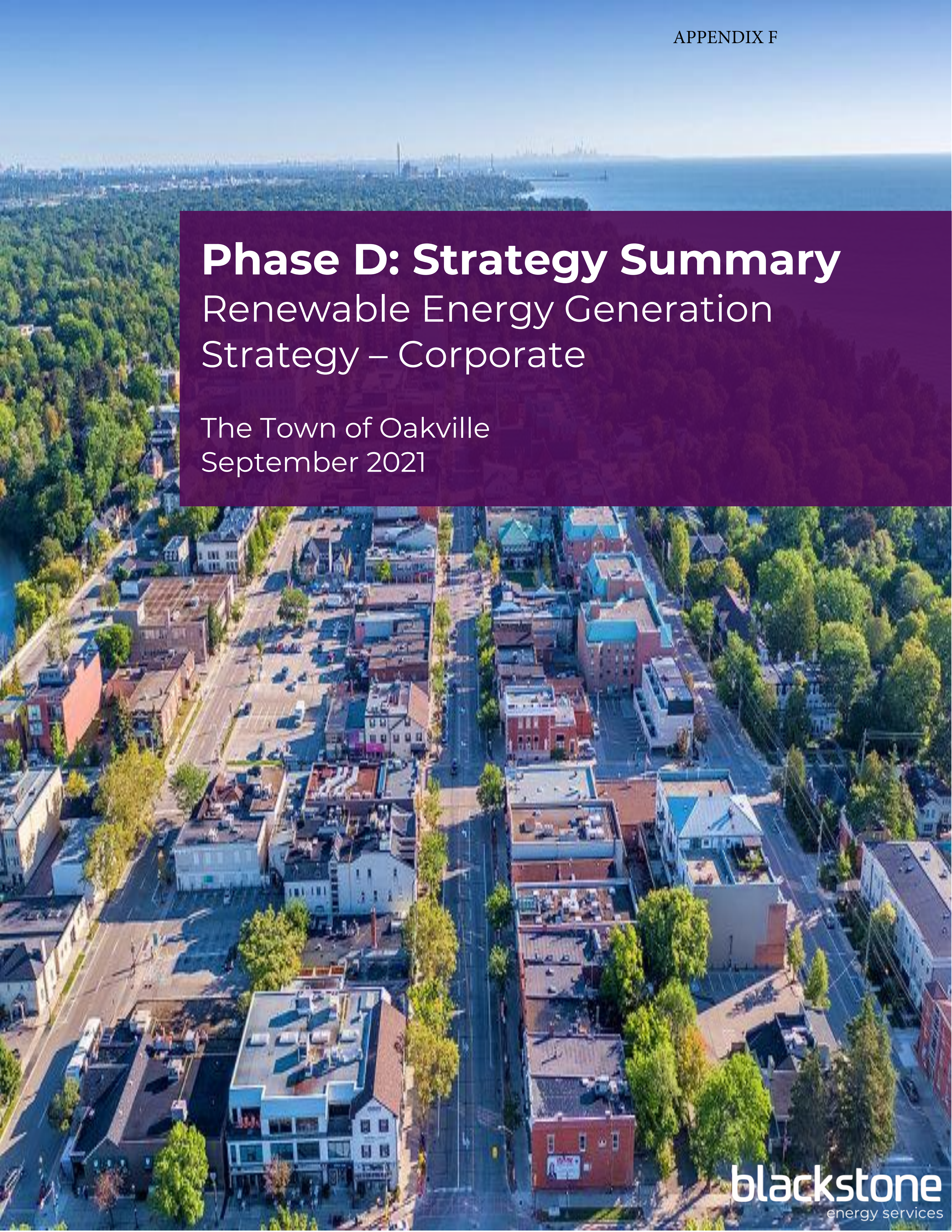
APPENDIX F



Phase D: Strategy Summary

Renewable Energy Generation Strategy – Corporate

The Town of Oakville
September 2021

blackstone
energy services

Contents

Introduction

The intention of this report is to describe low carbon technology strategies and how they can be applied in the Town of Oakville ("The Town" refers to corporate facilities for this report) to reduce carbon emissions to 80% below 2014 levels by 2050. Renewable energy (RE) systems are well recognized and fall into the broader application "low carbon" solutions. Going forward, we recommend The Town use the more generic and broader description "low carbon" to be sure all technologies that can assist in meeting the net-zero goals are considered – not just ones deemed "renewable" that are currently used. Blackstone analyzed ten (10) technologies as part of the "Renewable Energy Strategy":

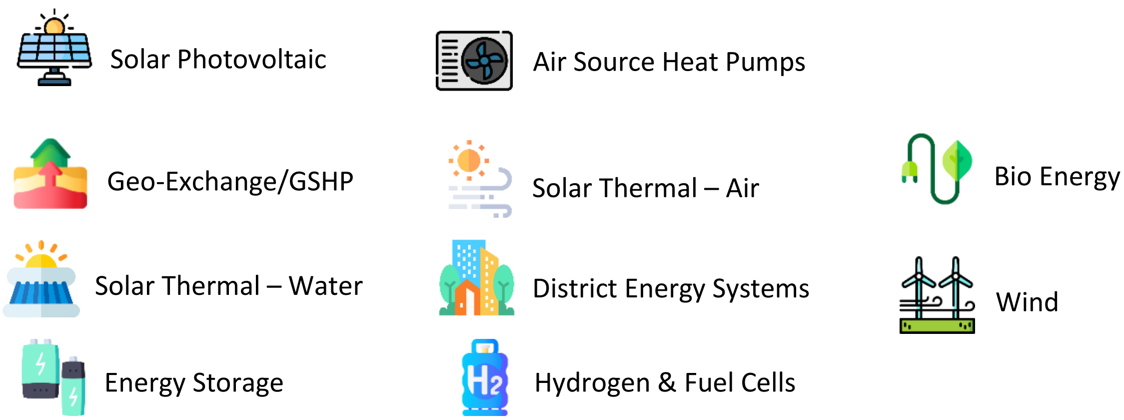


Figure 1: RE Technologies Analyzed

The following strategic discussions present solution reviews around conventional renewable energy systems (solar electric, solar thermal, wind) as well as low carbon technologies (district energy, hydrogen, heat pumps, biomass, batteries). These technologies are at a range of maturities (from young; hydrogen, to established; solar) and are candidates in most facilities though not all with comparable eligibilities. Though there may be a good wind regime for a facility near the lake, the public push-back would likely be significant and make it impractical. Social, environmental, and economic attributes must be taken into consideration, individually and as an integrated whole, for all energy related discussions.

Many low carbon solutions have both active and passive benefits. Wind may not be a good candidate with a turbine but is a low carbon energy source through "passive ventilation". Capturing rejected heat for use by heat pumps will improve the performance of a heat pump system. We recommend that all solutions consider passive and active elements of low carbon applications.

The final strategic plan is to prioritize the reduction of energy loads through conservation and low energy system designs first. Following that, low carbon technologies be evaluated in all energy-based decisions with a focus on how the solution will maximize the reduction of GHGs over the long term. All new and large renovations will be designed, through standards, to high performance, low source heat, designs. Rather than basing decisions on the first cost, a LCA approach should be used that includes the cost of carbon in all decisions. Solar PV can be quickly implemented on most facilities and will offset the increased use of electricity as natural gas is reduced heading toward a net zero future. Solar applications should be investigated as soon as possible.

Strategic Plan for Low Carbon Future

The Town has shown consistent attention to the environment over the years. They accepted the fact that human induced greenhouse gases are causing significant climate degradation and passed a climate emergency statement in 2018. The Town has prepared several energy and carbon reduction measures through conservation and demand management plans since 2005 with the most recent one published with a plan for 2020 to 2025.

The Town has targeted a 20% reduction of corporate energy and GHG levels by 2030 and 80% by 2050 compared to 2014. At that level The Town could reach a net-zero carbon footprint by 2050 if they tackle their GHG footprint consistently over the next 30 years. Achieving this target, as daunting as it may seem, is possible with a coordinated effort between the corporation and community. Even with the level of action and measures taken over the years, a coordinated and collaborative approach is the best way to tackle big climate issues.

The strategies presented in this report address the need for a coordinated plan with shared and shareable results. The benefits of a strategy and collaboration across The Town will be reliable and sustainable energy and GHG reductions that are realistic, timely, cost effective, long lasting and something The Town can be proud of.

Primary Strategy Points

1. Develop and target high performance energy/GHG standards and measures in all facilities
2. Plan to electrify HVAC systems through targeted replacement and for all new facilities
3. Prepare buildings for thermal autonomy/resiliency with high performance envelopes
4. Plan to offset increased electrical loads with RES (i.e., PV, bi-directional EV stations)
5. Educate the communities about the plans, efforts, and successes

The Why, What, How & When of a RE Strategy

- The Town has embarked on a path to achieve or be close to carbon neutrality by 2050
- A Climate Emergency was approved by Council in 2019
- A strategy will gather and present reasonable standards, policies, measures, and timelines that can be applied across the Corporate portfolio and be coordinated within the Community
- Define technologies that can be integrated into the Corporate framework and how to take advantage of the strengths realizing that they will evolve
- Prepare business case foundations for the solutions that will show the benefits and costs for low carbon solutions
- Where applicable, the strategy will suggest “trigger” events that enable low carbon solutions, such as roof renovations, major HVAC replacements, incentive funding

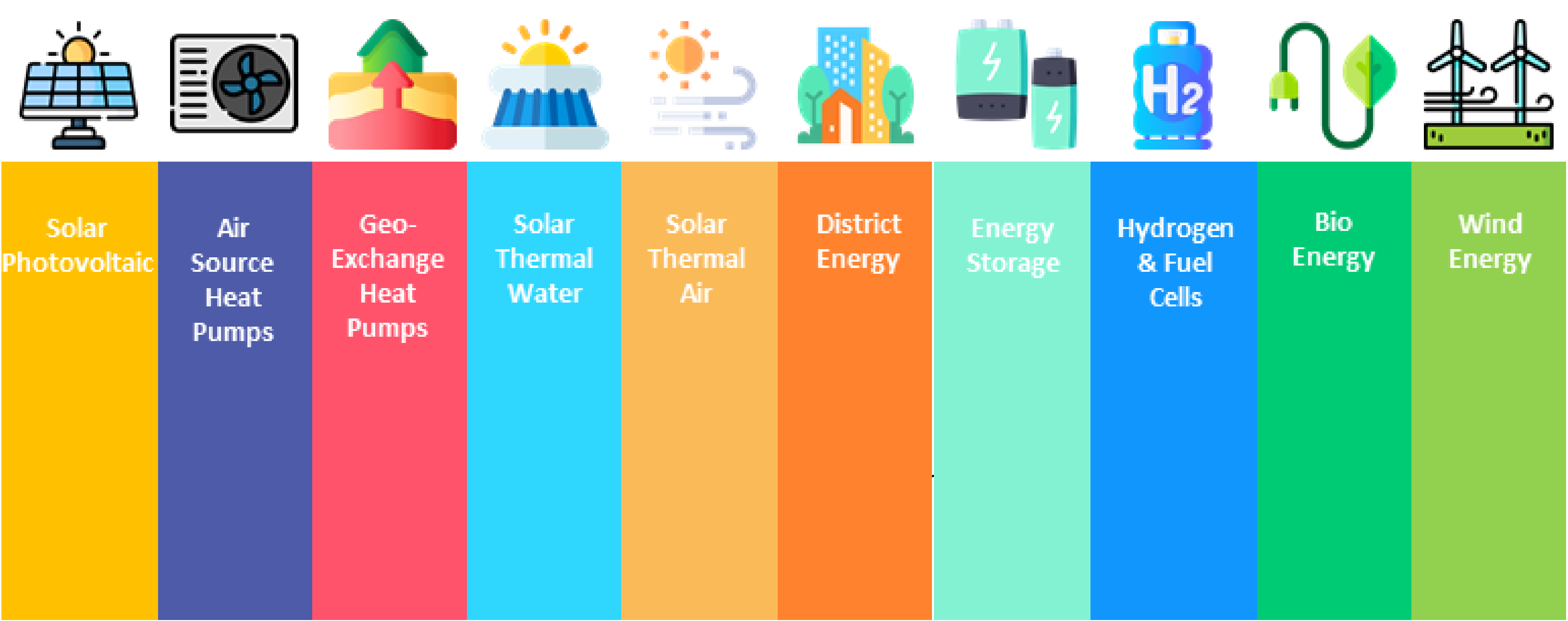
Renewable Energy Technologies Considered

Blackstone evaluated ten (10) renewable energy (RE) technologies options during this study. These represent the currently available and most common technologies in use at a municipal scale and will likely be applicable at some scale within The Town for the next 10 to 30 years. New technologies will evolve from these systems typically with higher efficiencies for the same footprint, lower capital costs, lower operating and maintenance costs, longer life cycles, end-of-life recycling, and integration possibilities. Detailed information on each technology can be found in the Phase B report of the full project.

- Solar energy including photovoltaics (electricity) and thermal energy (heated air and water)
- Heat pumps including ground source (geo-exchange), air source and waste energy
- Decentralized and district energy systems (energy nodes)
- Bio energy (wood pellets)
- Hydrogen (stationary boilers and transportation)
- Wind energy (urban scale and large of-site)
- Batteries (resiliency and demand shedding)

Though the focus is on the active technologies listed above, passive systems such as daylighting, induced ventilation, landscaping, site planning are necessary components for successful long-term energy planning and best addressed in building and community design standards. These are discussed in the policy section of the Phase A report of the full project.

Figure 2: RE Technologies Analyzed

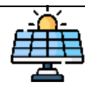


Strategic Directions

The following sections describe each of the low carbon technologies reviewed. The descriptions are to showcase the application at a high level for strategic direction.

The intention of these next sections (3.1 to 3.10 inclusive) is to provide a short strategic description for preliminary discussion. Full details on each technology can be found in the Phase B report of the whole project.

1. Solar – Photovoltaic



Photovoltaic energy (PV) is an accepted, well understood, long lasting technology that will be an important system to meet The Town’s goals and showcases the use of renewable energy very well. PV technologies currently include mono/polycrystalline and thin film modules and can be applied on roofs, ground, as awnings, carports and more recently as building integrated systems. The direction is to install PV systems wherever feasible and aim for a minimum contribution to the corporate electrical loads from solar power by 2030 and beyond.

PV system applications should be pursued at all new construction and major renovations when roofs are being upgraded. Net metered systems are recommended. The Town should ensure minimum energy performance standards are used for all new and renovation projects to ensure high performance energy loads result for optimum PV generation impact.

Be prepared to enter virtual power plant agreements as they emerge. This concept, described in this report, would access large scale PV generation, and reduce the increased electricity loads due to proposed fuel switching (electrification).

As an example, the following table illustrates a PV plan for the existing Culture & Recreation facilities based on estimated array sizes. These areas are put into context by comparing them with the array size at the Glen Abbey facility (1,800 m^2 for 226 kW_{DC} for approx. 8 sq.m./kW).

The Culture & Recreation Facilities and Operations/Administration buildings offer the most opportunity for GHG reductions due to electrification. The “Other” row includes streetlights, parking, splash pads, etc., with no to very low natural gas use and why the GHG reduction is negative. (i.e., some added GHG due to purchased electricity for the loads).

Culture and Recreation Centre Opportunity
The following table illustrates estimated cost performance for the Culture & Recreation sites which tend to have roof areas suitable for PV. Estimated costs (2020), using an electrical escalation of 2%, a PV panel degradation of 0.55%/yr. and actual GHG costs/tonne to 2030, again at the range of PV system contributions.

Table 1: *Estimated PV array performance to 2030 – Culture & Recreation Centres*

Culture & Recreation	PV system size kWdc	Est Cost	Est Energy Generated kWh/yr.	Est Value $ 2021	Elect CUSUM $ value 10 yrs.	Tonnes/ yr.	GHG CUSUM value 10 yrs.	Total value $ 10 yrs.
10% from PV	1,483	$2,817,700	1,683,205	$252,481	$2,752,896	72	$72,258	$2,825,154
20% from PV	2,965	$5,633,500	3,365,275	$504,791	$5,336,060	145	$144,467	$5,480,527
50% from PV	7,413	$14,084,700	8,413,755	$1,262,063	$12,107,596	362	$361,192	$12,468,788
80% from PV	11,860	$22,534,000	13,461,100	$2,019,165	$21,344,239	579	$577,868	$21,922,107

For reference, a 1,483 kW_{DC} system would require a total of ~12,000 m^2 or the equivalent of almost seven (7) Glen Abbey size arrays on roofs.

PV Installation Strategy

The following table proposes a PV installation strategy and the results between 2025 and 2050 at the Corporate facilities. The percent (%) values represent estimated contributions of the PV array for the year of installation. The annual corporate electricity for each milestone assumes a 2.5% electrical load increase for each building type section. For example, a total of 1,696 kW installed in Culture & Recreation would supply ~18% of the electricity load for that building group in 2025; about 32% in 2030 after a 2.5% growth rate per year for electricity from 2025 to 2030.

Table 2:*Proposed PV Installation Schedule to address GHG contributions and electricity growth*

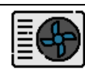
Building Types	2025 kW installed	%	2030 kW installed	%	2040 kW installed	%	2050 kW installed	%
Culture & Recreation	1,696	18%	3,393	32%	8,482	64%	13,572	82%
Operations/Administrative	1,396	16%	2,792	29%	6,980	58%	11,168	74%
Arenas	916	14%	1,833	25%	4,582	49%	7,331	63%
Other	472	10%	945	17%	2,362	34%	3,780	44%
Total	**4,481**	**15%**	**8,963**	**27%**	**22,406**	**54%**	**35,851**	**69%**

Note that the proposed PV strategy does not imply the GHG targets will be met – only the level of offset electricity generated against that used within the corporate buildings. Growth in electricity will increase when natural gas HVAC systems are replaced with electrical systems, e.g., heat pumps. Consideration for the added electrical loads due to fuel switching should be taken into consideration where fuel switching is completed. See the Phase B report of the full project for a discussion on the impact of fuel switching on GHG levels.

Recommended Strategic Direction

1. Prioritize PV applications – roof, carport, ground, façade. Culture and recreation facilities offer the best opportunities. Recommended as early plan selection (~1,700 kW or 14,000 m^2 of array area at community centres before 2025, increase across portfolio to ~4,400 kW by ~2025).
2. Target 15% corporate electricity contribution through PV by 2030 (~ 4,400kW), increasing to ~55% by 2040 (~22,400 kW) and 70% by 2050 (~36,000 kW).
3. Anticipate and estimate electrification of natural gas heating of The Town's corporate energy loads with PV as an electricity offset measure. See more detailed information in the Phase B report – Solar Photovoltaic section.
4. Trigger PV opportunity applications when roof upgrades are being planned.
5. Encourage Town policy to require high performance designs to meet high performance energy indices; include PV into revised building performance standards; building applied and integrated.
6. Investigate opportunities to participate in virtual power plant projects and power purchase agreements as they become available.

2. Air Source Heat Pumps



As with geo-exchange heat pumps, air source heat pumps (ASHP) will play a large part in reducing natural gas heating and achieve the GHG targets. ASHPs are an enabling technology in that they can be retrofitted into existing buildings. The Town should prepare a schedule based on HVAC replacements due to major repairs or end of life (i.e., trigger events) and prepare sizing models that reflect actual thermal performance after potential conservation measures.

Recommended Strategic Direction

1. Give priority to the selection of heat pump technologies for all HVAC designs.
2. Ensure all new building designs and major renovations (e.g., when HVAC systems are being replaced) are based on high performance standards allowing low temperature heating sources.
3. Compare all heat pump systems to conventional natural gas fired systems using a life cycle cost analysis over a ~20-year cycle, including the cost of carbon.
4. FCM to initiate an on-going heat pump system monitoring and verification protocol with existing heat pumps to gain insights around optimum performance criteria and share with HVAC design teams.

3. Geo-Exchange Heat Pump Systems

Heat pumps will make up a large part of the electrification on the thermal loads for The Town. Ground source systems should be considered when there is sufficient ground such as under a new building, under a parking lot or nearby grounds for the borehole fields. The supply temperatures from current heat pump technologies are less than conventional heating systems which means retrofitting into an existing building will likely require terminal device conversions, derating and possibly a booster heater. The facility needs to have cooling and heating loads that can be balanced annually to ensure the ground is properly charged.

FCM should prepare a trigger event schedule that uses end of life and HVAC renovations to bring heat pump solutions to the building into consideration. Consider geo-exchange solutions for large campus-like opportunities and where thermal off-takers are available, such as around an athletic facility, large community centre, and operations centres. Geo-exchange systems should be evaluated using a life cycle cost assessment against a conventional gas fired boiler/chiller system and include the impacts of carbon costs, utility escalation, maintenance, and operations.

Recommended Strategic Direction

1. Give priority to the selection of heat pump technologies for all HVAC designs.
2. Give priority to ground source geo-exchange systems where land or ground volume is available (e.g., parking lots, land close to sites, under buildings in some cases).
3. Ensure all new building designs and major renovations (e.g., when HVAC systems are being replaced) are based on high performance standards allowing low temperature heating sources.
4. Compare all heat pump systems to conventional natural gas fired systems using a life cycle cost analysis over a ~20-year cycle, including the cost of carbon.
5. FCM to initiate an on-going heat pump system monitoring and verification protocol with existing heat pumps to gain insights around optimum performance criteria and share with HVAC design teams.

4. Solar Thermal – Water

Solar hot water reduces natural gas use directly. When there are annual hot water loads such as in pools, community centres, long term care, athletic centres, and operations facilities, solar hot water systems should be considered to supplement the conventional heating plants. The temperatures delivered are best suited for process laundry, truck/bus washing, and DHW loads. It is also a good match for supporting geo-exchange and DES applications. Solar hot water is a recommended technology for consideration and use.

Blackstone recommends encouraging the evaluation of solar hot water applications for any new building or renovation where process hot water is required year-round. The aim is to get a minimum annual solar fraction of 30% (solar supplies 30% of annual hot water needs). Consider making new buildings "solar ready" with plumbing (and electrical) chases from the roof to the mechanical rooms. Roof structures will be a major decision factor as will solar access.

The cost of natural gas will increase due to the impact of carbon rates, possibly being on the same order of magnitude as the commodity itself by 2030. It would be prudent to consider solar hot water now and capture the savings potential of these carbon fees over the next nine (9) years which will help reduce the simple payback.

Recommended Strategic Direction

1. Always consider pre-heating water with solar in applications where year-round hot water is required. Good sites to consider for solar hot water, e.g., pools, community centres, laundry facilities, fleet washing, domestic hot water.
2. Ensure all new building designs and major renovations (e.g., when DHW systems are being replaced) are based on high performance standards allowing solar heating sources to contribute to annual loads.
3. Consider the costs of carbon when assessing the life cycle costs of a solar hot water system as it will reduce the DHW/hot water heating plant size and take advantage of the increasing costs of natural gas.
4. Due to increasing costs of natural gas due to carbon costs and variable commodity costs, consider renovating large DHW load applications with solar hot water.

5. Solar Thermal – Air

Solar thermal air systems are more often mounted onto vertical walls and where there are outside air heating loads. The opportunities in The Town may be present at existing sports and operations facilities where there are large South-East to South-West facing walls. As these systems pre-heat air, they are best suited for locations with high winter outside air heating loads.

The Town should review sites with outside air heating loads and access to vertical walls with rooftop air distribution systems. An estimated performance can be calculated and reviewed for carbon and natural gas benefits. Solar thermal air systems should be considered where outside air is required and must be pre-heated.

The cost of natural gas will increase due to the impact of carbon rates, possibly being on the same order of magnitude as the commodity itself by 2030. It would be prudent to consider solar air now and capture the savings potential of these carbon fees over the next nine (9) years which will help reduce the simple payback.

Recommended Strategic Direction

1. Always consider pre-heating air with solar in applications where large volumes of outside air are required between September and June each year. Good sites to consider for solar air are those with central distribution air systems from rooftop air handlers, e.g., pools, community centres, offices, fleet garages.
2. Ensure all new building designs and major renovations are based on high performance standards allowing solar heating sources to contribute to annual loads.
3. Consider the costs of carbon when assessing the life cycle costs of a solar hot water system as it will reduce the DHW/hot water heating plant size and take advantage of the increasing costs of natural gas.
4. Due to increasing costs of natural gas due to carbon costs and variable commodity costs, consider supplementing large DHW loads with solar hot water.
5. Due to increasing costs of natural gas due to carbon costs and variable commodity costs, consider adding solar heated air to pre-heat loads.

6. District Energy Systems

The Town is planning to develop intensification neighbourhoods which could be candidates for a DES model. FCM group at The Town should maintain contact with this effort and coordinate opportunities to design new buildings or renovations that can connect to a community DES. The community uses many corporate facilities now so it is very likely there will be a need for buildings within the developments that will come into the FCM portfolio. Other DES opportunities within the FCM should be pursued when available, such as for large athletic facilities with multiple thermal off takers nearby (i.e., expansion of sports complex to include expansion with pools). In all cases, renewable energy systems should be considered in the DES designs.

Recommended Strategic Direction

1. Connect with and formalize a relationship for participation in community level DES developments to include Corporate facilities
2. Ensure building performance standards (new and renovation) anticipate DES design requirements that can use low temperature heating water.
3. Encourage a life cycle cost analysis, including the cost of carbon, for evaluating a DES connection or campus of multiple Corporate buildings, compared to conventional natural gas heating.
4. Ensure RE such as PV and solar thermal energy is considered during DES evaluation and design and target a RE contribution fraction to offset GHG from the DES.

7. Energy Storage

Consideration for batteries should first be applied in a “safe haven” site, for example, in community centres. They can be used there as peak shedding during the year to offset expensive time of day rates where applicable. In the current Ontario grid architecture, the benefits of batteries can be realized for buildings certified as Class A for global adjustment. Battery technology and the controls for integration into the buildings and grid are improving rapidly. The costs are also dropping making batteries a reasonable energy system to reduce costs during peaks as well as avoid marginal emissions when the grid is carrying gas fired peaker plant power. Technologies for combining PV and batteries are available. This combination is of interest for EV charging/discharging applications where parked cars are used for a small portion of the time during the day to offset grid power. This V2G concept is discussed more later.

The recommendation is to consider battery storage for peak shedding and possible demand reduction schemes in buildings that are Class A. Consider for use in buildings with high demand periods and develop a demand reduction plan to capture the grid peak times each year. Consideration for “safe haven” application is recommended.

Recommended Strategic Direction

1. The priority for battery storage systems should be into facilities that could become "safe haven" energy hubs such as community centres and long-term care facilities.
2. These should initially be designed to support emergency level equipment to extend the resiliency of the site to provide comfort under extreme weather conditions, lighting, some refrigeration, heating system fans, pumps, some service plug loads for charging phones, computers, radio/television, for 4 to 6 hours.
3. Extend the consideration to peak power shaving and shifting applications in sites where shaving and shedding is possible (Class A), such as operations centres, administration, sports complexes.
4. Ensure all new buildings are designed with high efficiency electrical load end devices.
5. Ensure all buildings are designed for high efficiency electrical loads to extend the electrical autonomy and provide safe-haven potential.
6. Follow technologies and case studies with V2G applications.

8. Hydrogen & Fuel Cells

Currently, hydrogen delivery and infrastructure are not widespread in or around Oakville. Hydrogen produced by steam reformation of methane is called "grey hydrogen" and not a good low carbon source. Hydrogen is clean when it is made using renewable energy and called "green hydrogen", which is preferred. Hydrogen made from reformation and the carbon is captured is called "blue hydrogen" and more common than green hydrogen. The technologies for hydrogen as a heating and/or combined heat and power system are being brought to market for commercial applications. Until there is a more robust distribution system for hydrogen electrification will be the more appropriate strategy to reduce GHG emissions in buildings and fleets. Hydrogen is being used for short-haul trucking and last mile deliveries in some pilots now. The hydrogen is generated at the trucking operations centre. Hydrolysis is an expensive technology still though with increased deployment should become more cost effective within 5-10 years. The Town should continue to be aware of CHP technologies as they prepare for hydrogen fuel blends and understand how the carbon reduction of blended fuels will impact the carbon loads and therefore the cost of carbon in conventional heating systems.

The Town should prepare a cost calculation for fuel that includes the defined carbon content for natural gas and the carbon costs that result each year and carry and monitor these along with the standard utility tracking metrics.

Recommended Strategic Direction

1. Hydrogen is not yet ready for wide-spread use without more distribution infrastructure.
2. If hydrogen is to be used, short-haul and last mile trucking is likely the early adoption scenario.
3. FCM maintains an awareness of the state of hydrogen generation, applications (i.e., fleet operations in particular, CHP in general) and distribution.
4. FCM maintains an awareness of the status and cost impacts of hydrogen content in natural gas to ensure correct emissions factors are being used when calculating GHG loads from existing natural gas heating.
5. Follow the natural gas supply mix information as hydrogen is introduced as this will reduce the GHG emissions factor.

9. Bio-Energy

Due to delivery and storage needs, this is a technology best suited for district energy system applications. Transportation and storage criteria must be included in any feasibility studies and include sufficient fuel to carry through delivery disruptions. The Town should maintain awareness of the technologies and applications for consideration against other fuel supplies. Consider a more in-depth feasibility study to fully assess the capabilities and application criteria for The Town. This technology is not perceived as a long-term option or application for large corporate assets. There are technologies that may appeal to some sites for either pilot or awareness projects that can be addressed as they appear.

Recommended Strategic Direction

1. Not a good option for corporate portfolio.
2. FCM maintains an awareness of the technologies in the context of an urban application.
3. Ensure all new building designs and major renovations (e.g., when HVAC systems are being replaced) are based on high performance standards allowing low temperature heating sources.
4. The Town may select biomass as a fuel source for a DES that would be outside of the FCM responsibilities and should be aware of this decision as it may impact operations staff.

10. Wind

Wind energy can be either active or passive. Active wind energy capture using a turbine is not applicable within The Town but may be possible through a virtual power plant (VPP) and PPA. Passive use of wind through design is recommended to assist with ventilation and directing to prevent uncomfortable wind tunnels and snow build up. We recommend a wind study be completed for new buildings to ensure passive wind energy is being used to benefit energy and comfort. Wind energy is not recommended for urban applications other than small scale, stand-alone systems. Consideration for a partnership in a VPP should be investigated.

Recommended Strategic Direction

1. Active wind technologies are not likely to be eligible within the boundaries of Oakville.
2. There are some small-scale wind systems available for streetlights, off-grid parks, trails, that may be appropriate – they are a highly visible form of renewable energy that might appeal to the community.
3. Consider passive use of wind energy through free ventilation, wind breaks, venturi prevention planting, channeling.
4. Stay aware of the potential to join a virtual power plant opportunity when this energy supply method becomes available.

Summary of Strategic Direction for RE

Renewable Energy/Low Carbon Direction

The stages of the development of a renewable energy strategic direction include discussions of the technologies, sites, policies, standards, costs/benefits, and stakeholder considerations. Renewable energy systems are an increasingly recognized and accepted means to generate low carbon energy for community and corporate use (in the interest of expanding the discussion around renewables, we feel it is more appropriate to call "renewable energy" "low carbon" solutions). Though not described as such throughout these reports, it is a phrase that should be used more often as it encompasses more current technologies, as well as evolving ones, that will reduce the carbon presence of The Town. An example of a low carbon solution but not a fully recognized renewable energy source, is the use of air to water heat pumps.

The low carbon technologies reviewed are currently available and marketable with a range of applications within The Town. Some are not as marketable as others (e.g., PV versus hydrogen), but all are increasing their presence, cost effectiveness, understanding, and acceptance. Many can be integrated, so a holistic solution assessment needs to be used going forward – e.g., PV plus batteries, or solar hot water and heat pumps.

The following is a summary of the direction the Town can consider in their ongoing path toward an 80% reduction of GHG's by 2050.

Strategic Direction

1. Continue to reduce the energy loads through concerted energy conservation programs and high-performance low carbon building design standards.
2. Give priority to the electrification of HVAC loads.
3. Target increasing levels of PV contribution to the corporate electrical loads – e.g., 15% at 2030; 55% at 2040 and 70% at 2050.
4. Require appropriate renewable and low carbon energy system designs and assessment be included during site planning.
5. FCM to prepare GHG targets and milestones for submission to The Town Plan and encourage the commitment to achieve them as a part of The Plan.
6. Formalize renewable energy contribution targets as percent of total Town energy corporately to be achieved by 2030+.
7. Adopt and enforce a life cycle cost analysis that includes the cost of carbon.

Recommended Policy Initiatives

Using the policies, guidelines and standards reviewed in the Phase A report of the full project, and with insights from the Corporation, the following policies should be considered to encourage renewable and low carbon solutions. Many of the technologies we see today will improve in terms of efficiency, range of operating conditions, cost, and applications. The best policy scenario is one that allows future technologies to be considered and adopted as they evolve. For this reason, policies, guidelines, and standards will tend to be somewhat vague as they try to cover all scenarios.

Strategic Direction

1. Promote plans to electrify the HVAC systems for the corporate facilities.
2. Promote PV installation to offset corporate electricity loads and offset increased electricity use due to electrification.
3. Allow for flexible technology improvements, policies, standards, and guidelines, i.e., specify “best in class” or “high performance alternates”.
4. Standards should be reviewed and adapted on a regular cycle – e.g., 3-5 years maximum or at the update schedule for the OBC, whichever is sooner.
5. Formalize Corporate Energy Team collaboration with Council reviews of low carbon development strategies, planning and standards – e.g., formal RE Strategy Committee that includes Energy Engineering department staff to report to Council annually.
6. Consider setting the baseline year for energy benchmarking to 2015 to remove the impact of changing the grid emissions carbon content due to the closing of the coal fired electricity generation plants in 2014. Comparison before and after are appropriate but will skew the savings making future comparisons difficult.
7. Establish a minimum renewable energy fraction of the Corporate facilities energy profile along with a timeline for implementation, e.g., 15% at 2030; 55% at 2040; 70% at 2050.
8. Develop absolute energy and GHG performance indices applied to relevant Corporation building archetypes and stepped to increasingly higher absolute performance indices on a defined cycle. Propose standards that are higher performance than the current OBC plus SB10.
9. Include comprehensive commissioning procedures for all new buildings and large renovations that include thermal and air sealing tests – e.g., infrared imagery and blower door tests.
10. Require a RE Strategy/low carbon solution whenever a building permit is required for Corporate facilities.
11. Include renewable energy/low carbon design criteria into corporate Building Design Standards to meet minimum new and renovation performance indices.
12. Develop and promote a life cycle cost analysis, including the costs of carbon for low carbon system evaluation. Require a LCA report comparing RE Strategy and low carbon solutions with conventional technologies in all proposals/tenders over the life of the technology.
13. Strengthen the words “should” and “encourage” in all policies to actions words, e.g., “shall”, “adopt”, where renewable and low carbon energy systems are presented.