Infrastructure Canada

Canada

THE CLIMATE LENS

Disaster Mitigation Adaptation Fund

Guidance v 2.1

Aussi disponible en français sous le titre : L'optique des changements climatiques : Fonds d'atténuation et d'adaptation en matière de catastrophes - Lignes directrices.

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Disclaimer

This guidance document is for those applicants applying for funding under the **Disaster Mitigation Adaptation Fund (DMAF)** of Infrastructure Canada (INFC) and who are obligated to meet the Climate Lens requirement. Hence, the climate change impacts requested in this document are a direct reflection of the parameters of the Climate Lens and INFC funding requirements only.

This document is intended to be a learning tool for project developers and to introduce climate change considerations into project designs in the context of the Canadian environment. This guidance document is evergreen – meaning it will be periodically updated to remain aligned with advancing assessment methodologies. For the most recent version of the guidance, please ensure you consult the Infrastructure Canada website.

Revision History

Revision No.	Issue Date	Revision Description
Version 1.0	June 2018	First version implemented.
Version 1.2	September 2019	General revisions after internal review.
Version 2.1	August 2022	General revisions after feedback from release of Version 2.0. Climate Lens Guidance now two documents: DMAF Climate Lens Guidance v 2.1 ICIP Climate Lens General Guidance v 2.1

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1.0 Introduction

The purpose of this document is to provide guidance to those who need to undertake a Climate Lens Assessment. The objectives of this guidance are to:

1. Explain the purpose of the Climate Lens and which projects are subject to the requirement;
2. Provide information on when and how to submit a completed Climate Lens to Infrastructure Canada;
3. Provide step by step instructions on how to complete the Greenhouse Gas (GHG) Mitigation assessment of the Climate Lens.

1.1 What is the Climate Lens?

The Government of Canada is committed to meeting its 2030 greenhouse gas reduction target, establishing a cleaner, more competitive and resilient economy and getting Canada to net-zero emissions by 2050. The Climate Lens is a key tool for assessing the climate impacts of infrastructure from both a greenhouse gas and resilience perspective. The tool also encourages applicants to consider how their projects can reduce GHG emissions and increase resilience to climate change, which benefits their communities and creates jobs.

The Climate Lens is a project-level requirement applicable to Infrastructure Canada's Investing in Canada Infrastructure Program (ICIP) and Disaster Mitigation and Adaptation Fund (DMAF). The main goal of the Climate Lens is to raise awareness of climate change risks and impacts associated with projects and encourage improved choices by project planners, designers and decision-makers. The Climate Lens also supports Infrastructure Canada in measuring its progress towards meeting its climate goals.

The Climate Lens has two key sections: **GHG Emissions and Mitigation**, which looks at the anticipated GHG emissions impact of an infrastructure project; and **Climate Resiliency**, which examines the risk and resilience of the project to a climate change related disruption or impact. For applicants to the Disaster Mitigation and Adaptation Fund, considerations of climate resiliency are already integrated into the application process. **As such, projects approved under DMAF must complete the GHG Mitigation Assessment only.**

1.2 Cost Eligibility

Infrastructure Canada strongly encourages applicants to perform analyses informed by best practices regarding GHG mitigation and climate risks and resilience in their projects. For this reason, the costs of undertaking the Climate Lens will be deemed

eligible for cost-sharing for all projects approved for federal funding, in line with the guidance provided on eligible and ineligible expenditures in the DMAF Applicant Guide. Any costs incurred to undertake the GHG Mitigation assessment under previous versions of the Climate Lens guidance remain eligible for reimbursement in line with the guidance on eligible and ineligible expenditures.

If an applicant is using internal resources to conduct the Climate Lens, these salary costs are not eligible for reimbursement.

1.3 Responsible Party

It is the applicant's responsibility to ensure that the Climate Lens is completed by someone with appropriate qualifications and knowledge of the project, as determined by the applicant. This could be the applicant, the applicant's design consultant, or another consulting body. If the applicant determines that the needed qualifications are not available on the project team, Infrastructure Canada recommends engaging a qualified professional, such as a professional engineer or GHG accounting professional. Infrastructure Canada is able to provide further advice and recommendations on selecting an appropriate professional at the applicant's request.

1.4 Submission & Review of the Climate Lens

Projects approved under the DMAF must complete a GHG Mitigation assessment before first federal payment. Applicants should ensure all information and supporting documentation is included or attached with the Climate Lens form at the time of submission.

Infrastructure Canada will review each Climate Lens assessment and may follow up on the results of the Climate Lens to confirm the information submitted or to request further detail.

Applicants are encouraged to contact the Climate Lens Policy Team at: climatelens-optiquedeschangementsclimatiques@infc.gc.ca for further assistance and/or links to other resources as necessary.

2.0 Climate Lens Guidance

2.1 Introduction

The Climate Lens GHG Mitigation Assessment is comprised of the following sections:

Executive Summary – provides a succinct overview of the project, main activities that impact GHG emissions, any GHG mitigation measures implemented and the overall GHG emissions from the project.

Section 1.0 Project Overview provides administrative information and a description of the project including project location and timelines.

Section 2.0 Project GHG Emissions looks at the anticipated GHG emissions impact of the project resulting from construction, operation and maintenance and repairs.

Section 3.0 GHG Mitigation Measures provides an opportunity to present any qualitative or quantitative benefits resulting from any GHG mitigation measures that will be implemented.

References & Supporting Material – any supporting material relevant to the project and GHG assessment as well as references should be included in an Annex to the GHG Mitigation assessment.

The following section (2.2) provides guidance on how to complete Sections 1-3 of the GHG Mitigation Assessment.

As a reminder…

- Applicants can format their assessment in accordance to the sections listed above in the introduction.
- Please ensure all supporting information has been included in the form or attached as a separate document. All data, calculations and assumptions used to answer the questions in the Climate Lens should be provided to help assist in the review and minimize the need for follow-ups.
- Any changes to the project or the project timeline that occur after the submission of the Climate Lens must be reported to INFC as part of the regular progress reporting requirements and INFC will advise if a revised Climate Lens will need to be submitted.
- Applicants who applied with their projects in 2022 or earlier may still submit Climate Lens assessments according to previous versions of the Climate Lens Guidance v 1.2, if so desired.

2.2 Step by Step Instructions

Applicants are to follow the guidance provided in this section to complete the GHG Mitigation assessment of the Climate Lens. Please refer to Annex A for definitions of GHG terms used in the guidance, and Annex B for common greenhouse gas principles to follow throughout the assessment.

Part 1: Project Details

1.0 Project Overview
1.1 Project Title
Title of your project.
1.2 Ultimate Recipient
Full legal identification of the primary entity that is undertaking the project.
1.3 Project Description
Present a brief description of the project including all major activities occurring on the site. • Describe the project asset(s), including a description of any project-specific technologies that will be implemented. • Describe all major activities that will occur on the project site. The project description lays out the foundation for the types of activities that may release or sequester GHGs from the project. These activities must be quantified in the Climate Lens.
1.4 Project Location
Provide a .KML file detailing the location of the project. The file should indicate the location/boundaries of the project site(s) and ensure all relevant components of the project are included. Instructions for generating a .KML file can be found in the DMAF Applicant Guide. • Identify whether the project site is currently vegetated, a wetland or a peat bog, on permafrost, or is considered a brownfield.

1.5 Project Timeline

Record a detailed project timeline outlining the timing of operational activities. Specifically, the following estimated dates are required:

- Construction start and end dates
- Operational start and end dates
- Dates of any major maintenance/repairs/refurbishments expected
- Expected asset lifespan

Identify any risks that could substantially affect the project's operational timelines.

Part 2: Project Construction

2.1 Project Construction Phases and Activities

The overview of the construction of the project should provide the general phases of the construction process (e.g., site preparation, component installation and site restoration) and a brief description of the major construction activities.

Key Actions

- *Provide an overview of the general construction process of the project including the various phases of the construction process.*
- *Provide a timeline for the different phases of the construction process (e.g., site preparation, installation, site restoration).*
- *Using **Table 1. Construction Phases and Examples of Activities** in Annex C, identify the activities related to the various phases of the construction process. The information in the table is provided as a sample only, and applicants can add or remove activities to ensure the most appropriate fit for their project.*

Sample Table:

Construction Phase	Activities	Start Date	End Date
Site preparation			
Installation			
Site restoration			

2.2 Identification of Construction GHG Elements

In this section, all the elements required to complete the various construction activities (i.e., GHG sources and sinks) are identified.

Note that under this guidance, GHG emissions resulting from refrigerant leaking, natural gas leaking from compressors or vented from compressor engine start-ups and shutdowns are not

required to be quantified but can be included if sufficient data is available. GHG sequestration in plants/trees is also not required to be estimated, but can be included if sufficient data is available.

Key Actions

- *Using **Table 2. Construction Elements and Related Information** in Annex C, identify and provide details for all elements required to complete the selected activities.*
- *Include a list of assumptions regarding the performance/use of the elements (e.g., a dump truck operating at full load, 8 hours/day, 50-50 mix city/highway).*
- *Ensure all information is presented in a table as shown in Annex C- Table 3 or another legible format.*

2.3 Construction Element 1: Light-duty Vehicles

Key Actions

- *Identify all the vehicles expected to be used for each construction phase for the project. These vehicles include those that will be operated on site and used to transport material, workers, equipment, etc. to and from the project location.*
- *Identify the type and amount of fuel (L/MWh) expected to be used for the operation of all construction vehicles for each construction phase.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the vehicles by the expected vehicle kilometers travelled, which can be based on expected work or past similar projects. The combined fuel efficiency value can be used (50-50 mix of highway and city) or the most appropriate fuel efficiency value can be selected for the operational scenario and can be found in the Fuel Consumption Guide by Natural Resources Canada or from the fleet manufacturer's specification. The following calculation can be used:*

  Fuel Efficiency (L/kms) x kms travelled = L of fuel

- **If the vehicles are electric:** *Obtain the provincial/territorial electrical grid emission intensity for your location. Emission intensities should be dynamic and reflect cleaning of provincial/territorial (P/T) grids in future years. P/T Emission intensities can be found in Annex D. To quantify GHG emissions, apply the following calculation:*

  Energy (MWh) x P/T Emission Intensity (tonnes CO_2e/MWh) = Emissions tonnes CO_2e

- **If the vehicles are using gas/diesel/LPG/CNG:** *Obtain the relevant emission factors from Annex D or Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific mobile fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *Present the relevant information in a table as shown in Annex C or other legible format.*
- *Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the construction vehicles is included.*

2.4 Construction Element 2: Heavy Duty Vehicles and Machinery

Key Actions

- *Identify all the heavy machinery and large equipment expected to be used for each construction phase for the project.*
- *Identify the type and amount of fuel (L) expected to be used for the operation of all construction equipment and machinery for each construction phase.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the equipment by the expected hours in operation, which can be based on expected work or past similar projects. The most appropriate fuel efficiency value can be found in the manufacturer's specification of the equipment. The following calculation can be used:*

  Fuel Efficiency (L/hour of operation) x hours of operation = L of fuel

- *Obtain the relevant emission factors from Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific equipment fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *Present the relevant information in a table as shown in Annex C or other legible format.*
- *Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the construction equipment is included.*

2.5 Construction Element 3: Heating and Cooling Equipment

Key Actions

- *Identify all the heating and cooling equipment expected to be used for each construction phase for the project.*
- *Identify the type and amount of fuel (L/MWh) expected to be used for the operation of all heating and cooling equipment for each construction phase.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the equipment by the expected hours in operation, which can be based on expected work or past similar projects. The most appropriate fuel efficiency value can be found in the manufacturer's specification of the equipment. The following calculation can be used:*

  Fuel Efficiency (L/hour of operation) x hours of operation = L of fuel

- *Obtain the relevant emission factors from Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific equipment fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- **If the heating/cooling equipment is electric and drawing power from provincial electrical grid:** *Obtain the provincial/territorial electrical grid emission intensity for your location. Emission intensities should be dynamic and reflect cleaning of provincial/territorial (P/T) grids in future years. P/T grid emission intensities can be found in Annex D. To quantify GHG emissions, apply the following calculation:*

Energy (MWh) x P/T Emission Intensity (tonnes CO_2e/MWh) = Emissions tonnes CO_2e

- *Present the relevant information in a table as shown in Annex C or other legible format.*
- *Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the equipment is included.*

2.6 Construction Element 4: Generators

Key Actions

- *Identify the amount of fuel (m^3/L/kg) expected to be used for any generators on site during the construction process.*
- *Estimated consumption of fuel should be available based on expected work requirements, or obtained from similar past projects.*
- *Obtain the relevant emission factors for your fuel type and generator equipment. Emission factors can be obtained from Canada's National Inventory Report (2019). Note that emission factors are presented for each of the three main gases: CO_2, CH_4 and N_20. To obtain an emission factor in units of CO_2e, multiply each emission factor for CO_2, CH_4 and N_2O by their respective 100 year global warming potentials (1, 25 and 298 respectively) and add all three values together.*
- *To quantify GHG emissions, apply the following calculation:*

  Fuel (m^3) x Specific fuel combustion emission factor (tonnes/m^3) = Emissions tonnes CO_2e
  (Fuel may be in either L or m^3- ensure the units are consistent with the appropriate emission factor)

- *Present the relevant information in a table as shown in Annex C or other legible format.*
- *Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the equipment is included.*

2.7 *Optional* Construction Element 5: Tools and Equipment

Key Actions

Optional

- *Identify all the tools and smaller equipment expected to be used for each construction phase for the project.*
- *Identify the type and amount of fuel (L) expected to be used for the operation of all tools and smaller equipment for each construction phase.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the equipment by the expected hours in operation, which can be based on expected work or past similar projects. The most appropriate fuel efficiency value can be found in the manufacturer's specification of the equipment. The following calculation can be used:*

  Fuel Efficiency (L/hour of operation) x hours of operation = L of fuel

- *Obtain the relevant emission factors from Canada's National Inventory Report (Annex 6), and apply the following calculation:*

Fuel (L) x Specific equipment fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *Present the relevant information in a table as shown in Annex C or other legible format.*
- *Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the equipment is included.*

2.8 Construction Mitigation Measures

Key Actions

- *Describe any mitigation measures being implemented to reduce GHG emissions during the construction phase of the project. Examples of mitigation measures include:*
  - *Decreased idling times for construction vehicles and equipment*
  - *Use of renewable energy for construction site*
  - *Construction worker carpooling to and from construction site*
  - *More fuel efficient vehicles and equipment*
  - *Use of locally sourced materials*
  - *Use of low-carbon materials (e.g., recycled steel, Portland-Limestone cement)*
  - *Restoration or addition of vegetation to construction site*

2.9 Total Construction GHG Emissions

Key Actions

- *For each construction phase, sum together the tonnes of CO2e from all activities and present data in a Table such as the one below.*

Element 1 + Element 2 + Element 3 + Element 4 + Element 5 = Total Construction Emissions tonnes CO_2e

Table 2.9 Total Construction Emissions (in tonnes of Co_2e)

Construction Phase	Year(s)	Element 1 Light Duty Vehicles	Element 2 Heavy Duty Vehicles & Machinery	Element 3 Heating & Cooling	Element 4 Generators	Element 5 *Optional* Tools & Equipment	Total Construction Emissions
	2023-24						
	2024-25						
	2025-26						
	TOTAL						

Part 3: Project Operation and Maintenance

3.1 Operation and Maintenance Overview

The overview provides the emissions associated with the operation of the project as well as routine, periodic, and emergency maintenance and repairs.

Key Actions

- *Identify any activities associated with the operation of the asset(s). This may include electricity use for the running of equipment, heating and cooling needs, and vehicle and equipment use for any maintenance/repairs of the asset.*

- *For identifying any possible maintenance and repair activities, please consult the following guidelines:*

  Routine maintenance and repairs: *Occurs consistently throughout the asset(s) lifespan and relatively predictable intervals. Routine maintenance should be considered maintenance that occurs at either monthly, weekly, or daily intervals depending on the asset.*
  Periodic maintenance and repairs: *Occurs consistently throughout the asset(s) lifespan at larger predictable intervals. Periodic maintenance should be considered maintenance that occurs at annual intervals.*
  Emergency Maintenance: *Occurs intermittently throughout the asset(s) lifespan but is not predictable. Emergency maintenance should be accounted for if a possible issue should require repairs to the asset, but cannot be foreseen when the maintenance will need to occur.*

Note: Various operational activities and GHG sources are listed under 3.2-3.7. Only those activities relevant to the project should be completed.

3.2 Operational and Maintenance Activity 1: Electricity Use

Key Actions

- *Identify the amount of electricity (MWh) expected to be used during the asset(s) lifespan (For example: lighting, pumping equipment)*
- *Estimated electricity consumption should be available based on expected work requirements, or obtained from similar past projects.*
- *Obtain the provincial/territorial (P/T) electrical grid emission intensity for your location. Emission intensities should be dynamic and reflect cleaning of P/T grids in future years. P/T Emission intensities can be found in Annex D. For remote communities not connected to a P/T grid, use the emission factor (found in Canada's National Inventory Report (2019)) for the type of energy used to generate electricity in that location (e.g., diesel generators).*
- *To quantify GHG emissions, apply the following calculation:*

  Energy (MWh/year) x P/T Emission Intensity (tonnes CO_2e/MWh) = Emissions tonnes CO_2e

- *The energy use, emission intensities and the associated GHG emissions should be presented in a table or other legible format.*
- *Document all assumptions and references used to calculate the electricity consumption for the construction of the project and the associated GHG emissions.*

3.3 Operational and Maintenance Activity 2: Heating/Cooling with fuel

Key Actions

- *Identify all the heating and cooling equipment expected to be used for any maintenance and repairs during the operation of the asset(s).*
- *Identify the type and amount of fuel (L) expected to be used for the operation of all heating and cooling equipment.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the equipment by the expected hours in operation, which can be based on expected work or past similar projects. The most appropriate fuel efficiency value can be found in the manufacturer's specification of the equipment. The following calculation can be used:*

  Fuel Efficiency (L/hour of operation) x hours of operation = L of fuel

- *Obtain the relevant emission factors from Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific equipment fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *Present the relevant information in a table other legible format.*

Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the equipment is included.

3.4 Operation and Maintenance Activity 3: Light-duty Vehicles

Key Actions

- *Identify the type and amount of fuel (L/MWh) expected to be used for the operation of all maintenance vehicles.*
- *Vehicles include those that will be operated on site and used to transport material, workers, equipment, etc. to and from the project site during the operation of the project.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the vehicles by the expected vehicle kilometers travelled, which can be based on expected work or past similar projects. The combined fuel efficiency value can be used (50-50 mix of highway and city) or the most appropriate fuel efficiency value can be selected for the operational scenario and can be found in the Fuel Consumption Guide by Natural Resources Canada or from the fleet manufacturer's specification. The following calculation can be used:*

  Fuel Efficiency (L/kms) x kms travelled = L of fuel

- If the vehicles are electric: *Obtain the provincial/territorial electrical grid emission intensity for your location. Emission intensities should be dynamic and reflect cleaning of provincial/territorial (P/T) grids in future years. P/T Emission intensities can be found in Annex D. To quantify GHG emissions, apply the following calculation:*

  Energy (MWh) x P/T Emission Intensity (tonnes CO_2e/MWh) = Emissions tonnes CO_2e

- If the vehicles are using gas/diesel/LPG/CNG: *Obtain the relevant emission factors from Annex D or Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific mobile fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *The fuel use, emission factors and the associated GHG emissions is most useful when presented in a table or other legible format.*

3.5 Operation and Maintenance Activity 4: Heavy Duty Vehicles and Machinery

Key Actions

- *Identify all the heavy machinery and large equipment expected to be used for any maintenance or repairs during the asset(s) lifespan.*
- *Identify the type and amount of fuel (L) expected to be used for the operation of all equipment and machinery.*

- *Amount of fuel can be estimated by multiplying the fuel efficiency of the equipment by the expected hours in operation, which can be based on expected work or past similar projects. The most appropriate fuel efficiency value can be found in the manufacturer's specification of the equipment. The following calculation can be used:*

  Fuel Efficiency (L/hour of operation) x hours of operation = L of fuel

- *Obtain the relevant emission factors from Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific equipment fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *Present the relevant information in a table or other legible format.*
- *Ensure all assumptions made to obtain/calculate the amount of fuel associated with the operation of the equipment is included*

3.6 Operation and Maintenance Activity 5: Generators

Key Actions

- *Identify the amount of fuel (m^3/L/kg) expected to be used for any generators on site during the asset(s) lifespan.*
- *Estimated consumption of fuel should be available based on expected work requirements, or obtained from similar past projects.*
- *Obtain the relevant emission factors for your fuel type and generator equipment. Emission factors can be obtained from Canada's National Inventory Report (2019). Note that emission factors are presented for each of the three main gases: CO_2, CH_4 and N_20. To obtain an emission factor in units of CO_2e, multiply each emission factor for CO_2, CH_4 and N_2O by their respective 100 year global warming potentials (1, 25 and 298 respectively) and add all three values together.*
- *To quantify GHG emissions, apply the following calculation:*

  Fuel (m^3) x Specific fuel combustion emission factor (tonnes/m^3) = Emissions tonnes CO_2e
  (Fuel may be in either L or m^3- ensure the units are consistent with the appropriate emission factor)

- *The fuel use, emission factors and the associated GHG emissions should be presented in a table or other legible format.*
- *List all assumptions and references used to calculate the fuel consumption for generator use during any maintenance or repairs of the project, the associated GHG emissions and include any relevant equipment specifications.*

3.7 *Optional* Operation and Maintenance Activity 6: Tools and Equipment

Key Actions

Optional

- *Identify the type and amount of fuel (L) expected to be used for the operation of all equipment and machinery during the asset(s) lifespan.*
- *Amount of fuel can be estimated by multiplying the fuel efficiency of the equipment by the expected hours in operation, which can be based on expected work or past similar projects. The most appropriate fuel efficiency value can be found in the manufacturer's specification of the equipment. The following calculation can be used:*

  Fuel Efficiency (L/hour of operation) x hours of operation = L of fuel

- *Obtain the relevant emission factors from Canada's National Inventory Report (Annex 6), and apply the following calculation:*

  Fuel (L) x Specific equipment fuel combustion emission factor (tonnes/L)= Emissions tonnes CO_2e

- *The fuel use, emission factors and the associated GHG emissions is most useful when presented in a table or other legible format.*
- *Document all assumptions made to obtain/calculate the amount of fuel associated with the operation of the equipment.*

3.8 Total Operation and Maintenance GHG Emissions

Key Actions

- *Sum together the tonnes of CO2e from all elements and present data in a Table such as the one below.*

  Activity 1 + Activity 2 + Activity 3 + Activity 4 + Activity 5 + Activity 6= Total O&M Emissions tonnes CO_2e

- *Provide values for each year over the lifespan of the asset(s). If the emissions are expected to be static for each year over the lifespan of the asset, please indicate the typical value in the first year and multiply by the number of years the project will be in operation to obtain the total operational emissions. Please note any repairs or maintenance activities that may change the value in any given year*

Table 3.8 Total O&M Emissions (in tonnes of CO_2e)							
Year	**Activity 1 Electricity**	**Activity 2 Heating/ Cooling**	**Activity 3 Light-duty Vehicles**	**Activity 4 Heavy Equipment**	**Activity 5 Generators**	**Activity 6 Tools/ Equipment**	**Total O&M Emissions**
2024..						*Optional*	
2030..							
2035..							
2050							
Total							

Part 4: GHG Mitigation Measures

4.1 GHG Mitigation Measures Operation and Maintenance Emissions

This section will provide you with the necessary information to estimate the potential GHG emissions reductions from the application of GHG mitigation measures to the project.

Key Actions

- *Identify and describe any GHG mitigation measures that are applicable towards the project in order to lower the GHG emissions generated from the asset(s) operation and maintenance activities.*
- *If possible, provide an estimate of the potential GHG emission reductions resulting from the mitigation measures being implemented.*

Examples of potential GHG mitigation measures include:

- Use of electric/hybrid vehicles instead of gas or diesel for transportation of workers or materials to the project site as part of routine, periodic, or emergency maintenance.
- Use of renewable and/or non-emitting energy sources for power used at the project site.
- Use of low-carbon or locally sourced materials for infrastructure repairs (e.g., asphalt, steel, cement, etc.)
- Use of high efficiency lighting fixtures for outdoor and/or indoor lighting.
- Use of high efficiency heating and cooling equipment where applicable.
- The GHG emissions reductions from each mitigation measures can usually be expressed as either an absolute value or percentage reduction from standard practices. For example:

***Mitigation Measure**: Use of electric vehicles for project site maintenance*

Calculated emissions from maintenance vehicles: 500 tonnes of CO2e per year
Calculated emissions savings from use of electric vehicles 350 tonnes of CO2e per year
Total emissions from maintenance vehicles: 150 tonnes of CO2e per year (500 – 350)

For additional guidance on calculating emissions reductions from mitigation measures please consult:

- World Resources Institute

- BC Climate Action Toolkit
- Canadian Institute for Climate Choices
- International Institute for Sustainable Development
- United Nations Framework Convention on Climate Change (UNFCCC)
- Alberta Offset Protocols
- California Air Resources Board (CARB)
- Climate Action Reserve

For any questions or concerns with respect to the calculation, understanding, or approach to determining emissions reductions through the implementation of mitigation measures, please contact Infrastructure Canada's Climate Lens Policy Team at: climatelens-optiquedeschangementsclimatiques@infc.gc.ca

Part 5: Total Net Project GHG Emissions

5.1 Total Net Project GHG Reductions

The general equation for calculating total GHG emissions from a project is:

Construction Emissions + Project Emissions - Reductions from Mitigation Measures = Total GHG Emissions

Key Actions

- *Input the emissions from the construction of the project, from operation and maintenance of the asset(s) and the emission reductions (if applicable) from any mitigation measures into a table (sample provided below).*
- *Calculate the total GHG emissions resulting from the project by subtracting any mitigation measures emission reductions from the total project emissions.*
- *Provide values for each year over the lifespan of the asset(s). If the emissions are expected to be static for each year over the lifespan of the asset(s), please indicate the typical value in the first year and multiply by the number of years the project will be in operation to obtain the total emissions. Please note any repairs or maintenance activities that may change the value in any given year.*

Table 5.0 Total Net Project GHG Emissions (in tonnes of CO_2e)

Year	Construction Emissions	Project Operation and Maintenance Emissions	Emission Reductions from mitigation measures	Total Net Project GHG Emissions
2022				
2023				
2024 …				
TOTAL				

2.3 Submission of the Climate Lens

GHG Mitigation assessments are to be submitted to Infrastructure Canada via the DMAF analyst responsible for your project or to the DMAF general inbox (dmaf-faac@infc.gc.ca).

If the project requires changes to its components, process or timeline, a revised Climate Lens may need to be submitted. Only project changes that may impact the GHG emissions estimate significantly may trigger the need for a re-assessment. Infrastructure Canada will review the changes and will contact the applicant if a revised Climate Lens is required.

Infrastructure Canada will make the Climate Lens and all supporting guidance available via the INFC website.

The Applicant is responsible for completing the Climate Lens and providing the completed form to Infrastructure Canada. It is the applicant's responsibility to meet any request for further information from Infrastructure Canada.

ANNEX A – GHG Definitions

Elements: GHG sources and sinks can be further broken down into the specific elements which are responsible for completing the activity and result in GHG emissions. For example, for the activity of heating a building, the associated element will be the stationary combustion unit such as a boiler or furnace. The specifications of an element, including how it operates, are important factors to identify and state in a GHG assessment, as they impact the overall quantity of emissions released and/or sequestered.

End Variable: An end variable is the annual input/output or activity level of an element (i.e., the amount of fuel combusted in one year in a boiler) and estimated for each year of the project lifetime. End variables are generally calculated using specific data from an element or activity and gathered from various sources. Examples of end variables include: litre (L) of fuel, kWh of electricity and tonnes of hydrofluorocarbons (HFCs).

Emission Factor: An emission factor is a representative value that relates the quantity of greenhouse gases released with a specific level or output of an activity. Emission factors are based on the unique characteristics of elements or processes, and can also be specific to the location where an activity is placed. A common equation used to estimate GHG emissions from a project or baseline activity involves an end variable and a relevant emission factor, which is typically found in Canada's National Inventory Report. The equation is structured in the following way: GHG Emissions = End Variable (EV) × Emission Factor (EF).

Ex Ante Estimation: The estimation of GHG emissions prior to the development and operation of a project and actual generation of GHG emissions. As no actual data has yet been generated by the project at this stage, project proponents must look to comparable sources of data such as the following: similar projects completed by the proponent in the past; similar projects completed by others in the surrounding area; contracts, work plans or estimates for the project provided by third party contractors involved; any modeling work performed by project developers, energy consultants, etc., and estimates developed to the best of the proponent's ability.

Sources & Sinks: Under ISO 14064:1, a **source** is any process or activity that releases a greenhouse gas into the atmosphere, whereas a **sink** is any process, activity or mechanism that removes a greenhouse gas from the atmosphere. Although there are numerous sources and/or sinks related to construction, only a few relevant activities are typically selected for quantification, as they are likely to result in more significant amounts of GHG emissions.

ANNEX B – Greenhouse Gas Principles

When developing any type of GHG assessment or inventory, developers should follow relevant GHG standards, guidance documents and methodologies suggested by the specific program authority. However, as the process of GHG quantification has inherent flexibility and room for interpretation, developers of GHG assessments will still be faced to make specific decisions that are outside the scope of any guidance document. On these occasions, developers should make decisions based on the overarching objectives of integrity and credibility. To achieve these objectives, developers should follow a set of common **GHG quantification principles**, found throughout the many GHG standards, protocols and guidance documents worldwide.

The following principles have been adapted from the ISO 14064:1 Standard and should be followed when developing a GHG assessment of a project:

Relevance	Selected sources (activities) of GHG emissions, data and methodologies must be appropriate to the project and the needs of the intended user.
Completeness	Include all relevant GHG emission sources. Include all relevant information to support program criteria and the GHG emission estimates.
Consistency	Developers should apply estimation methods and assumptions consistently across all aspects of the project and for all individual GHG emission sources. In other words, developers should maintain the same "quantification rules" throughout the GHG assessment.
Transparency	All assumptions, methods, calculations, and associated uncertainties should be provided in order to allow intended users to make decisions with reasonable confidence and allow for successful validation and verification of the results.
Accuracy	Estimates and calculations should be unbiased, and uncertainties should be reduced as far as practical. Calculations should be conducted in a manner that minimizes uncertainty.
Conservativeness	Where there are uncertainties, the values used to quantify GHG emissions should err on the side of underestimating potential reductions.

ANNEX C – Project Construction Supporting Information

1. Construction Phases and Examples of Activities

#	Phase	Examples of Activities
1	Site Preparation	• Tree & vegetation removal • Site grading, clearing, excavation • Drilling/blasting/dredging • Installation of site services- fencing, lighting, security systems • Construction of temporary site access roads, linkages to roadways • Changes to existing infrastructure (e.g., relocation of pipelines) • Transportation of material to site • Removal of waste from site
2	Installation and Construction	• Transport of project components to site • Construction of buildings, facilities, structures • Installation of project components • Paving/asphalt of roadways • Removal of waste from site
3	Site Restoration	• Removal of temporary site services • Landscaping • Planting new vegetation/trees • Transport of restoration material to site • Removal of waste from site

2. Construction Elements and Related Information

Elements	Examples	Data Required	Sources of Data	End Variables
Light-duty Vehicles	Small, mid-size, large trucks, duel rear wheel trucks	Type/# of vehicles Fuel Type Distance travelled Fuel efficiency of vehicle	Fuel purchase records Operational logs Fuel Consumption Guide (NRCAN) Internal records Proxy data	Fuel (L, kWh)- Gas, Diesel, Electricity
Heavy-duty Vehicles- Large machinery and Heavy Equipment	Bulldozers, Cranes, Backhoes. Dump trucks, Graders, Packers, Loaders, Excavators	Type/# of equipment/units Fuel Type Efficiency of equipment Hours of operation Capacity/Load	Fuel purchase records Operational logs Internal records Proxy data	Fuel (L, m3, kWh)- Gas, Diesel, Electricity
Heating and Cooling Equipment, including de-humidifiers, fans/air movers, air scrubbers, heat pumps	Direct and Indirect-Fired Heaters, Ground Heaters (hydronic/blankets) Portable AC units/spot coolers	Type/# of equipment/units Fuel Type Efficiency of equipment Hours of operation	Fuel purchase records Equipment specifications Proxy data	Fuel (L, m3, kWh)- Gas, Natural Gas, Diesel, Electricity, Propane
Generators	Portable, whole-house, Gas/Diesel/Solar	Type/# of equipment/units Fuel Type Efficiency of equipment Hours of operation	Fuel purchase records Equipment specifications Proxy data	Fuel (L, m3, kWh)- Gas, Diesel, Green energy (solar)

3. Sample Table

Construction Phase	Elements	Assumptions	Fuel Type	Estimated Fuel use	Emission Factor	GHG emissions (tonnes CO2e)
Site preparation	*Element 1- Dump truck (x2)*	*Operation at full load, 8 hours/day, 50-50 mix city/highway)*				
	Element 2…					

Note: This table format can be used to present the data for the other two phases of the construction process.

ANNEX D – Average P/T Grid Electricity Emission Intensities (tonnes/MWh)*

Region	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Alberta	0.517	0.446	0.357	0.250	0.232	0.211	0.225	0.223	0.217	0.208	0.207	0.201	0.204	0.203	0.203	0.204
British Columbia	0.004	0.002	0.003	0.003	0.004	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Manitoba	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
New Brunswick	0.276	0.259	0.269	0.268	0.275	0.273	0.274	0.272	0.258	0.252	0.124	0.116	0.124	0.113	0.123	0.114
Newfoundland	0.091	0.068	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.010	0.010	0.010	0.011	0.010	0.010	0.009
Northwest Territories	0.058	0.067	0.062	0.051	0.017	0.008	0.008	0.008	0.010	0.012	0.014	0.016	0.020	0.014	0.013	0.009
Nova Scotia	0.634	0.562	0.458	0.457	0.463	0.464	0.417	0.401	0.384	0.361	0.118	0.116	0.112	0.109	0.105	0.101
Nunavut	0.747	0.747	0.744	0.712	0.635	0.498	0.480	0.469	0.470	0.455	0.457	0.442	0.435	0.447	0.454	0.458
Ontario	0.034	0.044	0.067	0.065	0.066	0.077	0.093	0.081	0.067	0.064	0.062	0.060	0.058	0.041	0.035	0.030
Prince Edward Island	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Quebec	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Saskatchewan	0.410	0.366	0.299	0.306	0.252	0.249	0.253	0.221	0.173	0.167	0.163	0.157	0.146	0.142	0.137	0.133
Yukon Territory	0.045	0.121	0.068	0.077	0.086	0.089	0.099	0.074	0.046	0.029	0.018	0.014	0.018	0.023	0.032	0.041

Region	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Alberta	0.206	0.207	0.209	0.210	0.212	0.213	0.215	0.216	0.217	0.219	0.220	0.221	0.221	0.221	0.222
British Columbia	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Manitoba	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
New Brunswick	0.124	0.111	0.118	0.114	0.129	0.129	0.120	0.121	0.122	0.124	0.125	0.126	0.128	0.130	0.131
Newfoundland	0.009	0.009	0.009	0.009	0.008	0.008	0.008	0.008	0.008	0.008	0.007	0.007	0.007	0.007	0.007
Northwest Territories	0.008	0.006	0.006	0.006	0.008	0.025	0.026	0.031	0.020	0.018	0.016	0.017	0.019	0.020	0.022
Nova Scotia	0.094	0.088	0.088	0.086	0.084	0.082	0.081	0.079	0.076	0.074	0.074	0.074	0.074	0.074	0.073
Nunavut	0.470	0.482	0.488	0.488	0.501	0.505	0.515	0.523	0.525	0.529	0.535	0.544	0.547	0.556	0.561
Ontario	0.024	0.021	0.019	0.017	0.016	0.015	0.015	0.015	0.014	0.013	0.011	0.009	0.009	0.011	0.013
Prince Edward Island	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Quebec	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Saskatchewan	0.130	0.126	0.123	0.121	0.117	0.115	0.112	0.108	0.105	0.098	0.095	0.092	0.089	0.085	0.082
Yukon Territory	0.054	0.067	0.052	0.039	0.027	0.019	0.013	0.017	0.020	0.026	0.033	0.042	0.050	0.034	0.022

Notes:

1. Grid Emissions intensity is defined as: (utility generation emissions) + (industrial net sales to grid by sector) x (industrial electricity generation emissions factor) *divided by* electricity consumption from the grid,
2. For alternative emission intensities from B.C. electricity consult the provincial emission intensities found here.

Source: ECCC's Greenhouse Gas Emissions Projections.
Link: Canada's Greenhouse Gas Emissions Projections - Environment and Climate Change Canada Data.
Last Modified: June 2022

ANNEX E – References

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