CLIMATE ACTION SUPPORT CENTRE

MUNICIPAL CORPORATE ENERGY PLANNING GUIDE

Canada

FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Clean Air Partnership

Clean Air Partnership

ABOUT THE CLEAN AIR PARTNERSHIP:

Clean Air Partnership (CAP) is a registered charity that works in partnership to promote and coordinate actions to improve local air quality and reduce greenhouse gases for healthy communities. Our applied research on municipal policies strives to broaden and improve access to public policy debate on air pollution and climate change issues. Clean Air Partnership's mission is to transform cities into more sustainable, resilient, and vibrant communities where resources are used efficiently, the air is clean to breathe and greenhouse gas emissions are minimized.

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Corporate Energy Managers Community of Practice

CLEAN AIR COUNCIL

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EXECUTIVE SUMMARY

Conservation and Demand Management (CDM) Planning involves conserving or changing energy use. This is a cost effective way to reduce greenhouse gas production, save energy dollars, and avoid the need for new generation and transmission, reducing strain on our energy systems. CDM planning is standard practice in medium to large private sector organizations, and for many public sector bodies. Across Canada, provinces can direct how the public sector addresses CDM planning.

In Ontario, O.Reg. 397/11 requires that public agencies prepare, publish and implement CDM plans. Public agencies are defined as school boards, municipalities, municipal service boards, public hospitals and post-secondary educational institutions. The Regulation requires that CDM plans:

- ***(1)*** summarize the public agency's annual energy consumption and greenhouse gas emissions for its operations, and;

- ***(2)*** describe previous, current and proposed measures for conserving energy from their operations and for managing the public agency's demand for energy, including a forecast of the expected results of current and proposed measures.

Because of the widely variable level of resources available to Ontario's 444 municipalities, Regulations such as O.Reg. 397/11 are rightly non-prescriptive.

Public sector agencies retain the right to internally determine the ambition of their CDM plans. However, in order to achieve Canada's 2030 and 2050 greenhouse gas reduction targets, we need to advance towards carbon neutrality and 'net zero emissions', meaning there are no carbon emissions associated with our buildings and fleets. To do this, public sector CDM planning must be more aggressive and ambitious.

This Guide is designed to assist public sector agencies who seek to achieve more with their mandated CDM plans. Rather than provide technical detail regarding the implementation elements of CDM plans (such as specifics around electric vehicle charging or heat pump installations), the Guide provides analysis of the supporting policies and practices that must be in place to allow for the advancement of our low carbon future. These elements include financial policy updates, carbon budgeting frameworks, use of public-private partnerships, and use of integrated design.

While this Guide has been created for use in municipalities across Canada, many of its elements have broader value to the public sector as a whole.

INTRODUCTION

This Guide was created to support the development and updating of municipal energy management plans, typically called ***Corporate Energy Plans or Conservation Demand Management Plans (Plans)***. The goal of these Plans is for municipalities to manage their facilities and operational energy consumption and greenhouse gas emissions and achieve Canada's 2030 and 2050 greenhouse gas (GHG) reduction targets.

Many municipalities across Canada have adopted climate and energy plans and strategies. In Ontario, municipalities are required to update their energy management plans every five years, including reviewing results of implemented energy initiatives, and forecasting new ones. Given their critical role in addressing climate change, these Plans need to be ambitious, effective and aligned with GHG reduction targets.

More than 475 local governments across Canada, including over 50 in Ontario (representing 84% of Ontario's population) have declared a climate emergency and are leading the way on climate action by setting bold GHG reduction targets for community-wide emissions aligned with the latest climate science of 30–60% below 2010 levels by 2030, and "net zero" by 2050 or sooner.

This Guide includes an analysis of Plans from 35 Ontario municipalities and a compilation of input received from municipal energy managers participating in the Corporate Energy Managers Community of Practice. Municipal energy managers can use this Guide to benchmark progress of their Plans and respective actions, learn from other municipalities, and identify steps and leading practices to align their Plans with the scale of action needed to achieve 2030 and 2050 targets.

Section One is a compilation of the various sections and topics that are often covered within municipal Corporate Energy Plans.

Section Two benchmarks the state of actions being undertaken as well as implementation strategies, policies and actions in relation to their alignment with municipal climate emergency declarations, provincial mandates, Canada's 2030 and 2050 targets, and the Paris Agreement.

Section Three provides case studies of the net zero emission enabling policies and actions that have been undertaken across Ontario municipalities and lessons learned.

This Guide is accompanied by an online resource compendium developed by Clean Air Partnership that is available ***here***.

SECTION 1:
COMPONENTS OF EXISTING MUNICIPAL CORPORATE ENERGY PLANS

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This section provides a compilation of components that are often addressed within municipal Corporate Energy Plans.

ABOUT THE MUNICIPALITY AND ITS OPERATIONS

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
ABOUT THE MUNICIPALITY	Where it is located, geographical size, population, expected population growth, employment growth, how that growth is expected to influence energy use.
SERVICES THE MUNICIPALITY PROVIDES	A description of the departments within the municipality and the types of services, including community services, the municipality provides.
TYPES OF FACILITIES THE MUNICIPALITY OPERATES AND MANAGES	A summary of the types of buildings and their functionality such as administration, community centres, pools, ice rinks, fire stations, cultural facilities, libraries, waste, water, transit, long-term care homes, day care centres, storage, streetlights and traffic signals.
DESCRIPTION OF MUNICIPAL FLEET VEHICLES AND EQUIPMENT	Description of the types and use of vehicles including light, medium and heavy-duty vehicles, as well as equipment used.
SUMMARY OF MAIN TAKEAWAYS FROM THIS SECTION	Summarizing the "so what" of how the municipal context influences how the municipality uses energy, its opportunities to improve efficiency, challenges it faces related to options available for efficiency gains within different facilities and service areas.

THE VALUE AND RATIONALE FOR MUNICIPAL CORPORATE ENERGY PLANS

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
TO REDUCE ENERGY USE AND COSTS	Description of the role energy use plays in the delivery of municipal services and how good management requires the tracking of energy use in order to identify opportunities to increase efficiency. The energy costs incurred by the municipality over the past few years and how energy costs impact municipal budgets. The role that increased energy efficiency can play in reducing the municipality's vulnerability to energy and carbon price increases over time.
TO INCREASE THE EFFICIENCY OF MUNICIPAL SERVICE DELIVERY	A core responsibility of municipalities is to practice good corporate management and ensure the efficient use of energy to deliver the services it provides to the community.
TO ADDRESS CLIMATE CHANGE AND REDUCE GREENHOUSE GAS EMISSIONS (GHGS)	The connection between energy used by the municipality and climate change. How the municipality has a responsibility to reduce and eventually eliminate GHG emissions released by the municipality's operations.
TO INCREASE RESILIENCE TO ENERGY DISRUPTIONS	Description of the connection between the Plan and how it improves the municipality's ability to continue to deliver services during periods of energy disruption.
BETTER MANAGEMENT OF MUNICIPAL ASSETS	Description of the connection between the Plan and asset management plans. How management practices associated with the energy plan can support the state of good repair of municipal assets.
ADVANCEMENT OF SUSTAINABLE PROCUREMENT GOALS/POLICIES	Description of the connection between the Plan and green or sustainable procurement policies. The Plan can provide a mechanism to advance sustainable procurement practices.
ENERGY LITERACY OPPORTUNITY FOR MUNICIPAL COUNCIL, STAFF AND COMMUNITY	The Plan presents an ideal opportunity to educate municipal staff and the community regarding where energy comes from, its sources, how it is used, the need to reduce the costs and impacts associated with our energy use, efforts that have or will be undertaken at other levels of government that impacts municipal energy use (e.g. coal phase out and upcoming increased natural gas for electricity generation).

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
DEMONSTRATING LEADERSHIP BY EXAMPLE	Municipalities have declared climate emergencies, adopted GHG reduction targets and it is critical to credibility that if the municipality is encouraging others to reduce their energy and GHG emissions that they also practice what they promote and serve as an example to others within their community and beyond.
TO MEET PROVINCIAL REQUIREMENTS	In Ontario there is a provincial regulation (Ontario Regulation 507/18) that requires all public sector agencies (municipalities, schools, hospitals, etc.). Provide a short description of its origin, changes and present requirements. Pull out box provided below.
ALIGNMENT WITH PROVINCIAL AND FEDERAL CLIMATE PLANS AND TARGETS	Highlight of provincial and federal energy and climate commitments and how this Plan contributes to the advancement of those commitments.

BACKGROUND ON CLIMATE CHANGE

The climate is changing, both globally and locally, due to an increase of greenhouse gases (GHGs) released into the atmosphere. While GHGs are naturally found in the environment and can fluctuate in nature through seasonal changes and events like volcanic eruptions and forest fires, anthropogenic (human-caused) sources are contributing large quantities of GHGs at a faster rate than our atmosphere can accommodate. Fossil fuels such as coal, natural gas, gasoline or diesel, etc. are the greatest human-caused contributors to GHG emissions, and are used to run equipment, generate lighting, and heat and operate our buildings and power motor vehicles.

Ontario's average annual temperature has increased by 1.4°C over the last 60 years. Models suggest that by 2050, the average annual temperature in Ontario could increase by another 2.5°C to 3.7°C.

Climate change impacts the weather (e.g. increased flooding, tornados, extreme heat events), increases air pollution and contributes to the rise in infectious diseases such as West Nile and Lyme disease. All these events have significant impacts on our health, wellbeing, infrastructure, environment, and economy.

ALIGNMENT WITH FEDERAL AND PROVINCIAL CLIMATE PLANS AND TARGETS

Released in 2017, the ***Federal Pan-Canadian Framework on Clean Growth and Climate Change (PCF)*** is Canada's climate plan. The PCF has a focus on energy-efficient measures, energy reduction measures, and carbon pricing measures to ultimately help meet Canada's international emissions reduction targets and commitments under the Paris Agreement (2015). By 2030, the PCF's goal is to meet or exceed a reduction in Canada's GHG emissions by 30% from 2005 levels. By 2050, the goal is for Canada to achieve net-zero emissions. The PCF was developed as part of a collaborative approach between federal, provincial, and territorial governments, and in consultation with Indigenous peoples. Below is a list of a few of the actions that are highlighted in this plan:

- Increasing the uptake of zero-emission vehicles for transportation and increasing efforts to transition to highly efficient facilities.
- Promoting homes that can generate as much energy as they use and promoting the use of clean energy.
- Investing in clean energy research and technology development.
- Using funds from the $2 billion Low Carbon Economy Fund and green infrastructure investments to help interested provinces and territories expand their efforts to improve facility energy efficiency.

In addition to the 30% target, Canada's ***Greening Government Strategy (2017)*** sets a target to reduce GHG emissions from federal operations by 40% from 2005 levels by 2030 (or earlier), and 80% by 2050. The federal government also made a commitment to be an early adopter of the new and existing building standards proposed under the PCF and to invest in energy improvements to homes and buildings. By succeeding in its mandate, the municipality can help the federal and provincial governments achieve their goals.

The ***Preserving and Protecting our Environment for Future Generations: A Made-in-Ontario Environment Plan (2018)*** aims to protect our air, lakes, and rivers and help achieve Canada's goal to reduce 30% of emissions below 2005 levels by 2030.

ONTARIO PUBLIC SECTOR REGULATION 507/18 FOR ENERGY REPORTING AND CONSERVATION AND DEMAND MANAGEMENT PLANS

Under the Electricity Act, Ontario Regulation 507/18 requires broader public agencies — municipalities, municipal service boards, school boards, universities, colleges and hospitals to:

- *report on their energy consumption and greenhouse gas (GHG) emissions annually beginning in 2019; and*
- *to develop and implement energy Conservation and Demand Management (CDM) plans starting in 2019.*

The regulation requires that the public agency develop, and make public, the CDM plan by July 1st, 2019. Public agencies must also update the plan every 5 years beginning in 2019.

The previous iteration of the requirement occurred in August 2011, when the provincial government introduced Ontario Regulation 397/11 under the Green Energy Act, 2009. This regulation required certain public agencies — Municipalities, Municipal Service Boards, Schools Boards, Universities, Colleges and Hospitals — to report on their energy consumption and GHG emissions annually beginning in 2013. The public agencies were also required to develop and implement five-year energy conservation and demand management (CDM) Plans starting in 2014. The intent of the regulation was to help the broader public sector organizations better understand their energy consumption, to help them benchmark energy use, and to encourage energy conservation and demand management activities within them.

In order to comply with the minimum requirements of the Act municipalities are required to submit annual energy consumption and GHG emissions for each calendar year in buildings or facilities the public agency owns or leases that are:

- *Heated or cooled and in respect of which the public agency is issued the invoices and is responsible for making the payments for the energy consumptions; or*
- *Related to the treatment or pumping of water or sewage and in respect of which the public agency is issued the invoices and is responsible for making the payments for the energy consumptions.*

BACKGROUND ON MUNICIPAL ENERGY USE

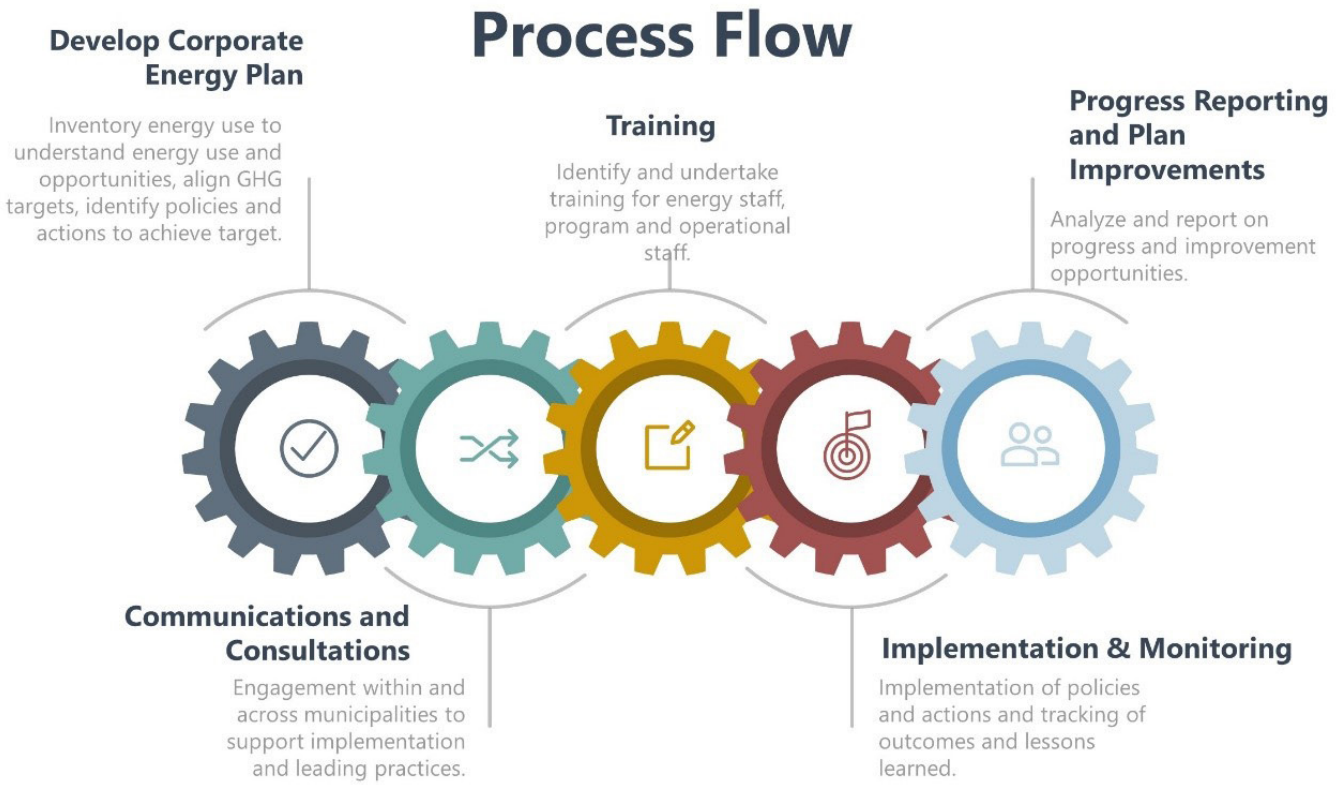
TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
TOTAL ENERGY USE AND GHG EMISSIONS	Provide total energy use (often expressed in Joules and total GHG emissions (often expressed in CO_2 equivalents)
BREAKDOWN OF ENERGY USE	Pie chart of types of energy used (electricity, natural gas, propane, diesel, gasoline, renewables, biogas, etc.)
BREAKDOWN OF GHG EMISSIONS	GHG emissions connected to municipal energy use and their comparative contributions across fuel types
BREAKDOWN IN ENERGY USE ACROSS FACILITY/SERVICE TYPES	Energy use across facilities is often presented by sectors (Buildings & Facilities; Fleet & Equipment; Wastewater & Water Pumping; Outdoor Lights; Waste; Employee Commuting & Municipal Air Travel). In addition, when facilities are presented, they are often grouped/benchmarked across similar use/features (community centres with similar features such as pools/arenas) being compared to better enable the municipality to identify which buildings are functioning more efficiently than others and where efficiency opportunities are largest.
WHAT IS AND IS NOT INCLUDED IN THE ENERGY AND GHG INVENTORY	it is important to be clear about what is included in the inventory and what is not. Inventories include Scope 1 emissions (all direct emissions from the activities of an organisation or under their control; including fuel combustion on site such as from natural gas boilers, fleet vehicles and air-conditioning leaks) but exclude emissions related to extraction, fugitive emissions and transmission losses. Most also include some Scope 2 emissions from electricity generation. However, most do not include the scope 2 emissions from the extraction and distribution of natural gas. Very few inventories factor in Scope 3 emissions which are the indirect emissions resulting from activities that are supply chain related and beyond a municipality's control such as consumption energy and emissions. Transparency associated with what is within and beyond scope are essential to maintaining consistency or comparing inventories across time periods.

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
METHODOLOGY RELATED TO ENERGY AND GHG INVENTORY	In addition to clearly identifying what is within and beyond scope, it is important to be clear about the methodology used to generate the inventory. Factors such as data sources, data source weaknesses, weather adjustments, and GHG coefficients used are also important to clearly outline in order to maintain transparency and enable consistency across inventories. These are often described in the appendix of the Plan.
THE ROLE OF UTILITY BILL VERIFICATION	It is important to check utility bills for errors by comparing bills to meters. Per units, rate codes and delivery costs differentiation are some of the common metrics that are used to highlight possible errors. For those municipalities with revolving funds in place, savings from billing errors are often added to the revolving fund when they are identified outside the fiscal year they occurred in.
ENERGY FORECASTING AND BUDGETING	Energy forecasting in some Plans include population growth and an analysis of how that growth is likely to impact facility use or the need for new facilities, increased hours, etc. Otherwise, forecasts often take per capita use and multiply it by population growth projections. For energy costs, factors often considered include expected increases in rates, consumption, fixed costs such as delivery, and budget limitations/allocations. There are software/third party organizations that specialize in estimating future energy costs. It is essential to be able to illustrate the changes of energy cost over the years in order to validate budget increases for the energy use of the municipality despite energy efficiency action implementation. Due to common increases in energy costs it is important to refer to energy savings as cost avoidance and document what energy costs would be if no energy efficiency efforts had been implemented.

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
EXPLANATION OF THE DIFFERENCE BETWEEN ENERGY USE AND ENERGY USE INTENSITY	Absolute energy use metrics speak to the total energy used. This can be presented in aggregated form where various forms of energy use are converted to equivalent Joules, or presented via their individual sources (electricity, natural gas, diesel, gasoline, etc.). Energy use intensity expresses energy use as a function of some other denominator such as population or m^2. Energy use intensity comparisons across similar facility types allow for the ability to benchmark which facilities are performing more efficiency than others (thereby enabling opportunities to identify leading practices or facilities that present the largest efficiently opportunity gains). While there are several municipalities that have set energy use intensity targets within their energy plans, climate change scientists typically use absolute GHG reduction targets and not simply per capita or intensity emissions. Therefore, in order to align with scientific GHG targets it is important for municipalities to set absolute GHG emission reductions even if they use an energy use intensity reduction. In addition, if an energy use intensity target is set by the municipality there is likely the need for fuel switching and ensuring a fossil fuel free electrical grid to be a priority action.
ENERGY LITERACY	Energy literacy is the knowledge of how energy is used in society, its sources and impacts, and the ability to make informed decisions on what the right energy choice is. A ***recent survey*** revealed that Canadians have a good general knowledge of energy use and relative cost but lack detailed knowledge about sources of energy fuels, as well as sources and linkages with environmental impacts. Plans present an opportunity to provide background on how much energy is used, where it comes from, its impacts and how energy use can be better managed to reduce the impacts arising from municipal energy use.
SUMMARY OF KEY INFORMATION THAT THE INVENTORY INFORMS	Considering the often exhaustive amount of background information contained within this section of the Plan, it is important to provide a narrative of key data to help share the leading takeaways such as (but not limited to): how the municipality uses energy, and for what, where that energy comes from, the impacts associated with energy use, and top opportunities for increasing efficiency and reducing impacts.

BACKGROUND ON THE CORPORATE ENERGY PLAN APPROACH, PROCESS AND PRINCIPLES

This section provides background on the approach the municipality has in place (or will put in place) to advance the Plan actions across municipal departments. This section also speaks to the roles and responsibilities of different parts of the municipality and the financial policies that are in place to inform decision making and implementation. It should also address how far these practices will advance the municipality towards the targets within the Plan as well as how it sets up the municipality to be able to move towards Canada's 2030 and 2050 targets.



TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
HOW THIS ENERGY PLAN ALIGNS WITH OTHER MUNICIPAL PLANS	It is often of value to present a summary of the other municipal plans that the Plan is aligned with. This can include (but is not limited to): Official and Strategic Plans, Sustainability Plans, Community Energy Plans, Climate Mitigation and Resilience Plans, Asset Management Plans, and Procurement Policies.
ROLE AND RESPONSIBILITY OF ENERGY STAFF/DEPARTMENTS	Describe the department and staff who will be leading the implementation of the Plan and will be responsible for progress monitoring and reporting. Highlight the role that other departments need to play in order to advance implementation.
ROLE AND RESPONSIBILITY OF INTER-DEPARTMENTAL STAFF TEAMS/DEPARTMENT HEADS	Many municipalities have developed inter-departmental teams to support the implementation of their Plan and to ensure that there is recognition across the municipality that energy staff are unable to implement the Plan without the support of municipal departments. Demonstrated support from senior management is critical to gaining and maintaining support from across the municipality.
ROLE AND RESPONSIBILITY OF COUNCIL	Council ultimately adopts draft Plans and typically sets GHG reduction targets that the Plan should align with. Municipal Councils play a critical role in setting the progress reporting and financial policies that guide energy management. Annual progress reporting on Plan implementation is a leading practice.

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
HOW THE PLAN ALIGNS WITH OTHER GOVERNMENT TARGETS	Due to the different time scales of municipal corporate and community action plans, as well as provincial and federal GHG reduction target commitments, discrepancies between inventories undertaken and target dates can make alignment across the levels of government challenging. To address this, track how aligned the reduction targets within a specific time frame coincide with the level of ambition and action needed to achieve longer-term targets. If there is a misalignment the plan should state why this discrepancy exists and what the municipality and other levels of government will need to do in order to ensure that shorter time frame plans are in alignment with longer-term GHG reduction targets.
PLAN MILESTONE PROCESS	There is a common pathway that is often recognized within Corporate Energy Plans that is meant to ensure progress and accountability and it makes sense for the Plan to identify the progress pathway it will follow to be able to ensure implementation towards Plan commitments and targets. Some of the most common pathways are provided in Figure 1.
PLAN GOALS AND PRINCIPLES	This section often speaks to the larger picture goals the Plan aims to advance and the principles that will govern decision making and action identification and often speaks to the preferred state of energy management for the municipality. Examples of Plan goals include: Advances a Culture of Conservation; Enhances a Corporate Structure and Process for Managing Energy and GHGs; Bringing Lifecycle Costing into Asset Management Planning; Making Progress Towards Longer-Term GHG Targets. City of Burlington's preferred state summary provides an example.

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
ALIGNMENT WITH PROCUREMENT POLICY	The most common barriers sited by energy staff to advancing energy efficiency procurement are related to the decentralization of purchasing decisions and not factoring in energy costs or consulting with energy staff. If there is no corporate-wide culture of energy conservation there is often benefit to ensuring that energy staff are involved in purchases that will have energy impacts. For example, the Town of Caledon has a purchasing requirement that energy and environment staff must be engaged in any purchase above 10K in order to ensure the best value for the Town.
ALIGNMENT WITH ASSET MANAGEMENT PLAN	Embedding energy planning into asset management plans provides significant opportunities to ensure a state of good repair. This integration also provides a structural mechanism for municipalities to move from short term payback actions toward life-cycle costing decision making required to meet GHG reduction goals.
FINANCIAL POLICY RE: ACTION IDENTIFICATION AND APPROVAL	This is where the Plan outlines the financial framework/ methodology it will use to identify and prioritize action decision making. Many municipalities are still using an up to 10-year payback financial decision framework (where operational savings pay back for costs of the actions), rather than a lifecycle costing approach that factors in capital and operational costs over the lifespan of that product. Very few municipalities are able to access the data they would need to undertake a full supply chain lifecycle costing analysis but all municipalities have access to the data that would enable them to move from payback to a total cost of ownership financial methodology. There are additional financial frameworks which are further explored in Section 2 such as carbon budgeting, carbon offset integration, and social costs of carbon that are critical to being able to move towards 2050 net zero targets. Municipalities can unintentionally undermine GHG reduction targets by cherry picking cheaper energy reductions in the short term, which results in making longer term targets more expensive to achieve.

THE CITY OF BURLINGTON'S PREFERRED STATE

1) ***The City of Burlington produces no net carbon releases*** *from its activities and includes renewable energy, where feasible, in all its facilities.*

2) ***The City of Burlington manages its energy*** *in a way that reduces the burden on ratepayers, while maintaining a high level of service for residents and businesses, and a healthy work environment.*

3) ***City of Burlington staff members have the training*** *and information they require to effectively and efficiently manage their energy use and emissions within their areas of responsibilities.*

4) ***Burlington collaborates with others*** *both inside and outside the corporation, such as technology firms, to enhance knowledge of how to use and manage operation systems to maximize efficiency and reduce emissions.*

5) ***The City of Burlington keeps aware*** *of initiatives in other municipalities and organizations that are designed to reduce energy use and emissions and assesses the applicability of these initiates to the City. This includes continuing participation in the municipal energy managers community of practice and other appropriate networks.*

6) ***The City is constantly piloting*** *and evaluating innovative ways of increasing energy efficiency, using renewable energy, and reducing GHG emissions.*

7) ***New equipment is chosen*** *with a consideration of its need/necessity, energy use, emissions, and life-cycle cost.*

8) ***The City measures*** *and monitors energy use and greenhouse gas emissions to ensure continual improvement.*

9) ***Council and senior management have knowledge*** *of energy use and emissions from City operations.*

10) ***The City leverages its expenditures*** *on energy efficiency, renewables, and emission reduction opportunities by taking advantage of incentives offered by utilities, IESO and other levels of government.*

CURRENT AND PAST MEASURES AND RESULTS

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
TYPES OF ACTIONS	Many Plans provide an overview of the types of actions that were undertaken via case studies and progress towards targets and key performance indicators. Different types of energy actions include: Energy Management (e.g. Building Automation Systems (BAS), sub-metering, Energy management systems, Real-time monitoring, Lighting Retrofits, Mechanical Systems, Building Envelope/ Structural, Fuel-Switching, Renewables, Storage).
TARGETS	A chart is useful to indicate progress on each of the targets. If targets were not achieved, provide a description of the factors that limited the implementation required.
CHALLENGES ENCOUNTERED AND LESSONS LEARNED	Many Plans include a narrative section that provides a summary description of the implementation challenges encountered, how those will be addressed in the future, and lessons learned to assist other municipalities advancing energy reduction efforts.
CASE STUDIES	Case studies play a significant role in sharing the state of implementation and often show diversity both in the facilities and departments engaged, as well as across types of actions (energy management, lighting, mechanical systems, renewables, mechanical upgrades, building envelope and storage).

PROPOSED FUTURE MEASURES AND EXPECTED RESULTS

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
TYPES OF ACTIONS	Plans typically provide a narrative overview of the proposed future actions (by facility or type) as well as an appendix either in case study format or table.
TARGETS	Plan should have targets that are aligned and supportive of longer term GHG reduction goals. If past plans did not achieve GHG reduction targets, then the new Plan should increase the scale of ambition to compensate.
DECISION MAKING STRUCTURE	Some Plans provide a list of slated actions for implementation for each facility. For others, Council approves a decision-making methodology that describes how actions will be prioritized based on financial and other criteria. The value of the latter is that it enables the Plans to be kept up to date and is a more streamlined approach allowing for accelerated implementation and bundling of energy projects.
PERFORMANCE INDICATORS	» **Total GHG emissions –** tonnes of carbon dioxide equivalent » **Total energy use –** gigajoules or kilowatt-hours equivalent » **Total electricity demand –** gigajoules and megawatt-hours » **Total energy costs** » **Total savings achieved/avoided costs** » **Grid electricity demand –** gigajoules and megawatt-hours » **Electricity self-generation –** gigajoules and megawatt-hours » **Total fossil fuel demand for buildings –** natural units and gigajoules or megawatt-hour equivalents » **Total fossil fuel demand for fleets –** natural units and gigajoules or megawatt-hour equivalents » **Other fossil fuel demand –** natural units and gigajoules or megawatt-hour equivalents » **Energy intensity of buildings –** energy use per unit floor area » **Thermal energy intensity of buildings –** thermal energy (fossil energy) per unit floor area » **Weather normalized energy use –** weather corrected total energy use » **Total vehicle-distance travelled** by fuel type » **Average fuel efficiency of the fleet** (MJ/km or ekWh/km, and L/100 km for fossil use) » **Disaggregated data are desirable** wherever possible, e.g. per building, per function, per vehicle etc.

MUNICIPAL FLEETS

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
SUSTAINABLE FLEETS PLAN	Many municipalities have developed Green/Sustainable Fleet Plans that undertake actions related to: fleet optimization and right-sizing; use of telematics; incorporating criteria such as total life-cycle costing, operational viability, available fuel options and environmental impacts into purchase decision making; anti-idling behaviours and technologies; driver training; active transportation opportunities; increased use of electric and low-emission vehicles. It makes sense to highlight these actions and plans within corporate energy plans even if not legislatively required as it is part of the energy used by the municipality to deliver its services and responsibilities.
TARGETS (SHORT AND LONGER TERM)	Highlight where there are opportunities for energy and GHG reductions including the state of current and future market opportunities needed to address GHG reductions targets from municipal fleets.
PAST ACTIONS UNDERTAKEN	Provide a summary of past actions as well as a few case studies to describe the types of actions that were undertaken and the results and outcomes.
FUTURE ACTIONS	Provide a summary of the prioritization of upcoming actions as well as how past actions will be continued and/or accelerated.
CORPORATE ELECTRIC/LOW EMISSION VEHICLE STRATEGY	While new markets and opportunities are emerging (e.g. electric vehicles and lower emission fuels such as biodiesel and/or renewable natural gas), effective strategies already available (e.g. right-sizing, trip reduction, use of cargo bikes, etc.) will continue to play an important role to address energy and carbon emissions resulting from fleets services. Energy Plans provide an opportunity to explain upcoming opportunities. For example, the City of Pickering's EV advancements efforts highlighted in their Energy Plan.
PROGRESS REPORTING	Identify the process and timeframe to monitor energy use, emissions and progress reporting to councils and the public on plan implementation and outcomes. Progress reports are often submitted to council on an annual basis.

WATER PUMPING AND CONSERVATION

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
WATER SERVICES DESCRIPTION	Plans present an opportunity to describe to staff and council how water services are delivered, the amount of energy used and reduction opportunities, and impacts resulting from the delivery of these services.
TARGETS	Sector/departmental targets provide an opportunity to show how different municipal services contribute to overall energy use and GHG emissions and the opportunities for reduction within that sector towards the municipal wide targets.
ACTION UNDERTAKEN AND ACTIONS SLATED FOR IMPLEMENTATION	A description of the top past and future actions.
OPTIONS/CHALLENGES FOR THIS SERVICE TO ACHIEVE LONGER-TERM TARGETS	Speaks to the state of where the technology and market is at present and where it needs to go in order to enable the municipality to achieve longer-term targets.

EMPLOYEE TRAVEL

TOP LEVEL TOPICS	DESCRIPTION OF CONTENT
STAFF COMMUTING SURVEY	Some municipalities have reduced energy and emissions resulting from commute trips of municipal staff. Undertaking an employee survey can assist the municipality to better understand commuting practices and barriers and opportunities that would enable staff to choose less polluting forms of commuting options.
TRANSPORTATION DEMAND MANAGEMENT (TDM) PROGRAMS	Many municipalities offer a range of TDM programs and services to assist employees to use sustainable modes of transportation including public transit, carpooling, walking and cycling.
TELECOMMUTING POLICY	Telecommuting (working from home) policies and practices are a core component of many TDM programs. In this section the municipality normally speaks to the policy, how it is advanced, the progress and outcomes to date, and how it can be improved to better meet the needs of the municipality and their staff.
STAFF ELECTRIC VEHICLE POLICY	With the evolving improvements in the passenger electric vehicle market, many municipalities have identified workplace EV charging policies as a priority action to support municipal staff's ability to use electric vehicles for their commuting purposes.

SECTION 2:

BENCHMARKING OF ACTIONS AND RECOMMENDATIONS FOR MEETING EMISSION TARGETS

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BENCHMARKING OF ACTIONS IN ONTARIO MUNICIPAL 2019 ENERGY MANAGEMENT PLANS

Based on the analysis of Plans from over 35 Ontario municipalities, the most common actions identified for implementation in the 2019 plans consist of:

COMMON ACTIONS IN 2019 PLANS	DESCRIPTION OF ACTIONS
ENERGY MANAGEMENT	Building automation systems, energy budgeting, energy sub-metering, energy monitoring and tracking systems.
LIGHTING	Switching to LED lighting
COMMISSIONING AND RE-COMMISSIONING	Making sure building elements such as heating, cooling, air handling, water and refrigeration systems work as they should. Commissioning also works towards improved energy usage and reduced operation and maintenance costs.
MECHANICAL SYSTEM UPGRADES	Increasing the energy efficiency performance of mechanical systems upon replacement (water heaters/HVAC/ chillers/fans/etc.), pneumatic upgrades, moving to heat pumps, heat recovery systems, etc.

Additionally, there are some longer-term actions identified for the time period 2019-2023, but there is a need for a higher prioritization of the implementation of the below actions to bring the Plans into alignment with longer-term GHG reduction targets. More information on many of the actions and technologies highlighted below are available via the Federation of Canadian Municipalities ***Municipal Energy Roadmap Guide***.

ACTIONS REQUIRING ACCELERATION	DESCRIPTION OF ACTIONS
BUILDING ENVELOPE (STRUCTURAL)	Exterior cladding, insulation, roof replacements, window and door replacement, foundation repairs, etc.
FUEL-SWITCHING	Moving from fossil fuel such as natural gas to electricity through such measures such as geo-exchange which uses heat pump technology to take advantage of the temperature differential between outside air, the ground or water and the inside of the building to provide thermal heat and water heating. Air source heat pumps and biogas or renewable natural gas can also be used to replace fossil fuels.
RENEWABLE ENERGY	Solar PV, solar thermal, solar walls, solar carports for EV charging, building integrated systems where solar panels are integrated into the building envelope such as windows and roofs, etc.
ENERGY STORAGE	Battery backup which can be combined with solar PV to provide electricity during energy disruptions, replace natural gas and diesel generators.
FINANCIAL POLICIES	Moving from payback to lifecycle costing, bringing in scope 2 emissions for natural gas, bringing in carbon pricing and budgeting approaches, etc.

The sections below speak to some of the strategies and leading practices that better enable municipalities to advance towards the deeper reductions needed to achieve their 2030 and 2050 targets. Almost 500 Canadian municipalities including 50 Ontario municipalities representing 84% of Ontario's population have passed climate emergencies that recognize and/or commit to the science-based Intergovernmental Panel on Climate Change (IPCC) targets. As such there is the need for Corporate Energy Plans to transition towards Corporate Net Zero Emission Plans.

THE NEED TO MOVE FROM ENERGY PLANS TOWARDS EMISSION PLANS

While the Ontario legislation that requires municipalities to develop Corporate Energy Plans has a focus on energy use over GHG emissions, most municipal plans speak to both energy use and GHG emissions and reduction targets. Many municipalities are moving towards placing a stronger emphasis on emissions and how actions will need to be advanced in order to bring Plans into alignment with municipal Climate Emergency Declarations and emission reduction targets. For example, the City of Burlington provided an estimate on the overall costs and savings to the municipality of moving towards a net zero emission target.

ZERO-ENERGY BUILDINGS: THE DIFFERENCE BETWEEN NET ZERO ENERGY AND NET ZERO EMISSIONS

A zero-energy building (ZEB) is one that produces enough energy (electricity, fuel combustion) to meet its own annual energy consumption requirements. The building terms "net zero energy" and "zero net energy" are synonymous and are broadly used. Energy consumption is averaged over a one-year period. The measurement of energy consumed and energy exported is highly dependent on the site boundary. A single building, a cluster of buildings, a portfolio, a neighbourhood, or a community can be zero energy.

All ZEBs have significantly reduced energy needs. This high level of efficiency allows the energy that is needed to be supplied by renewable energy sources, such as solar. Therefore, ZEBs are built to require as little energy as possible and will produce whatever energy it does need through renewables.

- ***Net Zero Energy Costs:*** *In a cost NZEB, the amount of money the utility pays the building owner for the renewable energy the building exports to the grid is at least equal to the amount the owner pays the utility for the energy services and energy used over the year.*

- ***Net Zero Emissions:*** *A net zero emissions building either produces no emissions or produces enough emissions-free renewable energy to offset emissions from all energy used in the building annually. Carbon, nitrogen oxides, and sulfur oxides are common emissions that NZEBs offset. To calculate a building's total emissions, imported and exported energy is multiplied by the appropriate emission multipliers based on the utility's emissions and on-site generation emissions (if there are any).*

UPDATE TO MUNICIPAL CORPORATE GREEN DEVELOPMENT STANDARDS

Many Plans incorporate green development standards with the most common being a commitment to build new municipal buildings to at least a LEED silver standard. Most corporate green standards were adopted in the late 2000's or early 2010s and only apply to new builds and not existing buildings. Significant gains and cost reductions have occurred over the last 10 years that have made these standards outdated. As such, it is recommended that municipalities update their corporate green development standards to be more aligned with their Climate Emergency Declarations. For example, the City of Toronto set their corporate standard to be at least one tier (Tier 2) above the requirements placed on community buildings, and has set a target that all new buildings will aim for net zero emissions based on lifecycle costing analysis that includes both capital and operational costs.

In order to move existing buildings towards net zero, an integration of energy and emissions considerations is required within asset management plans in order to allow for upfront, long-term planning. One strategy Rocky Mountain Institute pioneered is what's known as "zero over time." The idea is getting existing buildings to net zero energy over the course of 20 years by investing heavily in deep energy retrofits and smart efficiency at major points in the life-cycle of a building, when the HVAC or major exterior elements need to be replaced, for instance. This approach relies on investing at the right times and requires the energy and emissions reduction plan to align with the municipality's capital plan.

UPDATE TO FINANCIAL POLICIES AND PRACTICES

Few Corporate Energy Plans include financial mechanisms to guide action implementation prioritization. A large majority of Ontario municipalities are only using short-term paybacks to guide the actions that will be undertaken. Achieving deeper reductions cannot be achieved with a payback of under 10 years. Additionally, if municipalities only pursue actions that have a shorter-term payback (like lighting and mechanical system upgrades) they risk making their deeper reductions less cost effective (this risk can be mitigated by allocating short-term savings to a revolving fund). As a result, municipal business cases are missing the opportunity to bundle shorter term paybacks with longer term paybacks, and this places a larger financial burden on future actions towards net zero. To address this, some municipalities are pursuing a portfolio approach where more cost-effective short-term actions are bundled with more costly actions that will achieve deeper reductions. It is recommended that municipalities consider bundling actions within their business plans and move from payback calculations towards lifecycle costing for their Plans in order to achieve longer term GHG reduction targets.

Additional financial tools being used by some municipalities to help build the business case for deeper reductions include carbon budgeting and incorporation of a carbon price that better accounts for the true social costs of carbon emissions.

CARBON BUDGETING

Carbon budgeting is the process whereby international science-based targets are translated into the total amount of CO_2e that can be emitted while still achieving the goal of keeping temperature increases in line with the Paris Agreement climate targets (2 degrees Celsius commitment, with the aspiration towards keeping temperature increases at 1.5 degree Celsius increase). Those allowable carbon emissions are downscaled to calculate national, provincial, and/or municipal allowable emissions. The carbon budget then serves as a governance tool that clearly outlines the measures that the municipality will implement, who is responsible for them, the timeline for their implementation and the expected emission reductions to bring the action plan in alignment with the carbon budget. Many municipalities in Canada and across the world are advancing their efforts to move towards carbon budgeting. It is recommended that municipalities align their corporate energy plans with longer-term climate commitments adopted federally and by the municipality.

SOCIAL COSTS OF CARBON OR INTERNAL CORPORATE CARBON PRICING

Most Canadian municipalities now factor in carbon pricing into their business case development as a result of the federal carbon pricing backstop system that applies to any province or territory without its own carbon pricing system in place (currently Manitoba, New Brunswick, Ontario, Saskatchewan, Nunavut and the Yukon). However, while the carbon price is scheduled to increase over the coming years, it is largely recognized that the carbon price of $20 - $50 a tonne is nowhere near the actual costs, since social costs are not included. As such there is a growing trend by municipalities to incorporate their own internal corporate carbon pricing policy for business case development.

For example, the City of Vancouver adopted an Internal Corporate Carbon Pricing Policy that identifies the social costs of carbon that will be used in lifecycle costing analysis of emission reduction actions.

CITY OF VANCOUVER CARBON PRICE SCHEDULE

YEAR	CARBON PRICE
2018	$150 per tonne of CO_2e
2019	$150 per tonne of CO_2e
2020	$155 per tonne of CO_2e
2021	$160 per tonne of CO_2e
2022 AND BEYOND	Previous year's price multiplied by 1.06

ADDRESSING THE DISCOUNT RATE/OPPORTUNITY COST FACTOR

In the energy efficiency business case development process, some municipalities apply a discount rate to the present value of future cash flows. The easiest way to understand the discount rate principle is to consider it the opposite of an interest rate. The rationale is that funds allocated for energy efficiency actions are not available to be invested elsewhere. However, energy efficiency measures typically have relatively high upfront costs, which need to be recovered by savings over longer periods.

As such, the higher the discount rate, the lower the value that is assigned to future savings and the more difficult it is to build the energy efficiency business case. Consequently, high discount rates make energy efficiency measures and supporting policies look less attractive.

From a purely financial perspective the discount rate makes sense, but it does not consider the long-term benefits derived from energy efficiency projects, such as the value associated with job creation or reducing GHG emissions. Since GHG reductions achieved now are even more valuable than those postponed into the future, it is recommended that the practice of applying discount rates to energy efficiency business cases be discontinued.

REVOLVING FUND, RECOVERABLE DEBT AND PUBLIC/PRIVATE PARTNERSHIPS

Several Ontario municipalities such as Hamilton, Toronto, Guelph, and Caledon have instituted revolving funds to support their corporate energy plan implementation. Revolving funds are an internal capital pool that is dedicated to funding energy efficiency, renewable energy, and/or sustainability projects that generate cost savings. A portion of those savings are then used to replenish the fund (i.e. revolved) allowing for reinvestment in future projects of similar value. This establishes an ongoing funding vehicle that helps drive energy efficiency and sustainability over time, while generating cost savings and ensuring capital is available for important projects. Revolving funds have been found to result in increased implementation of actions, however they are vulnerable to being merged with general revenues during fiscal pressures.

RECOVERABLE DEBT

The City of Toronto previously used a revolving fund model to access capital required for energy efficiency actions but transitioned to a recoverable debt financial model in 2013 for the municipality and its agencies, boards and commissions (ABCs). In 2018, the City extended its eligibility to include academic, social, healthcare, industrial and commercial sectors, including privately owned buildings and condominiums located. The City issues a bond and collects the money to fund the retrofit program through a third party. This money does not contribute to the debt that municipalities can have (the municipality's debt ceiling) since it is based on the loans being 're-payable' through the energy savings accumulated by the project rather than from the property tax base.

PUBLIC PRIVATE PARTNERSHIPS

In several cases, access to capital to undertake energy efficiency opportunities is but only one of the barriers municipalities face in advancing their corporate energy plans. The lack of staff resources and capacity to undertake actions is also a common issue that municipalities face. Public/private partnerships are an option for addressing this common barrier. These public/private partnerships typically involve an energy services company (ESCO) that partners with the municipality to undertake energy efficiency actions. The contracts that are drawn up between the municipalities and the ESCOs can take various forms but they often identify the actions that will be undertaken, their costs, the anticipated savings, the maintenance and operational procedures that will be put in place to verify and maintain savings, and the savings sharing arrangement.

More recently, some contracts include an Efficiency Savings Performance Agreement that guarantees the savings and the arrangement that will govern savings disbursement if estimated savings differs from actual savings. It is important that the municipality and the ESCO work together to ensure that the more cost-effective actions undertaken will also lead towards the deeper reductions that the municipality aims to achieve. This can occur by bundling more cost-effective actions with longer term payback actions or by allocating avoided energy costs to a revolving fund.

IDENTIFYING THE CONNECTIONS BETWEEN ENERGY PLANS AND RESILIENCE EFFORTS

There has been an increased trend towards recognizing energy efficiency actions as a means of increasing community resilience. Community resilience is the capacity (of individuals, communities, institutions, and systems within a city) to survive, adapt, and thrive in the face of the chronic stresses and acute shocks they experience. The City of Pickering's Plan provides an example of the connection between energy efficiency actions and resilience benefits. Resilience may also be factored into decisions related to renewable net metering and storage system actions that are likely to play a larger role in corporate energy plans over the coming years.

CITY OF PICKERING CORPORATE ENERGY PLAN RESILIENCE CONNECTIONS

BENEFIT TYPE	ENERGY EFFICIENCY OUTCOME	RESILIENCE BENEFIT
EMERGENCY RESPONSE AND RECOVERY	Reduced electrical demand	Increased reliability during times of stress on electric system and increased ability to respond to system emergencies
	Backup power supply from renewables and micro grid	Ability to maintain energy supply during emergency or disruption
	Efficient buildings that maintain temperatures	Residents can shelter in place as long building's structural integrity is maintained
	Multiple modes of transportation and efficient vehicles	Several travel options that can be used during evacuations and disruptions
SOCIAL AND ECONOMIC	Local economic resources may stay in the community	Stronger local economy that is less susceptible to hazards and disruptions
	Reduced exposure to energy price volatility	Economy is better positioned to manage energy price increases, and businesses are better able to plan for the future.
	Reduced spending on energy	Ability to spend income on other needs, increasing disposable income (especially important for low-income families)
	Improved indoor air quality reduced local air pollutants	Fewer public health stressors
CLIMATE MITIGATION AND ADAPTATION	Reduced greenhouse gas emissions from power sector	Mitigation of climate change
	Cost-effective efficiency investments	More leeway to maximize investment in resilient redundancy measures, including adaptation measures

WORKING COLLABORATIVELY WITH OTHER MUNICIPALITIES

The Corporate Energy Managers Community of Practice (CEM COP) is a network of municipal corporate energy managers from across Ontario who work on municipal energy efficiency and green energy projects. The CEM COP ensures the efficient use of municipal resources by identifying opportunities to share research, expertise and lessons learned. This collaboration informs and expedites the scale-up of energy efficiency and GHG reduction efforts. Working together achieves far more with far less resources and risk.

When determining whether to undertake an action, many Councils ask "Who else is doing this? What did it cost? What did it achieve?" The costs of each jurisdiction allocating staff resources to research this individually is prohibitive and wasteful. Working collaboratively expedites the most successful actions to meet municipal priorities and ensures that efforts and resources are used as efficiently as possible.

Clean Air Partnership supports the CEM COP through secretariat and facilitation support. The lessons learned and business cases associated with the corporate energy actions are shared via workshops, presentations, webinars and a group email list. All activities of the CEM COP are documented and made available online to CEM COP participants, including recordings of presentations, webinars and resources. More information on the CEM COP is available ***here***.

IMPROVEMENTS TO MEASUREMENT AND PROGRESS REPORTING

Evaluating building energy performance typically relies on modeled predictions about how much energy the building will use or how much savings the measure will result in. In order to ensure progress towards targets it is critical to ensure that actual energy use and carbon reductions are being achieved. This can be challenging as the costs of sub-metering affect the cost effectiveness of energy saving actions. As such, some municipalities have identified the use of energy monitoring and building automation systems as a high priority within their 2019–23 plans. The tracking of energy use on an ongoing basis is key to ensuring that the actions being undertaken are achieving the goals and results expected. Annual progress reports to council is a leading practice for ensuring the implementation of plans is achieving outcomes.

INCREASED USE OF INTEGRATED DESIGN

Integrative design engages architects, engineers, and construction teams to identify the best method for delivering the owner's project requirements within budget, on schedule, and to ensure efficient operation throughout the life cycle of the building. Developing a net-zero energy/emission building requires an integrated, highly communicative process. A traditional design/build/hand-over/operate scheme lacks the feedback loops needed to make early design or later operational decisions that net-zero requires. The design/build process better supports the multi-disciplinary integration needed to deliver a net-zero ready building. As such a close relationship between trades, designers and operations staff is a key to success for net-zero buildings.

With an integrated design process, designers have the benefit of continuous feedback from the engineers and contractors before they commit to an approach or concept. Instead of each team (design, build, and operate) working in silos on each phase with information lost in the handover between each, or reverse-engineering building systems into an untested design concept, they are connected from day one. The integrated team speaks the same language, shares information, vision, goals, and desired outcomes, and can be confident that design will reflect the best engineering solution available.

SECTION 3:
CASE STUDIES

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CASE STUDIES

CITY OF TORONTO'S USE OF RECOVERABLE DEBT

The City of Toronto began using a recoverable debt financing model in 2013. Prior to that they used a revolving fund to finance energy retrofits, which was protected from other uses and limited to city divisions. To advance the recoverable debt financing approach, the City issues a bond and collects the money to fund a retrofit program through a third party. These loans do not contribute to the allowable debt that municipalities can carry because they rely on repayment from energy savings generated by the project, not property taxes. If the borrowing entity is external (e.g. not-for-profit, co-ops), a security is required.

There are two types of programs providing recoverable debt to promote energy efficiency retrofits:

- ***1. Energy Conservation & Demand Management:*** this program is directed towards city owned buildings.
- ***2. Sustainable Energy Plan Financing Program:*** broader in scope to incorporate City agencies (e.g. Exhibition Place), City corporations (e.g. social housing), and City divisions and non-profits.

The City's conditions for low-interest loans include:

- It can finance up to 100% of capital costs of the energy retrofit
- There is a payback of energy savings of 20 years or less
- There are risk mitigation strategies to minimize risk
- The interest rates are fixed at the City's cost of borrowing, so it places no financial burden on the municipality
- Interest rates and the repayment period of the loan only applies when the project is completed and is fully operational (i.e. debt repayment only occurs when savings begin)

To maintain consistency across business cases, an escalation factor of 5% for energy costs is used. The City works with parties to advance combined measures (e.g. decreasing natural gas and electricity) to ensure the highest potential of GHG reduction and a robust business case.

CITY OF HAMILTON REVOLVING FUND/ENERGY RESERVE

The City of Hamilton developed a Corporate Energy Policy in 2007 that began with a staff of one and grew within a decade to a staff team of ten. The Policy uses total lifecycle costs that bring capital and operational costs together into decision making and business cases. It also places a large focus on aligning energy actions with the capital budget.

The City of Hamilton Energy Reserve funds:

- Office of Energy Initiatives staff
- Capital outlays for energy efficiency actions
- Energy audits and feasibility studies
- Pilot projects for new energy technologies
- Renewable energy projects
- Training and education and awareness efforts

The Reserve is funded from:

- Savings from operational savings
  (based on energy costs if the energy action had not occurred)
- Recoveries from billing errors
- Energy project incentives

The energy reserve can be used for retrofits, cost mitigation (pricing increases) or when projects fail to attain the expected savings.

The City tracks the energy savings achieved from projects following completion, and reports to Council annually. Their 2019 contribution from project savings was 3.7 million and 2.4 million from incentives. Cumulatively, a total savings of 37.4 million has been achieved since 2007 for projects and incentives.

THE ATMOSPHERIC FUND – PUBLIC/PRIVATE PARTNERSHIP

The Atmospheric Fund (TAF) is an independent non-profit agency of the City of Toronto that has been a Green Bank for 25 years. It has worked with a variety of interest groups to incubate and invest in urban solutions to climate change. TAF work in partnership with a sister company called Efficiency Capital Corporation (ECC) which provides a financing method called ***Efficiency Savings Performance Agreement***. ECC is responsible for all the administrative and customer-relations duties for all TAF's retrofit transactions.

Energy efficiency projects decrease energy costs, avoid capital costs, and focus on achieving a Net Present Value positive investment. Net Present Value speaks to the present value of the cash generated by the investment above and beyond the original capital invested. To be successful in achieving a return on investments and capital assets, TAF undergoes an intensive evaluation and monitoring process to ensure the success of all projects. A strong focus is placed on operational maintenance, since 50% of all energy efficient projects fail due to failing to maintain retrofit applications.

Projects are analyzed by TAF engineers, by an engineer at an insurance company, and by an underwriter. This ensures that the numbers make sense, and nothing is overlooked. The engineers sign off on the business cases, so their credibility is aligned with the success of the project, ensuring that only best available equipment is used, and regular monitoring and maintenance protocols are followed. TAF is not limited to financing projects in the City of Toronto; it can finance projects across the Province of Ontario.

MOUNT DENNIS CHILDCARE: THE CITY OF TORONTO'S FIRST NET ZERO FACILITY

In order to comply with the City of Toronto's Corporate Green Development Standards, and to achieve as close to a net zero emissions target in a cost competitive manner as possible, the City issued in their Request for Proposal (RFP) to design a net zero emission building for the Mount Dennis childcare facility. The RFP required that the design meet the Canada Green Building Council's Zero Carbon Standard and use a Measurement and Verification (M&V) third-party provider.

This standard enables the facility to adapt to changing conditions and maintain or regain functionality and vitality in the face of stress or disturbance. Resilience features include a back-up generator, infiltration of rainwater on-site, permeable landscaping, and low flood risk.

Mount Dennis 2026 zero-emissions building overview includes:

- 100% electric
- Low embedded carbon building
- On-site renewables
- Incorporate Passive House/Air Tightness/Vapor Barrier/Insulation
- Added resilience (to avoid ice storm effects) + emergency back power
- Shading

It was funded using a lifecycle cost approach to bring together the capital and operating costs. The City also received some funds from Metrolinx because the daycare needed to be relocated to accommodate the Eglinton Crosstown light rail project.

MIDDLESEX CENTRE NET ZERO COLDSTREAM FIRE HALL

In 2013, Ontario's Middlesex Council approved the construction of a new fire hall to replace the old one which was in very poor condition and did not meet current functional standards. Middlesex set out in its RFP the desire to achieve a net zero facility that would advance six guiding principles:

- Building Orientation (maximize southerly exposure)
- Building Envelope (air-tight structure)
- HVAC Systems
  (use of ground source heat pumps, solar water heating, etc.)
- Energy Production
- Energy Audit/Modelling
- Occupant Use/Performance Monitoring

Middlesex applied to the Federation of Canadian Municipalities (FCM) for a feasibility study to advance net zero using the above principles and incorporate a geothermal heating exchange system and a 60-kW solar PV that will generate 70,600 kWh per year. Capital funding was also provided by FCM via a $2.6 million loan and a $93K grant and it is estimated that the higher up-front costs will be paid back within 10 years via operational savings.