

UNSM Corporate Energy and Emissions Inventory Instruction Manual

Definitions

Air Pollutants (AP) - Substances found in the air at larger than usual concentrations, which may impair the health of plants and animals (including humans), or reduce visibility. The most common man-made air pollutants are nitrous oxide (NO_x), sulphur oxide (SO_x), particulate matter (PM), and volatile organic compounds (VOC).

Greenhouse Gases (GHGs) – An assortment of gases that trap the sun's energy within the earth's atmosphere. Greenhouse gases include water vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO_x), and ozone (O₃).

Climate Change – Changes in global and local climate in modern times which according to the United Nation's Intergovernmental Panel on Climate Change are 90-95% likely to have been in part caused by the emission of Greenhouse Gases due to human activity, primarily through burning of fossil fuels (oil, coal etc.).

CO₂ equivalent (eCO₂) – Unit for measuring Global warming potential that estimates the degree to which a given mass of greenhouse gas contributes to climate change. The global warming potential of CO₂ is defined as one, and those of all other greenhouse gases expressed as multiples of that unit.

Tonne (t) – Unit of measurement for mass equivalent to 1000 kilograms, typically used for measuring GHGs.

Base year – The first year for which measurements are made, usually before new programs or initiatives impacting the variables measured are introduced. Changes resulting from new programs are understood in comparison to the base year. For the purposes of this Toolkit the base year is defined as 2006.

Indicators – In case of this Toolkit, variables that assist in measuring performance. For example, GHG emissions per employee, energy use per square meter etc.

1.0 Introduction

In 2007 the Union of Nova Scotia Municipalities along with the Nova Scotia Department of Energy, Department of Environment and Labour, and Service Nova Scotia and Municipal Relations, commissioned the task of building a Corporate Energy and Emissions Inventory Toolkit for Nova Scotia municipalities. The Toolkit builds on existing efforts in Canada to create a simple, standardized accounting methodology and approach in preparing accurate energy, greenhouse gas and air pollutant inventories.

At a time when environmental concerns are growing in importance among Canadians, over 600 Canadian municipalities have committed to understand and manage their contribution to energy use and resultant emissions. These commitments would address some of the most pressing environmental issues including air quality and climate change (see Definitions section). Given their prominent leadership and ability to influence citizens directly, municipalities have a particularly important role to play in addressing environmental challenges relating to energy, greenhouse gas (GHG) and air pollutant (AP) emissions.

It has been estimated that up to half of Canada's GHG emissions (350 million tonnes) and most other APs are under the direct or indirect control or influence of municipal governments. Those under direct control of municipalities include the energy use and emissions that the operations of the municipal corporation are responsible for (e.g. municipal office buildings, municipal fleet etc) – these are termed **corporate** energy use and emissions. The municipality also has influence over energy use and emissions in the larger community and among citizens within the municipal boundaries (e.g. residences, transportation and waste management) – these are termed **community** energy use and emissions. The first priority of a municipality is usually to address corporate energy use and emissions as a way of demonstrating environmental leadership and “walking the talk”.

Another reason municipalities may want to manage their corporate energy use and emissions, is the financial savings that can be associated with leaner municipal operations. Given the rising price of energy, it is in the best interest of municipalities to account for the amount of energy they use and its cost, and take steps towards reducing energy use and therefore energy spending.

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A first step towards managing energy and emissions is conducting an inventory of how much energy is used by a municipality and how much GHGs and APs are emitted (base year assessment). For municipalities that are serious about reducing their energy use and emissions, conducting the inventory becomes an annual task after the base year, so that improvements in performance can be monitored over time. The UNSM Corporate Energy and Emissions Inventory Toolkit assists municipalities with quantifying their energy, AP and GHG emissions for a base year as well as consecutive future assessments.

The Toolkit, developed by Jacques Whitford Limited in 2007, has three components:

- The Corporate Energy and Emissions Spreadsheet
- The Corporate Energy and Emissions Instruction Manual
- The Corporate Energy and Emissions Education Materials

The document you have in hand is the Instruction Manual and has been designed specifically to accompany the Corporate Energy and Emissions Spreadsheet, a calculation and quantification tool based on the Inventory Quantification Support Spreadsheet developed by the International Council for Local Environmental Initiatives (ICLEI) and administered in Canada by the Federation of Canadian Municipalities (FCM). The ICLEI tool was modified at the request of UNSM and its members to achieve the following:

- Clearly link energy use, GHG and AP emissions, and costs to specific operations or facilities, allowing the toolkit to be an analytic tool to help managers identify opportunities for energy savings and financial savings to better manage their assets;
- Provide a succinct and simple set of instructions allowing the toolkit to be used by non-technical personnel in a short amount of time;
- Identify and recommend sources of information to facilitate the process of populating the model with input data; and
- Ensure that the assumptions and coefficients behind the model are up-to-date and relevant to the Nova Scotia small and medium-sized municipalities' context.

The UNSM Toolkit differs from the ICLEI tool in two ways: First, the UNSM Toolkit focuses on both APs and GHGs whereas the ICLEI tool only accounts for GHGs; and second, the UNSM Toolkit focuses only on corporate energy and emissions whereas the ICLEI tool accounts for both corporate and community energy and emissions. However, there are advantages to using the ICLEI tool - including its assumptions and groupings - as the basis for the Spreadsheet. The most important advantage is that the information on energy and emissions contained in the UNSM Toolkit will be comparable to that generated by other municipalities throughout Canada that have been using the ICLEI tool.

Further technical details about the model underlying this Toolkit can be found in the ICLEI and the Partners for Climate Protection in Canada (PCP) Protocol and Guidelines for Reporting, Draft 3.0, April, 1999.¹ Specifically, pages 1 to 17 clearly address the scope and boundary issues which will be of interest to UNSM's member municipalities.

With the express permission of ICLEI, Jacques Whitford has updated the ICLEI tool to work more effectively within the province of Nova Scotia, and provided the UNSM with the supporting

¹ ICLEI and PCP Protocol and Guidelines for Reporting is available at http://www.collectivitesviables.fcm.ca/files/Capacity_Building_-_Energy/Resources_and_Tools/CCP-protocol.pdf

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documentation to increase ease of use and end user comfort with the calculations. The Corporate Energy and Emissions Spreadsheet and Instruction Manual have been developed in accordance with The World Business Council for Sustainable Development and the World Resource Institute's GHG Protocol, which is an internationally accepted document that assists organizations that are developing an accounting tool to manage GHG emissions. Functionalities to calculate AP emissions were added by Jacques Whitford.

The Spreadsheet and Instructions Manual have been designed to assist the users in tracking, not only their energy use and emissions, but also the costs they incur through the use of energy, if they wish to enter financial information into the Spreadsheet. One advantage of the Spreadsheet is that it allows anyone with a basic knowledge of the Excel software to perform the calculations. You do not need to be energy and emissions expert or a finance specialist to use the Spreadsheet. This Toolkit allows the task of calculating and tracking energy and emissions to be hosted in a variety of departments within the municipal structure (e.g. engineering, accounting or the CAO's office) and for the Spreadsheet to be filled out and maintained by an accountant, administrator, properties manager, or students/interns among others.

2.0 UNSM Corporate Energy and Emissions Spreadsheet

The Corporate Energy and Emissions Spreadsheet will assist in quantifying the GHG and AP emissions of your municipality's operations, also referred to as corporate emissions. This includes emissions from your municipal buildings, fleet and service delivery operations.

When you begin to populate the spreadsheet, you will likely find that you need to piece together information from several different operational units within your municipality. For example, you will need to locate information on your municipality's number of buildings and occupants, power bills and heating fuel invoices, number and types of vehicles etc. For this reason, establishing an effective organizational network before you begin to quantify your emissions can be very helpful. Ideally, you should have a meeting with the Chief Administrative Officer, accounts payable department representatives, appropriate account managers, public works and engineering department representatives, and property managers prior to the initiation of any energy, GHG and AP quantification project. If this is not possible, you should make an attempt to initiate a conversation with the above mentioned people early on in the quantification task to facilitate the collection of information.

The more information you can collect and enter into the Spreadsheet, the more accurate your GHG and AP calculations will be. However, if you are missing information in one or more categories, you can make some assumptions, enter aggregated information or data at the level you have available and move ahead with the calculations; over time you can refine your calculations by identifying and using a more complete dataset. Remember that the base year quantification will be most difficult to establish because you will have to hunt for sources of information. When you repeat the quantification exercise in the following years, the task will likely be much easier because you will have already established your sources.

The Spreadsheet contains a total of 10 workbooks (tabs) as follows:

- Workbook 1: General Information
- Workbook 2: Nova Scotia Power Coefficients
- Workbook 3: Buildings

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- Workbook 4: Vehicle Fleet
- Workbook 5: Streetlights
- Workbook 6: Water and Sewage
- Workbook 7: Waste
- Workbook 8: Summary
- Workbook 9: Conversions
- Workbook 10: Coefficients

The first 2 workbooks will help you set up the parameters for the quantification exercise. Workbooks 3 to 7 will require you to input your energy use and financial information (optional) for various facilities and operations. Once you have filled in the required information in these workbooks, the Spreadsheet will present a summary of your GHG and AP emissions in Workbook 8. The last two workbooks contain some further information underlying the calculations and can be thought of as appendices to the Spreadsheet tool. The workbooks are primarily designed to be viewed on the computer screen but can be printed. By default, the entire collection of cells on the Workbook that is likely to contain data has been set as “print area”. However, you can change this to print only the relevant sections of the Workbook. Use the Help function in your version of Excel for the simple steps on “setting a print area”.

The approach in Workbooks 3 to 7 is to provide space in the main table (Table A) for entering energy use information for all different aspects of municipal operations to the greatest degree of detail possible (e.g. on a building-by-building, streetlight-by-streetlight basis if information is available). For each entry you are also welcome to enter costs associated with the energy use. The Spreadsheet then uses the data provided to calculate the GHG emissions and AP emissions corresponding to the energy use figures entered. The GHG figures are displayed for each entry (each row) in Table A on each workbook. In addition, the most important AP for each category is sometimes presented for each entry (each row) and included in Table A. More often, APs are summarized and appear in aggregate form at the bottom of each workbook in Table B (below the main table) to make the information easier to read.

Please note that this is a generic Spreadsheet, and it is not expected that all categories of energy use, GHG and AP emissions identified in this Spreadsheet will be relevant to your municipality. Please leave fields blank where inapplicable.

2.1 Workbook 1: General Information

Step 1: Identification

Input the name of your municipality, as well as your name as the person completing the Spreadsheet for record keeping purposes. The inventory base year is automatically set to be 2006. However, if you have a reason for selecting a different baseline year, please indicate this on Workbook 1².

² The year 1990 is sometimes suggested as a more appropriate base year because 1990 is the agreed upon GHG emission reduction baseline under the Kyoto Protocol. However, some municipalities have found it problematic to find enough information to complete the quantification spreadsheet by using 1990 as a base year. You may wish to select a base year for which you have ample and accurate municipal records to use as inputs for the spreadsheet.

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Step 2: Take Note of Colour Coding Conventions

Please take note of the colours in the General Info Workbook and their role in this spreadsheet. The colour coding scheme allows you to keep track of energy use, energy costs, GHG emissions (in CO₂-equivalent or eCO₂), and AP emissions separately. For example, if you need to scan the Spreadsheet for cost information, you will be able to look for the red cells in each of the workbooks.

Generally speaking, there is a linear relationship between energy use, energy costs and GHG and AP emissions in a given situation. This Toolkit is designed to calculate your GHG and AP emissions based on inputted energy use, relying on coefficients that have been programmed in. It is also a good tool for keeping track of your energy costs and can eventually help you estimate cost savings and key financial indicators associated with reductions in energy use, GHG and AP emissions.

2.2. Workbook 2: NS Power Coefficients

Step 1: Select a base year if different from 2006

Due to changes in energy mix and technology at Nova Scotia Power facilities, the coefficient used to convert energy use to GHG emissions differ slightly from year to year. By default this Spreadsheet will use coefficients for a 2006 base year. If you are choosing another base year, select the most appropriate calendar year from which to base your energy and GHG calculations on Workbook 2. After you have selected a base year, find the corresponding coefficient from the table on this tab and enter it into the cell beside 'kWh Emissions Coefficient'³.

2.3. Workbook 3: Buildings

Step 1: Compile an inventory of municipal buildings and enter it into the spreadsheet

Identify every building and building group that you use to operate your corporate entity. In some cases, it may make sense to group a number of buildings together and represent these buildings on the spreadsheet under a group name (example: all office buildings, all recreation facilities), and in other cases, you may decide it is more appropriate to identify single buildings by name or address. To make this Spreadsheet a more useful decision support tool, enter your building information in as much detail as is available to you, and avoid aggregation where possible.

³ *NOTE: Emissions Coefficients from 1990 to 2000 were retrieved directly from the original ICLEI Inventory Quantification Support Spreadsheet Emissions Coefficients. Nova Scotia Power Inc. provided 2004 to 2006 coefficients, but they could not provide emissions coefficients from the year 2001 to 2003. NSPI is re-calculating emissions coefficients for each one of these years, and all years previous to this where possible. Representatives from NSPI estimate that this project may be complete by the end of this calendar year. Emissions coefficients from the year 2006 onward can be located by visiting the Government of Canada's Federal GHG Reporting website at <http://www.ghgreporting.gc.ca/>, or by following up with Nova Scotia Power each year. If you select a base year that corresponds with a year that does not have an emissions coefficient, please take an average of the first available year, previous year and year following.

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Buildings that should be included in your inventory are: City Hall, administrative buildings, cultural buildings, recreation centers, pools, arenas, public works buildings libraries, fire services, police services, civic operations, sheds, parking garages, market buildings and other municipally owned or operated buildings. Do not include water and wastewater treatment or solid waste facilities in this section.

Step 2: Identify the indicators

Indicators are variables that can help you understand the relative energy and emissions performance of your buildings. Typical indicators will include number of occupants, annual operating hours and total floor area (m²) of the buildings and building groups. Collect and enter this data into the Spreadsheet if and when available. Data may be variable, and it is sufficient to use averages or best estimates where more accurate estimates are not available. (For example, you may typically have 6 employees in a building but 2 are away on leave for parts of the year. You may estimate the number of your building occupants as 5.)

Step 3: Record your calendar year electricity purchases (in kWh and in dollars) from your energy provider for each building

Typically, it is labour-intensive to retrieve this information from within your municipality, although your municipality's accounting department should have this information in invoices and may be able to provide it to you for most buildings. Alternatively, you can retrieve information on electricity purchased per calendar year, broken down on a monthly basis by account number, directly from Nova Scotia Power by calling their customer service line at 1-800-428-6230. Have the appropriate account numbers identified for each building. There may be a minimal fee to generate this report.

Step 4: Record your calendar year purchases for heating fuels potentially including fuel oil (L), natural gas (GJ), diesel (L), district energy (GJ) and associated costs (dollars) for each building

Municipalities use different heating fuels for buildings and other facilities. Select and pursue only those fuels that apply to your municipality.

Fuel oil and diesel - There are multiple providers of fuel oil (popularly referred to as heating oil) in Nova Scotia. You must identify your fuel oil or diesel provider and request a calendar year report on your purchases (in L and dollars) if you do not have this information available within your municipality.

Natural gas - If identifying natural gas purchases from data already available within your municipality proves difficult, you can contact Heritage Gas directly and request a calendar year report on your natural gas purchases, by calling their customer service line at 1-877-836-7247. Have the appropriate account numbers ready.

District energy - District energy is energy created within your municipality at a single utility plant and distributed to other buildings in your municipality. The Spreadsheet makes the assumption that Natural Gas is the fuel used to provide district energy, in which case Heritage Gas should be able to provide this data to you. In cases where the District Heating system salvages steam or heat from an existing plant without using any additional energy, this section can be left blank. If you have a district energy system in place with a different energy source, an updated emissions coefficient and information source will be required.

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Step 5: View totals

Your energy totals, cost totals, GHG and AP totals as well as totals per unit indicator will be dictated by your inputs. Each total use input is automatically multiplied by an emission coefficient (sourced in the Spreadsheet), and represented in appropriate units.

At the bottom on Workbook 3 you will find three graphs, representing total eCO₂ by source, total cost by source, and kWh use per building. The visuals are programmed to work with the tables above. Should you require additional rows to calculate your municipality's emissions, you will have to adjust the data series to modify the chart or pie graph representing the information that you have added. You can also create graphs illustrating other factors. Use the Help function in your version of Excel for simple instruction on "making a chart".

Step 6: Insert your comments

Throughout this exercise, you will be making assumptions, calculating averages, performing conversions and aggregating where it makes sense to do so. Documenting your methods and data sources provides a record of your activity on the project, and can help any future users or third party verifiers track down the original sources of information for review purposes. There is a section at the bottom of Workbook 3 for documenting this information.

2.4. Workbook 4: Vehicle Fleet

Before quantifying your vehicle emissions, you must consider the quality and type of data that you have available to complete these calculations. This spreadsheet is designed to calculate emissions based on fuel use figures. In some cases, it may be possible for you to retrieve accurate fuel use figures from your vehicle fleet managers. In other cases, distance travelled per calendar year data may be more easily accessible. As a last resort, you might use the dollar amount your municipality paid for its vehicle fleet to estimate how much energy was used (not included in Spreadsheet). This will be a very rough estimate, given that the prices of oil and gasoline change regularly throughout the year. Use your best guess at the average price of oil for the year to convert dollars to liters of fuel.

If you retrieve distance travelled data per vehicle or vehicle group, please use the instructions located in the vehicle emissions workbook and the corresponding table to calculate your vehicle or vehicle groups' fuel consumption. To calculate the fuel consumption of heavy trucks and buses, use the general vehicle efficiency data located below the conversion table to convert kilometers traveled to liters of fuel used.

Step 1: Identify all vehicles and vehicle groups

Within your municipality, you must identify the appropriate department or departments where your vehicle fleet is managed and work with this department to generate a list of vehicles and vehicle groups owned or contracted, including passenger cars, motorcycles, police vehicles, light vans and trucks, heavy trucks, specialized heavy equipment, non-road vehicles and other vehicles such as contracted haulage trucks. This list does not include buses or other public transit vehicles, even though they may be owned by the municipality.

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Step 2: Identify the indicators

Indicators are variables that can help you understand the relative energy and emissions performance of vehicles of vehicle groups. Typical indicators will include kilometers travelled and number of vehicles in a vehicle group. Collect and enter data on the indicators into the Spreadsheet if and where available. Recall that it is sufficient to use averages or best estimates where more accurate estimates are not available.

Step 3: Record fuel use for each fuel type

For the appropriate fuel types (Gasoline, Diesel, Propane, Compressed Natural Gas, and Ethanol Blend), identify liters of fuel or GJ consumed and enter fuel consumption in the total use columns. If you have a record of the cost for each vehicle or group of vehicles, enter that information as well.

Step 4: View totals

Your energy totals, cost totals, GHG and AP totals as well as totals per unit indicator will be dictated by your inputs. Each total use input is automatically multiplied by an emission coefficient (sourced in the spreadsheet), and represented in appropriate units.

At the bottom on Workbook 4, you will find three graphs, representing total eCO₂ by source, total cost by source, and gasoline use by vehicle group. You can generate your own graph for other types of fuels as needed. The visuals are programmed to work with tables above. Should you require additional rows to calculate your municipality's emissions, you will have to adjust the data series to modify the chart or pie graph representing the information that you have added. See the Help function in your version of Excel for simple instruction on "making a chart".

Step 5: Insert your comments

Throughout this exercise, you will be making assumptions, calculating averages, performing conversions and aggregating where it makes sense to do so. Documenting your methods and data sources provides a record of your activity on the project, and can help any future users or third party verifiers track down the original sources of information for review purposes. There is a section at the bottom of Workbook 4 for documenting this information.

2.5. Workbook 5: Street and Area Lights

To calculate the energy use and emissions from street lighting and area lighting, you will have to know how many of various kinds of lights your municipality has. The Spreadsheet has been programmed to calculate energy and emission information based on the number of lights you enter. The lights included in these calculations are those leased and/or owned and paid for by the municipality. Typically, Nova Scotia Power provides the electricity in this category and can provide aggregate kWh and cost for the electricity used in street lighting.

Step 1: Identify all lights

There are eight categories of street and area lights typically used by municipalities. These are: Incandescent, Mercury Vapour, Fluorescent, Fluorescent Crosswalk (Continuous Burning), Fluorescent Crosswalk (Photocell Operation), Low Pressure Sodium, High Pressure Sodium, and Metallic Additive. These are further separated into Low Watt and High Watt or Low Number

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of Bulbs and High Number of Bulbs categories (see Workbook 10 for definitions of low watt and high watt lights as well as low number of blubs and high number of bulbs according to NSPI).

Compile a list of all of your municipality's lights and enter the total number of lights in each category in the Indicator column. Your list should include but may not be limited to all road lighting, trail lighting, park lighting, municipally owned cross-walks and signage, traffic lights, specialty or accent lighting, and lights on municipally owned parking lots. Regardless of the use, all lights of the same types can be grouped together in this spreadsheet (for example, if you have 20 low watt incandescent road lights and 10 low watt incandescent parking lot light, you can enter 30 low watt incandescent lights into the appropriate cell.) You may wish to enter a short description to better keep track of lights you have grouped together (for example, you might enter "20 road lights on Main Street, and 10 on City Hall Parking Light, in the example above). Recall that it is sufficient to use averages or best estimates where more accurate estimates are not available.

In you are able to estimate or obtain from NSPI the cost for various categories of lights, enter these in the appropriate column. Otherwise you may just wish to enter the total amount of money you pay to NSPI for lighting in the total column of this Workbook.

Step 2: View totals

This Workbook automatically calculates your energy use and emissions. Your totals, and totals for each indicator will be dictated. Each total use input is automatically multiplied by an emission coefficient (sourced in the Spreadsheet), and represented in the appropriate units.

At the bottom of Workbook 5, you will find three graphs, representing total kWh use by light category, total cost by light category, and total eCO₂ by light category. The visuals are programmed to work with tables above. If you require additional rows to calculate your municipality's emissions, you will have to adjust the data series to modify the chart or pie graph representing the information that you have added. Use the Help function in your version of Excel for simple instruction on "making a chart".

Step 3: Insert your comments

Documenting your assumptions, methods and data sources provides a record of your activity on the project, and can help any future users or third party verifiers track down the original sources of information for review purposes. Enter your comments into the box at the bottom on Workbook 5.

2.6. Workbook 6: Water and Sewage

Corporate energy and emission calculations include all those associated with water and wastewater treatment facilities, where owned or operated by the municipality. Please note that the steps to quantify emissions from your water and sewage systems are nearly identical to the steps to quantify emissions from your buildings.

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Step 1: Compile an inventory of water and sewage facilities and enter it into the spreadsheet

Identify every facility and facility group that you use to operate your water and sewage systems. Categories of facilities that should be included in your inventory are: water treatment, sewage treatment, water pumps, lift stations, and other relevant buildings. Ensure that there is no double-counting between facilities included in this category and your buildings in Workbook 3.

Step 2: Identify the indicators

The most appropriate indicator in this category is likely to be the throughput (water or wastewater treated) at each site for each facility or facility group. Data may be variable, and it is sufficient to use averages where more accurate estimates are not available. Throughput can be presented in units of 1000L.

Step 3: Record your calendar year electricity purchases (in kWh and dollars) from your energy provider for each facility

It can be labour intensive to retrieve this information from within your municipality; if so you can retrieve kWh purchased per calendar year, broken down on a monthly basis by account number, directly from Nova Scotia Power by calling their customer service line at 1-800-428-6230. Have the appropriate account numbers identified for each building. There may be a minimal fee to generate this report.

Step 4: Record your calendar year purchases for others fuels potentially including fuel oil (L), natural gas (GJ), diesel (L), district energy (GJ), and associated costs (dollars) for each facility

Various fuels maybe used in heating or operation waste and water treatment facilities. Select and pursue only those fuels that apply to your municipality.

Fuel oil and diesel - There are multiple providers of fuel oil (popularly referred to as heating oil) in Nova Scotia. You must identify your fuel oil or diesel provider and request a calendar year report on your purchases (in L and dollars) if you do not have this information available within your municipality.

Natural gas - If identifying natural gas purchases from data already available within your municipality proves difficult, you can contact Heritage Gas directly and request a calendar year report on your natural gas purchases, by calling their customer service line at 1-877-836-7247. Have the appropriate account numbers ready.

District energy - District energy is energy created within your municipality at a single utility plant and distributed to other buildings in your municipality. The Spreadsheet makes the assumption that Natural Gas is the fuel used to provide district energy, in which case Heritage Gas should be able to provide this data to you. In cases where the District Heating system salvages steam or heat from an existing plant without using any additional energy, this section can be left blank. If you have a district energy system in place with a different energy source, an updated emissions coefficient and information source will be required.

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Step 5: View totals

Your energy totals, cost totals, GHG and AP emissions totals as well as totals per unit indicator will be dictated by your inputs. Each total use input is automatically multiplied by an emission coefficient (sourced in the spreadsheet), and represented in appropriate units.

At the bottom on Workbook 6, you will find three graphs, representing total eCO₂ by source, total cost by source, and kWh use per facility. The visuals are programmed to work with tables above and will need to be adjusted in additional rows are inserted or if representation of other data is required. You can also create graphs representing other factors. See the Help function in your version of Excel for simple instruction on “making a chart”.

Step 5: Insert your comments

Documenting your assumptions, methods and data sources provides a record of your activity on the project, and can help any future users or third party verifiers track down the original sources of information for review purposes. Enter your comments into the box at the bottom on Workbook 6.

2.7. Workbook 7: Waste

Corporate waste and its associated energy use are calculated based on the waste generated by municipal employees or at municipal facilities. Please note that solid waste management facilities, though they may be corporate entities, are not accounted for in corporate energy and emission quantifications⁴.

For the purposes of this exercise it is assumed that GHG emissions from recycling facilities are insignificant compared to the emissions from landfills. In fact, the major emissions associated with recycling operations will be due to transportation – which should be included in Workbook 4 as part of the municipality’s vehicle fleet. Note that waste haulage trucks and recycling vehicles may be contracted by the municipality (not owned), but should be included in the calculations in Workbook 4 all the same.

Also note that APs are not a major concern from landfills compared to GHG emissions. This Toolkit does not consider AP emissions in the waste category.

Step 1: Identify the indicator

A likely indicator in this category is the number of employees. Enter the number of employees in the appropriate column.

Step 2: Identify all waste generated by municipal operations

This Spreadsheet concentrates only on corporate waste which is waste generated at parks, waste generated at recreation buildings and waste generated at all other municipal facilities and buildings. Typically, the waste generated by municipal operations can be divided into three categories: paper (for example, through office activities), yard trimmings (for example, from

⁴ The decision not to include solid waste management facilities in corporate energy and emission calculations is in keeping with the ICLEI tool.

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mowing of municipally owned lawns including parks) and food scraps (for example, generated from municipal social functions). Preferably, the amount of waste generated from each of these three sources should be entered separately into Workbook 7. You will have to know the composition of waste from your municipal operations to be able to separate these three categories. In cases where this information is not available, a total mixed solid waste amount can be used instead.

Step 3: Identify your landfill type

This Spreadsheet distinguished between two types of landfills: those with landfill gas (methane - CH₄) capture and those without. The emissions from landfills with methane capture are about 75% less than those without methane capture. So it is important to fill out the set of columns in Workbook 7 that correspond to the type of landfill you use to dispose of your municipally generated waste.

Step 4: Insert your comments

Documenting your assumptions, methods and data sources provides a record of your activity on the project, and can help future users and any third party verifiers track down the original sources of information for review purposes. Enter your comments in the space provided at the bottom on Workbook 7.

2.8. Workbook 8: Summary

This Workbook summarizes your corporate spreadsheet by providing you with the overall total costs, total GHG emissions and total AP emissions that your corporate facilities and operations are responsible for. Workbook 8 also includes four visuals. The first two represent total cost and total tonnes of eCO₂ in each sector (Buildings / Vehicle Fleet / Streetlights / Water and Sewage / Waste) and the remaining two represent total cost and total tonnes of eCO₂ by energy type.

2.9. Workbook 9: Conversions

This spreadsheet details unit conversion factors for mass, volume, energy, and others. This is provided as a reference guide and may be required to complete some of your calculations.

2.10. Workbook 10: Emissions Coefficients

This is a list of emissions coefficients and sources of emissions coefficients used in this spreadsheet.