



Report to: General Committee

Date Report Authored: September 25, 2017

SUBJECT: Ontario Ministry of Environment and Climate Change – Municipal GHG Challenge Fund - Grant Applications
PREPARED BY: Graham Seaman, Director, Sustainability & Asset Management
ext. 7523

RECOMMENDATION:

- 1) THAT the report, “Ontario Ministry of Environment and Climate Change – Municipal GHG Challenge Fund - Grant Applications”, be received;
- 2) AND THAT the Director, Sustainability & Asset Management be authorized to submit applications to the Ontario Ministry of Environment and Climate Change – Municipal GHG Challenge Fund for the following projects:
 - a. Decorative LED streetlight retrofit
 - b. Capture and conversion of natural gas CO2 emissions from a district energy facility into algae based useful products in partnership with Markham District Energy and Pond Technologies
 - c. Intelligent Buildings - Central Building Automation System, Facility Recommissioning, Analytics and Live Energy Display for Large City Facilities
 - d. Net Zero Energy Emissions for new and existing homes in partnership with Alectra and Enbridge
 - e. Community Battle of the Buildings
 - f. Smart Textile Recycling
- 3) AND THAT the Mayor and Clerk be authorized to enter into funding agreements(s) with the Province in a form satisfactory to the CAO and City Solicitor;
- 4) AND THAT the Mayor and Clerk be authorized to enter into partnership agreements(s), where applicable, for the above noted projects in a form satisfactory to the CAO and City Solicitor;
- 5) AND THAT Markham’s proposed internal funding of \$1,263,000 for all projects noted is from existing budgets or reserves as shown on Table # 1;
- 6) AND THAT staff be authorized and directed to do all things necessary to give effect to this resolution.

PURPOSE:

The purpose of the report is to seek authorization to apply for grant funding from the Ontario Ministry of Environment and Climate Change (MoECC) – Municipal Greenhouse Gas (GHG)

Challenge Fund for selected Markham led projects. No new internal City funding is required if the proposed projects are successful in winning a grant.

BACKGROUND:

The City of Markham is a leader in the fight against climate change; guided by the Greenprint, Markham's Community Sustainability Plan (approved by Council in 2011), our 1.83MW and growing of roof top solar is second only to the City of Toronto, and our Corporate Energy Management Plan and previous conservation efforts have resulted in net GHG emissions reduction for City operations of 8% from 2011 to 2016.

The Municipal GHG Challenge Fund was announced by the Province on August 14, 2017.

"The new Municipal GHG Challenge Fund is a program funded by the proceeds from Ontario's carbon market that aims to support community-led action on climate change.

The Challenge Fund highlights are as follows:

- The competitive application-based program will fund up to 100% of the eligible costs for greenhouse gas emissions reduction projects proposed by municipalities.
- Municipalities may request up to \$10 million per project.
- The Municipal GHG Challenge Fund is part of Ontario's Climate Change Action Plan to fight climate change, reduce greenhouse gas emissions and transition to a low-carbon economy.
- The action plan and cap and trade program form the backbone of Ontario's strategy to cut greenhouse gas emissions to 15 per cent below 1990 levels by 2020, 37 per cent by 2030 and 80 per cent by 2050.
- Submission deadline is November 14, 2017

OPTIONS/ DISCUSSION:**Program Criteria and Eligibility**

Any Ontario municipality with a community-wide greenhouse gas inventory, emissions reduction targets and a strategy/plan to reduce emissions and up to date Corporate GHG reporting is eligible to apply.

Municipal projects that are eligible for funding would aim to reduce greenhouse gas emissions in any sector, including in buildings, energy supply, water, transportation, waste and organics. Projects that are currently underway are only eligible if they were initiated after June 1, 2016.

A higher score will be given to municipalities that have a comprehensive GHG reduction plan that **meets or exceeds** the province's 2020, 2030 and 2050 targets. A higher score will also be

given to applicants that already have funding for up to 50% of eligible costs (e.g., through federal/municipal governments, private sector, industry partners etc.).

Municipalities are encouraged to partner with community organizations and other municipalities to implement their project.

Markham's Proposed Approach To the Municipal GHG Challenge Fund

The Greenprint, Markham's Community Sustainability Plan, targets net zero energy, water, waste and emissions by 2050 (exceeding the Provincial target). The Greenprint also contains a GHG emissions inventory and its recommended actions were the early plan to achieve net zero.

Staff are in the process of finalizing Markham's Municipal Energy Plan (MEP), which should come forward to Council prior to the November 14, 2017 application deadline, as its components will update the Greenprint's GHG inventory, target and plan. The MEP has a draft target of net zero energy emissions. The City is compliant with Ontario Regulation 397/11 that requires public reporting of emissions from Corporate assets.

In support of the current Corporate Energy Management Plan and the forthcoming Municipal Energy Plan, staff have devised the following criteria (adapted from the Canada 150 grant criteria) to support fact-based and fiscally-prudent decision making on which projects to put forward and to ensure Markham has the best chance of success with this funding program:

1. Ensure 100% compliance to the Municipal GHG Challenge requirements, including a maximum program grant of \$10,000,000 and up to 100 percent of total eligible costs
2. Reduce greenhouse gas emissions in support of the current Greenprint goal of net zero energy, water, waste and emissions by 2050
3. Align with the forthcoming GHG reduction actions in the draft Municipal Energy Plan and the current Corporate Energy Management Plan and future updates
4. Align with the City of Markham climate change priorities
5. Give priority to projects that provide high visibility and generate community interest in joining the fight against climate change
6. Fund projects that have a high level of readiness in order to be deployed in a timely manner
7. Support effort made in the multi-year budget by selecting unfunded or multi-year phased capital projects that can be accelerated to yield emissions and costs savings sooner
8. Support projects that have partners contributing external cash and in-kind where available

Using the above criteria, staff are recommending the following projects for Council support to apply to the Municipal GHG Challenge fund on or before November 14, 2017.

Table # 1 : Recommended Project Description and Funding Request Details

Recommended Projects	Cost Estimate	Request Amount	Other External Funding*	City Funding*
Decorative LED streetlight retrofit and infill in assumed areas	\$10,000,000	\$10,000,000	\$0	\$0
Capture and conversion of natural gas CO2 emissions from a district energy facility into algae based useful products in partnership with Markham District Energy and Pond Technologies	\$12,000,000	\$7,500,000	\$2M from MDE, \$2M from Pond, \$500k grant from NGIF being pursued	\$0
Intelligent Buildings - Central Building Automation System, Facility Recommissioning and Live Energy Display for Large City Facilities	\$3,500,000	\$2,500,000	\$0	\$1,000,000 from MECO and Facility Life Cycle
Net Zero Energy Emissions pilot for new and existing homes in partnership with Alectra and Enbridge	\$2,200,000	\$1,100,000	\$443,000 from Alectra, \$361,000 from Enbridge, \$83,000 from others	\$213,000 from existing Sustainability & Asset Management Capital and Operating accounts
Community Battle of the Buildings	\$500,000	\$450,000	\$0	\$50,000 from MECO and MEP Capital accounts
Smart Textile Recycling	\$150,000	\$150,000	\$0	\$0

Notes:

Values above are preliminary estimates and are subject to change as we finalize the project applications.

NGIF is Natural Gas Innovation Fund by the Canadian Gas Association

MECO is Markham Energy Conservation Office balance sheet account that has a current balance of \$766,521.60

MEP is Municipal Energy Plan implementation project budget #17055 that has a current balance of \$96,571.95

(*) Indicates other external funding and internal funding that includes both cash and in-kind value.

Recommended Project Descriptions

Decorative LED Streetlight Retrofit and Infill in Assumed Areas

The City of Markham presently manages the municipal streetlight system on City and Regional roadways. The system is comprised of approximately 28,545 luminaires, which vary in terms of wattage and style.

- ☐ 12,304 are cobra-head LED luminaires (43.1%);
- ☐ 1,793 are cobra-head HPS luminaires (6.3%);
- ☐ 932 are decorative LED luminaires (3.3%); and
- ☐ 13,516 are decorative HPS luminaires (47.3%).

47.3% of decorative street lighting in the City currently incorporates a HPS light source. This light source emits a yellowish light that has a very poor colour rendering index (i.e. under this light, colours and objects are not easily distinguishable). The existing HPS luminaires produce significant glare and 'up' light, which is a major contribution to sky glow as identified by the International Dark-Sky Association (IDA). Converting existing HPS lighting will have a reduction in energy cost and City's GHG emissions.

Area of implementation will be determined if and when funding amount is granted. As \$10M will not complete 100% of the City's decorative light conversion to LED.

MDE and Pond Technologies

MDE, Pond and the City propose constructing the first commercial scale demonstration project of its kind utilizing the Pond technology to initially capture and convert 1,000 tonnes of CO₂ emissions annually from our Warden Energy Centre production - located at 8100 Warden Avenue. The Plant will consist of four (4) 60,000 liters photo-bioreactors that will continually capture and convert natural gas CO₂ emissions from the plant's natural gas fueled boiler and power generation assets.

The application of this innovative Markham-based technology to MDE's natural gas fueled district energy system will reduce GHGs for City assets that are connected to the system and the community as a whole. The City as MDE's sole shareholder is applying on behalf of the partnership and the funds will be used to develop the proposed plant.

Intelligent Buildings

Staff are proposing a project that will accelerate the centralization of various Building Automation Systems (BAS) that most major facilities have and which would have been otherwise phased in over a number years as BAS' and other connected equipment are renewed through Life Cycle. This will allow us to reduce our emissions and utility costs to achieve savings quicker.

The project is comprised of three major components:

- Building Automation System (BAS) retrofit and centralization

The project scope involves installing new building automation systems using Markham's new BAS Design Specification (2016), which is intended to improve energy efficiency, occupant comfort, proper equipment operation and central access and control.

- Re-commissioning facilities

Re-commissioning will be completed to ensure the facility is operating as efficiently and effectively as possible. Building commissioning is a low-cost, low-risk energy management strategy with benefits including: reduced maintenance, extended equipment life, and improved occupant comfort, productivity, and indoor air quality.

- Software monitoring, analytics and live energy data display

Software analytics increase energy efficiency, reduce maintenance costs, prolong equipment, and improve occupant comfort, as well as allow Markham to monitor, verify, continuously commission, and track and maintain energy savings in its facilities. Live energy displays will be deployed to help our building occupants understand their impact on energy use while raising public awareness and education on reducing GHG emissions.

Net Zero Energy Emissions

Alectra Utilities, the City of Markham and Enbridge Gas Distribution Inc. are proposing a partnership for a project to test and offer optimal solutions for residential, commercial and industrial (C&I), and community-scale sectors that are integrating land use, electrical energy, thermal energy, and smart EV charging network to move towards Markham's Net Zero Energy Emission (NZEE) community in support of the draft MEP target. This pilot project will be implemented by a team of partners and will be comprised of 4 distinct work streams:

(1) Home Technologies: The objective will be to identify, design, and demonstrate a comprehensive solution, for seven to ten existing single-family houses that will be retrofitted. The focus will be on integrating electrical and thermal technologies to achieve deep carbon reductions, and this will include the home infrastructure to support electrification of personal transportation. This offered residential solution includes: electrical and thermal energy efficiency measures, solar and battery storage system, hybrid heating system including micro combined heat and power (mCHP) and air source heat pump (ASHP), primary Home Energy Management System (HEMS), and Electric Vehicle Supply Equipment (EVSE);

(2) Workplace Charging Study: The team will conduct a detailed engineering study on the impact of an established smart workplace EV charging station on reducing GHG emissions;

(3) Community Microgrid Study: The team will conduct a detailed engineering and financial feasibility study on a community-scale microgrid to connect to critical energy infrastructure in Markham;

(4) Community Engagement and Education: The City of Markham will lead an effort to develop a Community Engagement NZEE Platform, which consists of the following:

- (a) Community Planning, Modeling, Monitoring and Reporting Tool to enable the City of Markham to develop, test and monitor various land use scenarios, implementation of planning policies and/or programs to achieve reduction of GHG at local scale in support of Community Energy Plans for Secondary Plan areas and to improve community resiliency;

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- (b) Community Engagement Strategy and Benchmarking Initiatives for sharing knowledge, development of skills, removal of barriers to advance Markham's communities towards the NZEE goal; and
 - (c) Community Energy Conservation Office to implement the Strategy to advance information sharing and public awareness of NZE communities.

This pilot project will serve to validate the impact of these solutions on community-wide GHG emissions reduction by using various dispatch models, operating modes and customer incentive structures for homes as well as provide a foundation for Markham's Community Engagement NZEE Platform. A key aspect of the project will be the validation of how the aforementioned technology solutions can improve energy resiliency for homeowners, identify community design approach for community-scale infrastructure planning in the bulk energy systems and deliver emission reductions while maintaining energy affordability for consumers.

The City is the lead on this grant application and if successful, the grant will be applied to developing and deploying the technologies, studies, community engagement and education initiatives and staff resources necessary to support this work.

Community Battle of the Buildings

In 2019, the City of Markham is proposing to challenge our community's largest energy consuming buildings (Institutional, Commercial and Industrial) to join us in our Battle of the Buildings competition – an annual competition that challenges participants to reduce energy consumption. The City has run the Battle of Buildings Competition internally for the last three years; as an example our facility operators succeeded in saving \$68,000 in the first six months of 2017 through operational changes only to their buildings.

Each participating facility is challenged to reduce their cumulative energy consumption by at least 15% and to keep these savings going year-round. The primary goals of the competition are to inspire building users to take ownership of their building's energy performance and promote awareness of energy efficiency. Battle of the Buildings has a strong intent to educate and motivate facility occupants, change their operational habits, and reduce building energy usage, resulting in significant cost savings. Markham's Battle of the Buildings competition is modelled of the Environmental Protection Agency's EnergySTAR National Building Competition.

Smart Textile Diversion

The goal of this project is to reduce GHG emissions by increasing our waste diversion rate and through optimization of service. Textiles represent over 7% of waste stream. Textile diversion was one of the 10 initiatives presented to Markham City Council on the road map to 80% diversion. On April 17, 2017, Markham banned textiles from the garbage. As a result, there has been an increase in textile donation container use across the City. One component of this project is to address locations that have been identified that require larger donation bins (i.e. SMART Bins) to accommodate the volume of donations.

The second component of this project is to optimize servicing Markham's Textile Recycling container network and reduce GHG emissions. The City uses four charitable partners to collect textile material donated at over 100 municipally branded donation bins. Often these bins are

serviced before they fill completely, resulting in unnecessary trips made by the collection agents. Outfitting each container with a smart remote volume sensor – which can send fill-level updates for each bin – would allow the servicers to route required pick-ups only, minimizing inefficient trips and reducing emissions from their vehicle fleets.

FINANCIAL CONSIDERATIONS AND TEMPLATE:

The Municipal GHG Challenge Fund has a maximum grant of \$10M with as much as 100% of the project cost available for funding. However, the Province will favour applications with as much as 50% matching funds from project applicants.

Therefore, where existing budgets or reserves are already available or where projects were started after June 1, 2016, or where external partners are willing to commit cash and in-kind support for the projects Staff will include those amounts in the application in order to increase the likely of securing a grant.

ALIGNMENT WITH STRATEGIC PRIORITIES:

The recommended projects support the Greenprint, Markham's Community Sustainability Plan, Building Markham's Future Together – Safe and Sustainable goal, and the fourth coming Municipal Energy Plan and the existing Corporate Energy Management Plan.

BUSINESS UNITS CONSULTED AND AFFECTED:

Environment Services and Finance

RECOMMENDED BY:

Trinela Cane
Commissioner, Corporate Services



Andy Taylor
Chief Administrative Officer

ATTACHMENTS:

1. Municipal GHG Challenge Fund Program: Program Guidelines

Municipal GHG Challenge Fund



PROGRAM GUIDE

Climate Change
Action Plan





1) Introducing the Municipal GHG Challenge Fund

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INTRODUCING THE MUNICIPAL GHG CHALLENGE FUND

Introduction

Taking collective action on climate change has never been as critical as it is today. We've already seen the impacts of climate change here in Ontario, from floods to severe storms and migrating diseases impacting human health. The province has committed to doing its part to fight climate change and meet its short and long-term greenhouse gas (GHG) emission reduction targets.

Ontario's Climate Change Action Plan (CCAP), released in June 2016, identifies more than 90 measures, funded through proceeds from the province's cap and trade program to reduce GHG emissions. The Action Plan recognizes that municipalities can play a key role in helping Ontario meet its targets.

Ontario's municipal governments own more infrastructure than any other level of government, and local decisions about buildings, land-use and transportation have significant impacts on how people consume energy and emit GHGs. Community-based emission reduction projects are essential to achieving long-term and cost-effective GHG reductions in Ontario.

The new Municipal GHG Challenge Fund is aimed at supporting community-led action on climate change. The competitive, application-based program will fund up to 100% of eligible costs for

GHG emissions reduction projects proposed by municipalities. Municipalities are encouraged to partner with other municipalities and community organizations to implement their project.

All Ontario municipalities that have GHG emission reduction plans (or equivalent) with community-wide GHG inventories and targets are invited to apply. Exceptions exist for very small municipalities (see Very Small Municipalities Stream below for further details).

Background

On April 13, 2015, Ontario announced it is putting a limit on the main sources of GHG emissions through a cap and trade program that will invest auction proceeds in a transparent way back into initiatives that reduce emissions and help businesses remain competitive. Ontario's Climate Change Strategy, also announced in 2015, establishes the long-term vision for meeting Ontario's GHG reduction targets out to 2050.

The Climate Change Mitigation and Low-carbon Economy Act, passed in 2016, entrenches a long-term framework for Ontario's action on climate change including the following emissions reduction targets (relative to Ontario's 1990 GHG emissions):

- A reduction of 15 percent by the end of 2020 from 1990 levels
- A reduction of 37 percent by the end of 2030 from 1990 levels
- A reduction of 80 percent by the end of 2050 from 1990 levels

The essentials

- **Who can apply:** Applicants must be incorporated Ontario municipalities. Municipalities are encouraged to partner with other municipalities and community organizations to implement their project.
- **Eligible Municipalities:** Any Ontario municipality with a council-approved community-wide GHG emissions inventory, emissions reduction targets, and a strategy/plan to reduce GHG emissions is eligible to apply. If your municipality has a population of less than 10,000 and does not meet these requirements, you may be eligible for the Very Small Municipalities Stream.

- **Eligible Projects:** Municipal projects that reduce GHG emissions in any sector including buildings, energy supply, transportation, water, waste and organics sectors. Projects that are currently underway are only eligible if they were initiated after June 1, 2016.
- **Funding:** Municipalities may request up to \$10 million per project. The province will contribute up to 100% of eligible costs; however, a higher score will be given to applicants that leverage funds for up to 50% of eligible costs (e.g., through federal/municipal governments, private sector, industry partners etc.).
- **Timelines:** The deadline to submit an application is November 14, 2017. Successful applicants will be informed in writing by February, 2018.

IS YOUR MUNICIPALITY ELIGIBLE?

Municipal eligibility

Any Ontario municipality with a council-approved:

- Community-wide GHG emissions inventory;
- Community-wide GHG emissions reduction targets;
- Community-wide strategy/plan to reduce GHG emissions; and,
- Up-to-date O.Reg. 397/11 CDM 5-year plans and annual reporting (mandatory for all municipalities).

GHG emission reduction strategies/plans can come in a variety of forms, such as Climate Change Action Plans, Community Energy Plans, Municipal Energy Plans, Official Plans and Asset Management Plans containing climate change policies. A higher score will be given to municipalities that have a comprehensive GHG reduction plan that meets or exceeds the province's 2020, 2030 and 2050 targets.

Single-tier, lower-tier, and upper-tier municipalities are eligible to apply for funding if they meet the eligibility requirements. Municipalities may partner with other municipalities and community groups so long as the lead applicant meets the eligibility requirements.

Municipalities not currently eligible for the Challenge Fund will have the opportunity to apply for funding to support the creation of GHG reduction plans, inventories and targets through the forthcoming Municipal Action Plan Program (MAPP) to be launched later this year.

Funding is also currently available through the Ministry of Energy's Municipal Energy Plan (MEP) program to develop a plan that includes the required GHG reduction plans, inventories and targets. MEP funding is also available to enhance or update an existing community energy plan to meet Municipal GHG Challenge Fund requirements. Developing a comprehensive plan to reduce GHG emissions can take two years or more, so municipalities are encouraged to start as soon as possible.

If you have questions about the eligibility of your municipality or project, please contact ChallengeFund@ontario.ca for assistance.

Very small municipalities stream

If your municipality has a population of less than 10,000 and does not have a community-wide GHG emissions inventory, reduction targets, and a plan, your municipality may be eligible for the Very Small Municipalities Stream. For selected projects in this stream, municipalities would commit to developing plans, targets, and inventories in parallel with the implementation of their GHG reduction project.

Distribution of funding

Municipalities may request up to \$10 million per project. The province will contribute up to 100% of eligible costs; however, a higher score will be given to applicants that leverage funds for up to 50% of eligible costs (e.g., through federal/municipal governments, private sector, industry partners etc.) See Evaluation Criteria for further details.

Projects currently underway are only eligible if they were initiated after June 1, 2016. In these cases, municipalities are limited to requesting funding for up to 25% of eligible costs.

Municipalities may submit more than one application. Municipalities must complete separate applications for separate projects; however, a single project may have multiple sites. For example, a project that involves upgrading equipment at four wastewater treatment plants could be submitted in one application.

Municipalities are encouraged to stack funding from other sources. Municipalities may not stack funding from other CCAP programs funded through the GGRA (e.g. Ontario Municipal Commuter Cycling Program).

At least 30% of funded projects will be located in Small / Rural / Northern Municipalities (population < 100,000 or areas north of, and including, the districts of Parry Sound and Nipissing).

IS YOUR PROJECT ELIGIBLE?

Project eligibility

Eligible Projects: Any kind of municipal project that reduces GHG emissions could be eligible for funding including in the buildings, energy supply, transportation, water, waste and organics sectors. Projects must commence by March 2019. Projects that are already currently underway are only eligible if they were initiated after June 1, 2016.

Ineligible Projects: Projects that are not reasonably likely to directly reduce GHG emissions are not eligible, such as:

- Plans, studies, and research initiatives
- Education and awareness initiatives
- Granting programs
- Projects exclusively focused on adaptation

Eligible and ineligible costs

Eligible costs are those directly related to the reduction of GHG emissions associated with the project. For example, a community centre retrofit project is eligible only for construction costs that are directly related to the measure(s) that reduce energy and GHG emissions, such as renewable energy technology, adaptive thermostats and lighting retrofits.

Only actual expenditures are eligible. In-kind costs are not eligible.

Examples of eligible costs include, but are not limited to:

- Costs for acquiring, developing, constructing, modernizing or leasing systems (equipment, hardware, software).
- Costs of construction, renovation or modernization of facilities and structures such as materials and installation costs.
- Rental of tools and equipment.
- Fees for professional or technical consultants and contractors.
- Transportation costs for delivery of materials and services essential for the project.
- Costs for outreach to encourage behavioural change directly related to the project.

- Direct staff time working on the project, with supporting timesheets.
- Administrative costs that are directly linked to the project. Administrative costs should be minimized to the greatest extent possible.

Examples of ineligible costs include, but are not limited to:

- Purchase or lease of real property.
- Capital costs related to ongoing or other business activities and not a specific requirement of the project.
- Back-up systems, spare parts inventory in support of a qualifying system, and operating costs including fuel, electricity, maintenance and insurance costs.
- Office space, supplies, general overhead costs incurred in the ordinary course of business.
- Environmental assessments.
- Legal fees.
- Costs incurred prior to receipt of application for this program.
- Cost of developing a proposal or application for this or any other funding program.
- The portion of taxes for which your municipality is not otherwise eligible for rebate.

WHAT IS THE PROVINCE LOOKING FOR?

Evaluation criteria

Project Focus (10%)

- Higher scores will be given to projects that aim to replace fossil fuels with clean, renewable energy and achieve net zero (or better) emissions buildings, transportation systems, and/or infrastructure.

GHG Emissions Reduction Assessment (40%)

- Higher scores will be given to projects that result in significant and cost-effective GHG reductions. Greater weight will be given to projects that yield earlier GHG reductions.

Project Co-benefits (10%)

- Higher scores will be given to projects that result in positive co-benefits, including:
 - ♦ Economic Benefits
 - ♦ Social Benefits
 - ♦ Environmental Benefits
 - ♦ Behavioural Change Benefits
 - ♦ Innovation, Science and Technology Benefits
 - ♦ Benefits to low-income and vulnerable communities

Alignment with Municipal GHG Emissions Planning (10%)

- Higher scores will be given to projects that align with a municipality's GHG emissions planning and to municipalities that have a comprehensive GHG reduction plan that meets or exceeds the province's 2020, 2030 and 2050 targets.

Work Plan and Budget (30%)

- Higher scores will be given to projects that have a detailed, feasible work plan to achieve the project outcomes.
- Municipalities may request up to \$10 million per project. The province will contribute up to 100% of eligible costs; however, a higher score will be given to applicants that leverage funds for up to 50% of eligible costs (e.g., through federal/ municipal governments, private sector, industry partners etc.)

Project Examples

Renewable energy and energy efficiency retrofits to municipal facilities, such as arenas, community centres, libraries, and other municipal-owned buildings.

- **Geothermal Arena:** The Municipality of Ritchot, Manitoba, retrofitted their community arena by replacing four natural-gas furnaces with geothermal heat pumps, installing heat-recovery ventilators and replacing an air-cooled compressor with geothermal pumps for ice-making. The district geothermal system is now connected to the arena, community centre, fire hall and EMS garage. The geothermal field now operates four separate buildings for two levels of government.
- **Municipal Building Retrofits:** The City of Regina, Saskatchewan, implemented energy-efficiency retrofits of several municipal facilities. At City Hall, for example, upgrades included replacing and redesigning lighting, installing weatherproofing and insulation to improve the building envelope, installing building automation control equipment to optimize electricity demand, and installing a variable speed drive to the domestic water booster pump to eliminate excess drainage and improve electricity consumption and demand.

Creating or expanding low-carbon district energy systems.

- **Biomass Heating System:** The City of Yellowknife, Northwest Territories, installed a wood pellet boiler system that heats their community pool, arena, and curling rink, replacing a district energy system powered by an oil boiler. All biomass heat generated displaces oil use. The diversified source of energy reduces the city's exposure to oil cost fluctuations, and has also catalyzed a market transformation, spurring more interest and uptake of wood pellet boilers within the wider community.
- **Renewable Neighbourhood Energy:** The City of Vancouver, British Columbia, created and owns the South East False Creek Neighbourhood Energy Utility, a district heating network based on various renewable sources. The network currently captures waste heat from a relocated and expanded sewer pump station, and it has been designed to accept heat energy from future new waste heat sources, starting in 2018, and other renewable energy sources.

Making energy-efficiency and renewable upgrades to a drinking water or wastewater treatment plants.

- **Energy-efficient Water Treatment Facility:** The Town of Drayton Valley, Alberta, will build a new energy-efficient water treatment facility to replace its current outdated and inefficient treatment plant. The new water treatment facility will feature a range of efficiency measures, including an innovative reinforced membrane filtration system that can filter highly turbid water without pre-treatment and will substantially lower the plant's GHG emissions and use of chemicals such as alum sulphate.
- **Wastewater Treatment System Upgrade:** The City of Cranbrook, British Columbia, installed more efficient pumps, low-pressure spray nozzle technologies, and fine bubble air diffuser aeration in treatment lagoons, to increase the capacity of the city's wastewater treatment system. As a result, the system upgrade has increased the quality of its effluent, decreased the GHG emissions and energy consumption, and provided better forage land to support ranching, agriculture and wildlife, all at less than half the annual operating costs of mechanical sewage treatment.

Installing systems to collect, process and treat methane gas from landfill sites to produce energy.

- **Landfill Methane Gas Capture:** The Columbia Shuswap Regional District in British Columbia launched a landfill closure project in 2010 that captures and purifies biogas from the Salmon Arm landfill to upgraded pipeline quality natural gas that is being distributed through local systems. The closure system consisted of a liner cover system, six gas collection wells and a gas treatment plant. In addition, leachate is captured from the newly lined phase of the landfill and used to irrigate 2,300 poplar trees planted on the closed phase.

Building or modifying an anaerobic treatment system for municipal organic waste, where generated renewable biogas is put to beneficial use.

- **Waste Methane Gas Capture:** The City of Saint-Hyacinthe, Quebec, initiated an anaerobic treatment system that now converts organic waste and sewage sludge from 23 municipalities and agri-food businesses into natural gas that can be used for vehicle fleets and heating buildings. As a result of this project, all of the region's organic waste is converted and GHG emissions from sewage sludge related operations have been reduced.

- **Organics Biofuel Facility:** The City of Surrey, British Columbia, launched an organics biofuel facility project that uses residential and commercial kitchen and yard waste and converts it to renewable biofuel. The biofuel is then used for their waste collection vehicles that use natural gas, as well as acting as a source for their district energy system. The facility processes 100% of the City of Surrey's residential organic waste.

Reducing GHG emissions in existing municipal fleets and transportation network.

- **Fuel Efficient Municipal Fleet:** The District of Saanich, British Columbia, participated in the E3 Fleet Program, a green rating system for fleets. The program committed to right-sizing their municipal fleet by reducing engine sizes, replacing vehicles with more efficient hybrid models, converting fleet from gas to high efficiency diesel, and incorporating the full life-cycle costs of the new vehicles. Since 2010, Saanich includes 9 electric vehicles (EV) for its municipal operations. Saanich's police department was also the first in the country to have an EV in its municipal fleet.

- **Bike-Share System:** The City of Hamilton, in partnership with Social Bicycles, started a bike share program in 2014. 750 bikes were deployed in spring 2015 for the official launch of the program. The program will serve transit riders, commuter cyclists, recreational cyclists and visitors to Hamilton. Bike Share complements existing public transit and provides first and last mile connectivity by filling in any transit gaps.

HOW TO APPLY

Applying through Grants Ontario

All applications must be submitted electronically through Grants Ontario at www.grants.gov.on.ca. If your municipality does not have a Grants Ontario account, you can create one by following these steps:

- **Create a ONE-key account** at <https://www.iaa.gov.on.ca/iaalogin/IAALogin.jsp>. ONE-key provides secure access to Ontario government programs and services, including the Transfer Payment Common Registration (TPCR) system.
- **Access the TPCR system to register.** For instructions, please refer to the user guides at <http://www.grants.gov.on.ca/GrantsPortal/en/TransferPaymentCommonRegistration/HowtoRegister/index.htm>.
- **Request enrollment to the Grants Ontario System (GOS).** For assistance, please refer to “How to Access Grants Ontario from the Transfer Payment Common Registration System” at <http://www.grants.gov.on.ca/GrantsPortal/en/OntarioGrants/HowtoApply/index.htm>. Please allow sufficient time as confirmation of GOS access may take up to two business days. The grant application form can only be accessed once GOS confirmation is complete.

Application checklist

- ☐ Complete Application Form
- ☐ Budget/Work Plan Template
- ☐ Copies of community-wide GHG emissions inventory, emissions reduction targets, and community GHG emission reduction plan or equivalent
- ☐ Commitment to the project from municipal council or a senior municipal authority (e.g. council resolution or letter)
- ☐ Additional GHG Reduction Estimates Supporting Information
- ☐ Letter of commitment from any other funders (if applicable)

Timelines

The deadline to submit an application is **November 14, 2017**. Late or incomplete applications will not be assessed.

Successful applicants will be informed in writing by **February, 2018**.

Funding agreements will be completed before the end of the 2017/2018 fiscal year.

Funding agreements

Project funding, if approved, will be provided to grant recipients under a funding agreement called a Transfer Payment Agreement between the province and the grant recipient. Grant recipients will be responsible for managing and executing their projects in line with the funding agreement. The funding agreement will set out the terms and conditions governing the grant, and may include:

- project budget;
- project management;
- project activities;
- communication strategies for monitoring and reporting requirements, including progress reporting, GHG reporting, audits and financial reports;
- milestone and performance measures;
- mode and schedule of payment; and,
- contract termination and corrective action.

Successful grant recipients will:

- be accountable to the province for all monies and project components, and will be considered to be the final decision-making authority among any partners for the project under the funding agreement.

- manage their project plan to meet financial and accountability reporting requirements and deliverables, as identified in the funding agreement.
- be responsible for the receiving, administering, and allocating funds to any partners in accordance with the requirements of their agreements, and may be required to open a separate bank account for the program funds.
- be responsible for measuring results and reporting on their performance as required by their funding agreement.
- be required to submit regular reporting that will be used by the province to assess the progress of implementation, as well as compliance with financial and auditing requirements, as required by the funding agreement.

The funding agreement may require the grant recipient to develop formal agreements and/or memorandums of understanding with any project partners to whom funding may be flowed for the purpose of meeting project objectives or addressing obligations.

The province will review all reporting and monitoring to ensure compliance with the funding agreement and its terms and conditions.

It is anticipated that funding will be allocated in installments according to a specific payment schedule and program phases. The payment of funding installments will be dependent on the grant recipient meeting all program and reporting requirements under the funding agreement with the Province.

Support for applicants

For questions about program requirements, eligibility, and evaluation criteria please email ChallengeFund@Ontario.ca.

For support in completing the application, please contact the Grants Ontario Customer Service Line at (416) 325-6691 or 1-855-216-3090, Monday to Friday from 8:30 a.m. to 5:00 p.m. or email GrantsOntarioCS@Ontario.ca.

APPENDIX A:

GHG Estimation Guide

Applicants will be required to provide an estimate of the GHG reduction potential for their project as part of the application process.

GHG quantification occurs at the project level and relies on initiative-specific information including: defining baselines, boundaries, emissions, emission factors, initiative characteristics, initiative lifespan, monitoring plan, assumptions, uncertainties and ensuring that data exists to support the quantification and monitoring approach.

This Appendix is intended to help applicants estimate the GHG emissions and emission reductions associated with proposed projects when applying for the Municipal GHG Challenge Fund.

About GHG quantification

Estimating GHG impacts is a critical part of demonstrating the merits of projects in reducing GHGs and helping achieve Ontario's climate change goals. Estimates will assist the province in our assessment of which projects will be awarded funding under the Municipal GHG Challenge Fund.

GHG emission quantification should be based on an approach most appropriate for the project in question. It should be complete, consistent, transparent and accurate. Quantification — whether an estimate or actual — is a multi-step process, including:

1. Identification of sources of GHG emissions within the project scope
2. Selection of measurement, calculation or estimation approach/methodology
3. Collection or estimation of activity data
4. Selection of GHG emission factors
5. Application of approach/methodology to activity data to calculate emissions

It is important that any GHG estimate calculations are well organised and accompanied by a detailed description of underlying assumptions and calculations. This is critical to ensure that estimates can be evaluated fairly.

The province asks that applicants quantify only the direct and energy indirect GHG emissions and reductions associated with the project. Other indirect, or lifecycle impacts can be quantified and will be considered, but are not required. In choosing emission factors or global warming potentials, the province asks that applicants draw from current, publicly available emission factors contained in Canada's National Inventory Report in the first instance. A list of commonly used emission factors is included at the end of this document.

The timeframe for analysis will depend on the project but at least 15 years is suggested to align with Ontario's emission reduction target years (2020 and 2030). Applicants should identify when GHG reductions are anticipated to begin. The province asks that, by default, values are reported for each year (i.e., not average values); applicants should also calculate the cumulative GHG emission reductions attributable to the project (i.e., the sum of all the annual values).

To facilitate the assessment of applications, estimates of GHG reductions should be accompanied by the following supporting information:

- Approach used to estimate emissions / emission reductions
- What model was used (if any)
- What assumptions were made and how these might impact the accuracy of the results
- What are the limitations of the data/analyses and how these might impact the accuracy of the results
- Sources of data
- Who was involved in the analysis
- Name of contact person if there are any questions regarding the analysis

Approach to estimating emission reductions

A best practice approach to estimating GHG emission reductions involves comparing emissions from a standard “Base” scenario to emissions that are expected to occur under a “Project Case”. The difference between the two scenarios is the GHG emission change that can be attributed to the project under consideration. The approach is based on the principle of incrementality (i.e., the difference between the baseline (base) and the project case) and it is recommended that applicants adopt this approach when estimating the GHG emission reductions associated with their proposed projects.

Baseline emissions are those that occur in the absence of the new project: the emissions that would have happened had the proposed project not been implemented.

The Project Case looks at the incremental impact of the initiative by updating the baseline scenario only with assumptions and data that differ due to the impact of the project. The Project Case impacts should continue for the duration of the initiative and for all later years in which the initiative continues to have an impact on the sector. For example, Ontario’s Home Energy Savings Program ended in 2012 but the energy efficiency improvements it funded continue to conserve energy.

The **GHG change** is then the difference between the Baseline and Project Case emissions.

Other considerations

Below are a number of other considerations for applicants to keep in mind while preparing their GHG estimates.

Uncertainty — In some cases emission reduction estimates will be based on assumptions with significant uncertainty or risk. For example, there is a chance that the exact types, number and timing of projects are not known at the outset. When project results could vary significantly due to uncertainty in the assumptions, including sensitivity analysis in the proposal is a best practice. Estimates of emission reductions from projects whose outcomes are uncertain should be given as ranges of possible GHG reductions and/or probabilities of certain reduction levels (when known or computable).

Pre-project estimate vs. post-project reporting

— It is important to recognize there are no crystal balls able to predict emission reductions with 100 percent certainty. For reasons outside the control of project proponents, the ex ante (or pre-project) reduction estimates may differ from ex post (project reporting) results. The expectation for pre-project estimates is that applicants do their best to make reasonable, transparent and conservative assumptions when estimating reduction potential and identify in their proposal the key risks to achieving estimated levels of reductions.

Resources

There are a variety of external resources available to support the development of GHG estimates. They range from policy-neutral guidance and methodologies such as the Greenhouse Gas Protocol (<http://www.ghgprotocol.org/standards/project-protocol>) to project-specific approaches such as California’s resource for Quantifying Greenhouse Gas Mitigation Measures (<http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf>).

In general, however, all take into account the considerations and approach outlined above and applicants are free to draw from external sources as required to inform/support their calculations with appropriate justification.

Additional potential resources can be found at the end of this document.

Common emission factors

The below table includes a list of common GHG emission factors that can be used by default for project quantification and reporting.

Fuel	Emission Factor
Stationary sources	
Electricity	0.043 kg CO ₂ e / kWh
Natural gas	1.899 kg CO ₂ e / m ³
Propane	1.548 kg CO ₂ e / L
Heating oil	2.755 kg CO ₂ e / L
Mobile sources	
Diesel	2.754 kg CO ₂ e / L
Gasoline	2.462 kg CO ₂ e / L

Further notes and comments

- The table is neither comprehensive, nor exhaustive nor necessarily representative of every energy source that may be encountered in a project; other factors may be used on a case-by-case basis with appropriate methodological justification.
- Factors are expressed in units of CO₂ equivalent (CO₂e) to reflect the different global warming effects of relevant greenhouse gases (CO₂, CH₄, N₂O, PFCs, HFCs, sulphur hexafluoride [SF₆] and nitrogen trifluoride [NF₃]).

- Non-CO₂ emissions are technology-dependent and vary by application; the above factors assume the most common and likely applications.
- Electricity emission factor is an average consumption intensity factor; electricity factors are subject to change on an annual basis depending on the mix of generation in a particular year. If your initiative will make use of electricity at off-peak hours, contact ChallengeFund@ontario.ca for emission factors at peak or off -peak.
- Factors are expressed in their native units (e.g., kWh, m³, or litre) and conversion to other common units (e.g., kg CO₂e / GJ) is possible through calculation; a suggested list of unit conversions is available from the National Energy Board <https://apps.neb-one.gc.ca/Conversion/conversion-tables.aspx?GoCTemplateCulture=en-CA>.
- Indirect GHG emissions are those associated with supply of fuel or electricity (production/generation and delivery). The Ontario indirect GHG emissions should be included in your calculation.
- Emission factors are sourced from Environment and Climate Change Canada's 2017 National Inventory Report (NIR) unless otherwise noted and values have been rounded; further information on emission factors can be found in Annex 6 of Part 2 of the 2017 NIR which can be downloaded http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/10116.php

Additional resources

Below is a collection of external resources that can be drawn upon by applicants when preparing their project GHG estimates. The list is neither comprehensive nor exhaustive; the province does not endorse any specific resource.

General

California Air Pollution Control Officers Association <http://capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf> — Quantifying Greenhouse Gas Mitigation Measures, A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures

World Resources Institute <http://ghgprotocol.org/policy-and-action-standard> Policy and Action Standard — Standardized approach for estimating GHG effect of policies and actions <http://www.ghgprotocol.org/standards/project-protocol> Project Protocol — Comprehensive, policy-neutral accounting tool for quantifying GHG benefits of climate change mitigation projects

Environment Canada, Natural Resources Canada <https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=47B640C5-1> — Technical Guidance on Reporting Greenhouse Gas Emissions

<https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=DDE56C0F-1> — Greenhouse Gas Emissions Quantification Guidance

ISO 14064 SERIES (Part 2 is specific to project related GHG estimation)

<https://www.iso.org/standard/38381.html>
Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals (ISO 14064-1:2006)

<https://www.iso.org/standard/38382.html>
Greenhouse gases — Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements (ISO 14064-2: 2006)

<https://www.iso.org/standard/60168.html>
Greenhouse gases — Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition (ISO 14065:2013)

Intergovernmental Panel on Climate Change (IPCC)

<http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol1.html>

IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1, General Guidance and Reporting

The Climate Registry

http://www.theclimateregistry.org/wp-content/uploads/2014/11/TCR_GRP_Version_2.0-1.pdf

General Reporting Protocol: Accurate, transparent, and consistent measurement of greenhouse gases across North America

https://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories

<https://www.theclimateregistry.org/wp-content/uploads/2014/11/General-Reporting-Protocol-Version-2.1.pdf>

General Reporting Protocol for the Voluntary Reporting Program

Sector-specific

Ontario's Greenhouse Gas Reporting Regulation
O. Reg. 452/09

<https://dr6j45jk9xcmk.cloudfront.net/documents/812/2-2-1-greenhouse-gas-emissions-reporting-en.pdf>

Guideline for Greenhouse Gas Emissions Reporting

The Atmospheric Fund:

<http://taf.ca/beecal/>

Building Energy Efficiency Policy Calculator

California Air Resources Board

https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/tircp_quantmethods02092015.pdf

GHG Quantification Methodology for the California State Transportation Agency — Transit and Intercity Rail Capital Program

California Strategic Growth Council

http://sgc.ca.gov/pdf/ADOPTED_FINAL_15-16_AHSC_Guidelines_with_QM.pdf

Affordable Housing and Sustainable Communities Program: 2015–16 Program Guidelines

California GHG Quantification Methods — all other sectors

<https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/quantification.htm>

Cap-and-Trade Auction Proceeds Quantification Materials

UNFCCC Clean Development Mechanism

<https://cdm.unfccc.int/methodologies/index.html>

Numerous methodologies for various scales and applications, including:

- 94 approved small-scale methodologies
- 88 approved large-scale methodologies
- 3 approved afforestation and reforestation methodologies

Green Investment Bank (GIB)

The Green Investment Handbook, <http://www.greeninvestmentbank.com/green-impact/green-investment-handbook/> is a manual setting out the practical tools used to assess, monitor and report the green impact of every investment made.