

Municipal GHG Challenge Fund



PROGRAM GUIDE

Climate Change
Action Plan





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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.