Report

GREENHOUSE GAS EMISSIONS ESTIMATION IN CANADIAN HEALTHCARE SYSTEMS

CASCADES
Climate Action Healthcare + Action climatique soins de santé

SYNERGIE SANTÉ ENVIRONNEMENT

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Canada

Report

GREENHOUSE GAS EMISSIONS ESTIMATION IN CANADIAN HEALTHCARE SYSTEMS

This report provides an overview of how greenhouse gas (GHG) emissions are estimated in healthcare and information on the current state of GHG emissions estimation in healthcare organizations across Canada.

This report is compiled from publicly available sources, and from informational interviews held with experts working in facilities and/or energy management in regional health authorities, integrated (university) health and social services centres (CI(U)SSS) and hospitals across Canada. As well, it is informed by discussions and deliberations held throughout a series of workshops with expert participants from across the country: June 15, 2022; October 3, 2022; November 14, 2022; and December 5, 2022.

Developed by CASCADES in partnership with Synergie Santé Environnement (SSE). SSE received funding from Health Canada to participate in this work.

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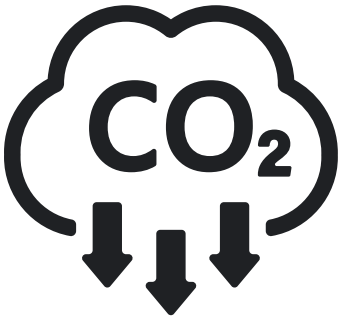
EXECUTIVE SUMMARY

This report is compiled from publicly available sources, and from informational interviews held with experts working in facilities and/or energy management in regional health authorities, integrated (university) health and social services centres (CI(U)SSS), and hospitals across Canada. As well, it is informed by discussions and deliberations held throughout a series of workshops with expert participants from across the country: June 15, 2022; October 3, 2022; November 14, 2022; and December 5, 2022.

This report outlines the importance of estimating greenhouse gas (GHG) emissions in healthcare, provides international examples of GHG estimation activities, and explains different estimation approaches and frameworks. The report presents the current state of reporting requirements in Canada, the types of emissions already being tracked and estimated, and an overview of tracking tools and methodologies used for GHG estimation. The report concludes with opportunities, challenges, and recommendations for future actions.

ESTIMATING GHG EMISSIONS IN HEALTHCARE



Healthcare contributes significantly to climate change, with 4.6% of Canada's national GHG emissions attributable to the healthcare system. Canada has the second highest per capita emissions among the 37 health systems included in the 2022 Lancet Countdown on health and climate change. Climate change has direct and indirect impacts on global health, making it essential to address GHG emissions from healthcare.

In 2021, at COP26, the Canadian government signed on to the World Health Programme, committing to developing sustainable, low carbon health systems and climate resilient health systems. As part of this commitment, a baseline assessment of health system emissions must be conducted and action plans for creating sustainable, low-carbon healthcare systems developed.

Internationally, the National Health Service (NHS) in England and Scotland have committed to achieving net-zero GHG emissions. In the United States, the Office of Climate Change and Health Equity (OCCHE) is responsible for supporting healthcare organizations in reducing their GHG emissions. In France, both the law and an agreement with the healthcare sector support GHG emissions estimation. Canada currently lacks a specific structure for addressing GHG emissions in healthcare.

CURRENT STATE OF HEALTHCARE GHG EMISSIONS ESTIMATION IN CANADA

Federal reporting requirements mandate facilities producing 10,000 tonnes or more CO_2e/year to submit reports on their Scope 1 emissions. Provincial reporting requirements vary, with British Columbia having the most comprehensive approach. Carbon pricing programs exist across all Canadian provinces and territories since 2019.

Responsibility for healthcare varies across organizations and provinces/territories, resulting in substantial variations in emissions estimation and facility coverage across institutions. Through a series of informational interviews, a table of regularly estimated GHG emissions, by source, is included in the report (see Table 3). Energy-related emissions (stationary combustion, purchased electricity, purchased heating/cooling) are regularly tracked using robust activity data and emissions factors are assigned. There is more variation in the consistent tracking and estimating of other sources of GHG emissions.

Some Canadian healthcare organizations, such as the Centre intégré de santé et de services sociaux de Laval, a British Columbia hospital, and the Children's Hospital of Eastern Ontario produced more detailed inventories of their emissions.

A variety of different tracking tools, like ENERGY STAR® Portfolio Manager, RETScreen Clean Energy Management Software, personalized Excel spreadsheets, or government and vendor-supplied software are being used in GHG emissions estimation, each with its own advantages and disadvantages.

OPPORTUNITIES, CHALLENGES AND NEXT STEPS

Currently, on-site fuel combustion emissions and associated Scope 2 emissions are regularly tracked using robust activity data at multiple healthcare organizations across the country. A survey of pan-Canadian working group members identified other sources of emissions that may be most ready for regular estimation. These are outlined in Section 3 (Opportunities to expand GHG emissions estimation) and include:

- anesthetic gases and nitrous oxide
- fuel use for owned/leased vehicles
- metred dose inhalers
- business travel
- waste
- purchased paper

Recommendations for federal, national and provincial action include expanding data sources, leveraging standards and procurement policies and federal action to support research funding, capacity building, and the maintenance of a pan-Canadian community of practice.

Methodological recommendations include conducting GHG emissions estimates at the provincial/territorial level, prioritizing readily available emissions sources for regular estimation, and considering other environmental impact metrics.

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PART 1 – ESTIMATING GHG EMISSIONS IN HEALTHCARE

INTERNATIONAL INTEREST AND ACTION

Climate change is a threat to health, as the 2022 report of the Lancet Countdown on Health and Climate Change makes clear:

"Climate change is affecting the health of people worldwide directly with increased exposure to extreme weather, and indirectly with impacts on the physical, natural, and social systems on which health depends" (1).

HEALTHCARE'S CARBON FOOTPRINT

Healthcare is a significant contributor to climate change. An estimated 5.2% of global greenhouse gas (GHG) emissions are attributable to healthcare systems (1). In Canada, healthcare accounts for an estimated 4.6% of national GHG emissions (2), with the second highest per capita emissions of the 37 health systems included in the Lancet Countdown (1).

GLOBAL ACTION

Attention to healthcare's role in climate change has been growing globally. In November 2021, a Health Programme, now known as the Alliance for Transformative Action on Climate and Health (ATACH), was introduced at COP26 with the intent to support countries in developing climate resilient and sustainable, low carbon health systems (3). As of April 2023, 58 countries have committed to delivering sustainable low carbon health systems; 63 have committed to developing climate resilient health systems, of which 21 have identified a target date to achieve net zero (4). The Canadian government committed to deliver both climate resilient and sustainable low carbon health systems but did not identify a net zero target date.

Global action continues. At COP27, in Egypt (November 2022), the US Department of Health and Human Services and NHS England announced a plan to collaborate on sustainable procurement, with a goal of aligning requirements as much as possible by COP28 (5). As well, the ATACH initiative has launched four working groups, to address financing, climate resilience, low carbon healthcare, and supply chains.

PATHWAYS TO GHG EMISSIONS ESTIMATION IN HEALTHCARE

TOP-DOWN AND BOTTOM-UP MODELLING

There are two broad approaches to estimating the environmental impacts of healthcare, including, but not limited to, GHG emissions: top-down and bottom-up. Hybrid approaches use a combination of top-down and bottom-up estimates.

Top-down approaches use financial activity data to estimate emissions from a healthcare system. Specifically, GHG emissions are estimated from the amount of money spent to purchase goods and services from various sectors, using environmentally extended economic input-output analysis. Top-down modelling offers a high-level estimation of healthcare emissions, which can identify hotspots and support efforts to develop overarching strategies to reduce emissions. However, because top-down models use averages based on spending across whole economic sectors, they do not provide detailed information on the emissions attributable to specific goods and services used in healthcare (7).

Bottom-up approaches can provide detailed quantitative estimates of the emissions of a product or a process over its life cycle (i.e., including raw material extraction and processing, manufacturing, assembly, use, and end-of-life) (7) which are calculated using activity data and associated emissions factors (8,9). Environmental life cycle assessment (LCA) is an internationally standardized methodology for conducting a systematic analysis of environmental impacts over the entire life cycle of a product, material, process, or other measurable activity. LCA allows comparison between different products or clinical procedures that perform similar functions (7). As with top-down approaches, the methodology is used in many industries and is not specific to healthcare.

Unlike top-down modelling, bottom-up modelling provides granular information that can be used to inform specific emissions reductions strategies. However, the collection of information for bottom-up modelling is time consuming.

The complexity of health systems and their supply chains means that a combination of top-down and bottom-up modelling approaches will be needed to estimate overall emissions (10). Evidence on the environmental impact of healthcare services, procedures, and products is growing (see HealthcareLCA for a repository of such information) (11), and researchers are devising new approaches to more accurately quantify healthcare emissions (e.g., by estimating GHG emissions for a random sample of purchased goods and services) (12). Yet limitations in evidence remain, including concerns about data quality given the inconsistencies in how environmental impacts in healthcare are estimated (13).

FRAMEWORKS AND METHODS

Several frameworks and methods for estimating and reporting organizational GHG emissions exist, including the Greenhouse Gas Protocol, International Organization for Standardization (ISO) 14064 and ISO 14069-2013, and the Bilan Carbone method, among others.

HealthcareLCA is a global living database of environmental impact assessments. Supported by CASCADES, the database is designed to provide an open-access, interactive, and up-to-date evidence resource for healthcare workers, sustainability researchers, and policy makers. In addition to global warming potential, the HealthcareLCA database includes data sources on a range of environmental impact categories, including eutrophication potential, ozone depletion potential, acidification potential, and others.

The **Greenhouse Gas Protocol (GHGP)** is a widely used international accounting and reporting standard for categorizing and estimating organizational GHG emissions. The GHGP consists of several separate but complementary standards, notably the Corporate Accounting and Reporting Standard and the Corporate Value Chain (Scope 3) Standard. The GHGP is used to track a company or organization's emissions over time, rather than for comparison between companies or organizations. The GHGP is not specific to healthcare and allows different methods to be used to collect data.

The GHGP categorizes emissions into **three Scopes** to capture different types of directly and indirectly controlled emissions. Emissions are also classified as "upstream" or "downstream". Upstream emissions are indirect emissions related to purchased or acquired goods and services. Downstream emissions are indirect emissions that occur after goods and services have left the control of the organization (10). This categorization scheme also informs the Bilan Carbone and ISO 14064 methodologies. For the purposes of this report, CASCADES has used the Greenhouse Gas Protocol as a framework for categorizing healthcare's emissions (Figure 1).

Scope 1	Direct GHG emissions from sources that are owned or controlled by the organization. These emissions include stationary combustion (e.g., boilers, furnaces), mobile combustion (e.g., owned/controlled vehicles) and fugitive emissions (e.g., refrigerant leaks from air conditioning units). In healthcare, this also includes anesthetic and medical gases.
Scope 2	Indirect emissions occurring from the generation of electricity, steam, heating water or chilled water purchased and consumed by the organization. These emissions are upstream activities – they relate to purchased goods and services.
Scope 3	Emissions that are unaccounted for in Scopes 1 and 2 are the consequence of the activities of the organization but are from sources not owned or controlled by the organization (based on the defined organizational boundaries). These emissions are those that arise as part of the value chain. Some of these emissions are upstream and some are downstream.

ISO 14064 is a three-part international standard created by the International Organization for Standardization in 2006. It provides minimum requirements for GHG inventories and a basic structure for independent auditing. It is not healthcare specific and uses a site and product/service approach to data collection that is highly detailed (14). In support of this, four other standards have been developed: ISO-14065[1] for the validation of GHG assertions for accreditation purposes; ISO 14066[2] which specifies requirements for GHG validation teams; ISO 14067[3] which provides a framework for GHG emissions estimation for products; and ISO 14069[4] for the quantification of GHG emissions for organizations.

Bilan Carbone (15) is an environmental management method, not specific to healthcare, developed in France by ADEME and the Bilan Carbone Association. It includes emissions accounting for all of an organization's activities, including both direct and indirect emissions. It includes a framework and supporting tools. The vision of this approach is emissions reduction that must be based on a preliminary measurement corresponding to the ISO 14064 profile.

➔ The Bilan Carbone approach is divided into five steps:

1. Pilot and objectives definition
2. Definition of reporting parameters (organizational, operational, and temporal)
3. Data collection and processing
4. Development of action plans for reduction
5. Process synthesis, including an emissions report and an improvement report

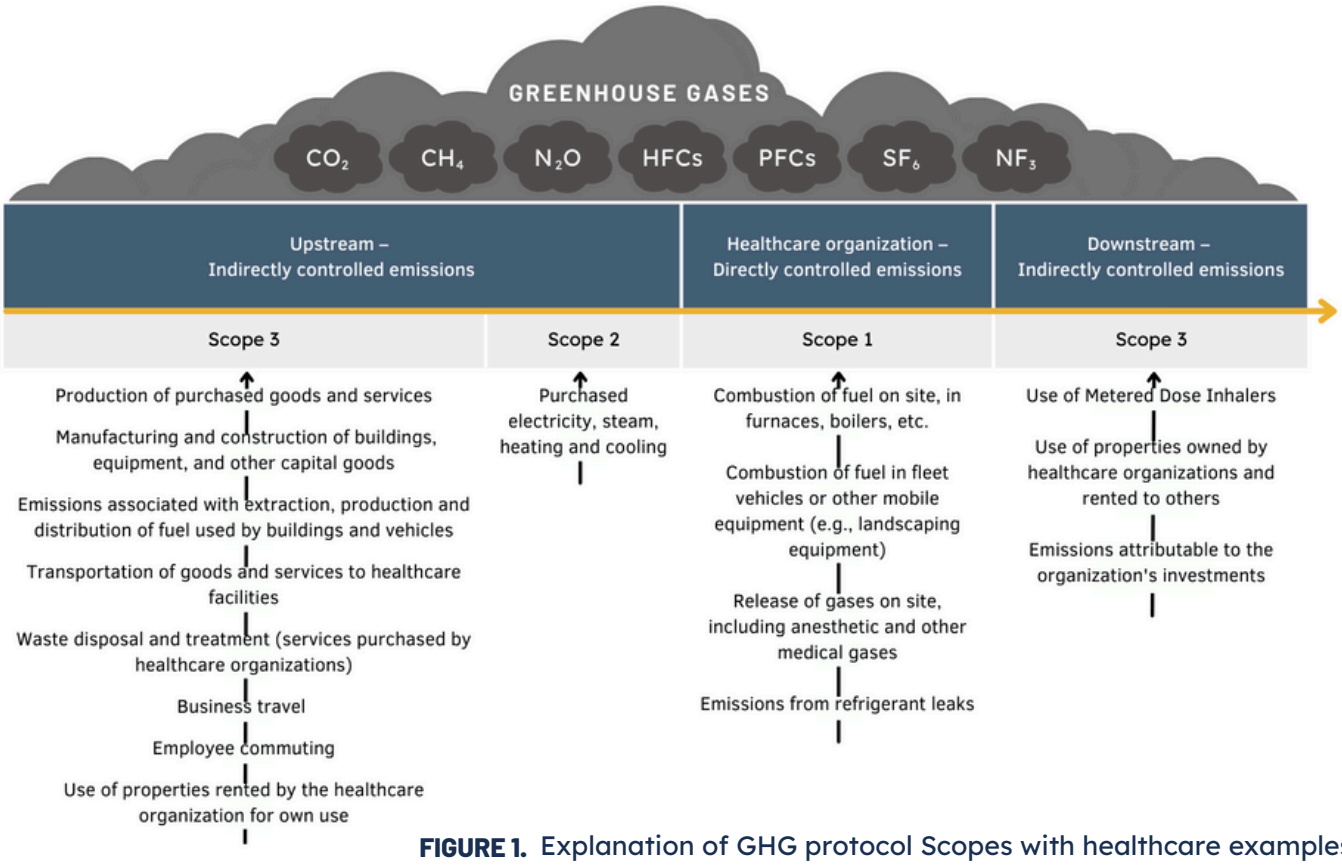


FIGURE 1. Explanation of GHG protocol Scopes with healthcare examples

1. ISO 14065: 2020: General principles and requirements for bodies performing validation and verification of environmental information statements https://www.iso.org/standard/74257.html
2. ISO 14066:2011: Greenhouse gases https://www.iso.org/standard/43277.html
3. ISO 14067:2018: Greenhouse gases – carbon footprint of products https://www.iso.org/standard/71206.html
4. ISO 14069:2013: Greenhouse gases https://www.iso.org/standard/43280.html

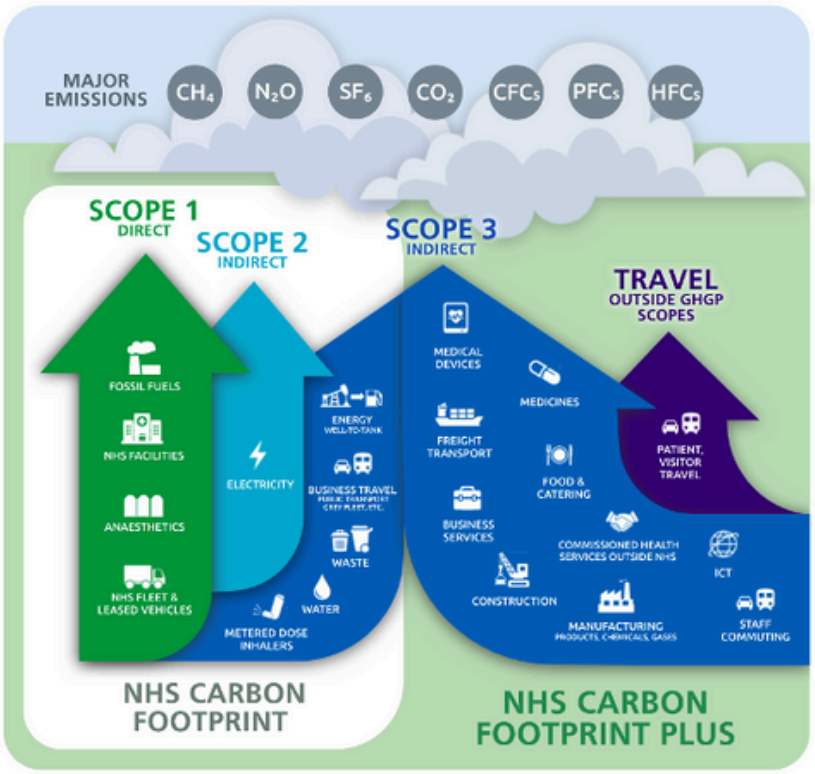
HOW HEALTH SYSTEMS IN OTHER COUNTRIES ADDRESS HEALTHCARE'S GHG EMISSIONS

A growing number of countries are working to estimate and reduce GHG emissions from the health sector, of which 21 have identified a target date to achieve net zero (4). We review a small sample of such national efforts here:

NATIONAL HEALTH SERVICE (NHS) ENGLAND

NHS England has identified a trajectory to achieve net-zero carbon emissions.

- By 2040, NHS England will achieve net-zero for the "NHS Carbon Footprint," which includes all Scope 1 emissions (including anesthetic gases), all Scope 2 emissions, and some Scope 3 emissions (including Scope 3 energy emissions, metered-dose inhalers, waste, water, and business travel) over which the NHS has greater control.
- By 2045, NHS England will achieve net zero for the "NHS Carbon Footprint Plus," which includes other Scope 3 emissions (e.g., from the production of pharmaceuticals and medical devices, food and catering, and staff commuting) along with patient and visitor travel, which the NHS considers to be beyond Scope 3, as defined by the GHGP.



Source: National Health Services – England. (2022). Delivering a "Net Zero" National Health Service. London. p.12

The NHS has been tracking and reporting its carbon footprint since 2008, initially through the Sustainable Development Unit (10). The Greener NHS programme, established in 2019, has created centralized capacity to support GHG emissions estimation and decarbonization planning for the health service as a whole. In July 2022, the Health and Care Act was revised to embed net zero into legislation; in practice, this means that all relevant NHS organizations now have a "Green Plan" that outlines their strategy to reduce their emissions locally, and all have a board-level "net-zero" lead (16).

The NHS combines two established methods to calculate health system emissions using a "hybrid" approach (10, 16):

"Top-down" modelling for comprehensive whole-system estimates:

- GHG emissions for the NHS as a whole are determined using top-down environmentally-extended input-output modelling. The NHS model uses the same input-output model that is used to calculate the UK's national consumption emissions (17). Commissioned health services, business travel, and the NHS supply chain emissions are calculated using top-down modelling (16).

"Bottom-up" modelling for precise estimates associated with specific activities:

- Bottom-up activity data (electricity used, kilometres driven, etc.) are collected to support efforts to monitor the impacts of interventions and verify progress. Staff commuting, patient and visitor travel, NHS fleet vehicle mileage, anesthetic gas use, MDI prescriptions, and building energy use are calculated using bottom-up data (16). Where emissions can be calculated using bottom-up data, the related expenditure is eliminated from the top-down model to avoid double-counting emissions. Bottom-up data is also used to calculate emissions at sub-national levels. The NHS aims to continually increase the volume of bottom-up data used in the hybrid model over time, by identifying and integrating other NHS data sources and by establishing new national data collections.

NHS SCOTLAND

NHS Scotland has also been working on decarbonization efforts. Released in 2022 by the Cabinet Secretary for Health and Social Care, the NHS Scotland climate emergency and sustainability strategy: 2022-2026 has five areas of focus:

- Sustainable buildings and land
- Sustainable travel
- Sustainable goods and services
- Sustainable care
- Sustainable communities

Since November 2022, Health Boards, which plan, commission, and deliver NHS services (18), are required to report annually on sustainability progress using the National Sustainability Assessment Tool developed by NHS Scotland.

Like NHS England, NHS Scotland is aiming to have net-zero emissions by 2040 for the following sources of emissions (19, p. 19):

- Building fossil-fuel energy use
- Owned and leased fleet fuel use
- Fluorinated gases and anaesthetic gases
- Purchased energy use (electricity, heat, steam)
- Energy transmission and distribution
- Waste
- Water consumption
- Waste water treatment
- Business travel, including the use of grey fleet[5]

NHS Scotland also aims to achieve net zero by 2045 for the sources of emissions that they can influence but not directly control:

- Supply chain
- Staff commuting
- Patient and visitor travel

NHS Scotland has data sources of varying completeness and quality on these emissions sources, as outlined in Appendix B of the climate emergency and sustainability strategy. The most robust activity data are building emissions (combustion by fuel type), medical gases, and dispensed metered-dose inhalers. Some activity data exists for waste, fleet emissions, and staff, patient, and visitor travel. No activity data are available for business travel.

UNITED STATES

The US Department of Health and Human Services (HHS) established the Office of Climate Change and Health Equity (OCCHE) in 2021. OCCHE is responsible for implementing the commitments made as part of ATACH. To support healthcare organizations in reaching their GHG emission reduction commitments, the OCCHE has produced a compendium of federal resources. This includes, "A Primer on Measures and Actions for Healthcare Organizations to Mitigate Climate Change" developed by the Agency for Healthcare Research and Quality in partnership with the Institute for Healthcare Improvement. The primer offers guidance on high-priority measures and strategies for healthcare organizations to reduce their carbon footprint.

Concurrently, the National Academy of Medicine (NAM) launched the Action Collaborative on Decarbonizing the U.S. Health Sector the federal government, medical industries, hospital systems, private payers, and health professions. It "aims to develop and implement a shared action plan for decarbonizing the health sector and strengthening its sustainability and resiliency" (20).

5. "Grey fleet" refers to the use of private vehicles for business travel

On Earth Day, 2022 the White House/HHS Health Sector Climate Pledge was issued to encourage private healthcare providers to match the commitments made by the federal government, including federal health systems (Indian Health Service, Veterans Health Administration, and Military Health System) (21), to reduce GHG emissions in federal operations and to lead by example in order to achieve net-zero emissions economy-wide by 2050 (22). The pledge is a voluntary commitment to climate resilience and emissions reductions and includes cutting greenhouse gas emissions by 50% by 2030 and achieving net-zero emissions by 2050. The pledge also requires an inventory of Scope 3 emissions by the end of 2024. Over 100 organizations have signed up (21).

FRANCE

Following national deliberations over environmental policy that were codified through the Grenelle Act (2009) (23), the health sector committed to measure and improve its sustainable development performance in 2009 by signing the "Convention portant les engagements mutuels dans le cadre du Grenelle de l'environnement avec les fédérations hospitalières" (Agreement on mutual commitments within the framework of the Grenelle Environment Forum) (24) bringing together the hospital federations, the Ministry of Ecology, the Ministry of Health, and the French Agency for the Environment and Energy Management (ADEME). In addition, the law on the energy transition for green growth (LTECV) (25), encourages the implementation of measures to mitigate GHG emissions and adapt to climate change.

Since December 31, 2012, Article 75 of the Grenelle 2 law (26) requires GHG emission assessments every three years for public establishments with more than 250 employees and private establishments with more than 500 employees, which in 2019 covered 956 health and social services establishments. These reports, supported by the Decree on greenhouse gas emissions (BEGES), must include Scope 1, 2 and 3 emissions since July 2022 (27).

In support of this legal article, the healthcare-specific guide "Carrying out a greenhouse gas emissions assessment for medico-social establishments" (28) was published in 2013 and updated in 2019 based on the GHG protocol, ISO-14064, and Bilan Carbone methods. In May 2023, the French government published the roadmap “Ecological Planning of the Healthcare System”, announcing the creation of a steering committee and time-bound objectives to reduce the environmental impact of the French healthcare sector (29).

PART 2 – CURRENT STATE OF HEALTHCARE GHG EMISSIONS ESTIMATION IN CANADA

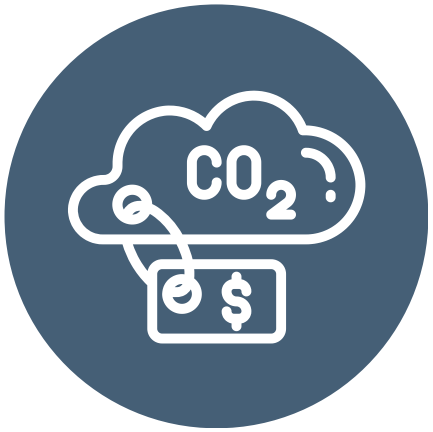
CURRENT STATE OF GHG EMISSIONS REPORTING OR PRICING REQUIREMENTS: APPLICATION TO HEALTHCARE

There are a range of provincial/territorial and federal requirements for reporting and pricing GHG emissions that affect the healthcare sector. Depending on where they are in the country, healthcare organizations are affected by these requirements in three possible ways:

- **As major emitters of Scope 1 emissions:** Some healthcare organizations are large emitters of Scope 1 emissions and thus may be affected by federal and/or provincial reporting requirements.
- **As broader public sector entities:** In some provinces, healthcare organizations are required to report (and in BC, to pay for) a range of GHG emissions (typically energy-associated) by virtue of their status as broader public sector entities.
- **As consumers of fossil fuels:** All healthcare organizations are affected by federal or provincial surcharges on fossil fuels.

PAN-CANADIAN CARBON PRICING

The federal government's Greenhouse Gas Pollution Pricing Act was enacted in 2018. Since 2019, every Canadian province and territory has a carbon pricing program in place – either their own or by using the federal program as a "backstop". Thus, there is some variation in carbon pricing systems across Canada, but the federal government sets the minimum standards that every jurisdiction must meet (30).



Federally, the pricing system has two parts: the fuel charge on fossil fuels, charged to the consumer, and the Output-Based Pricing System (OBPS), targeted at large industrial emitters (30).

The threshold for participating in the federal OBPS is 50,000 tonnes of CO_2e (27) emitted per year (Scope 1 emissions) (31), which applies to jurisdictions under the federal backstop program (MB, PE, YT, NU). The federal OBPS has limited implications for healthcare facilities because of the high reporting threshold and focus on "emissions-intensive, trade-exposed industries" (32); as of December 31, 2020, 250 facilities were registered under the OBPS (32). The other provinces and territories have their own pricing systems (with emissions thresholds ranging from 10,000 to 100,000 tonnes CO_2e/year). As with the federal backstop, the focus of these provincial and territorial regulations is Scope 1 emissions emitted by specific facilities.

The federal fuel charge applies to natural gas, gasoline, fuel oil and other fossil fuels at varying rates (33). As of July 2023, Ontario, Manitoba, Saskatchewan, Alberta, New Brunswick, Newfoundland and Labrador, Nova Scotia, Yukon and Nunavut follow the federal fuel charge. The carbon pollution pricing systems in Quebec, Northwest Territories, and British Columbia meet the federal benchmarks on fuel charges (34). This cost is included in the price of the fuel and is therefore passed on to the purchaser of the fuel, which could include healthcare organizations or facilities. This may be an incentive to reduce consumption of the fossil fuel in question.

FEDERAL REPORTING REQUIREMENTS – HIGH EMISSION FACILITIES:

In addition to a pan-Canadian carbon pricing program, the federal government has a separate and longstanding GHG reporting program. The Canadian Greenhouse Gas Reporting Program (GGRP) requires facilities that produce 10,000 tonnes or more CO_2e/year to submit a report on their Scope 1 emissions. In 2017, the threshold for reporting was lowered from 50,000 tonnes CO_2e to 10,000 tonnes CO_2e. This saw an increase in the number of facilities reporting under the GGRP, including hospitals (35). An interactive map of facilities that have reported their GHG emissions is available here.

PROVINCIAL REPORTING REQUIREMENTS – HIGH EMISSION FACILITIES:

Some provinces require that emitters over a certain threshold of CO_2e/year report those emissions to the provincial government (verification requirements may occur at higher thresholds). Some healthcare facilities may report under these regulations (see Table 1).

PROVINCIAL REPORTING & PRICING REQUIREMENTS – PUBLIC & BROADER PUBLIC SECTOR:

Some provinces and territories have reporting requirements for public and broader public sector entities, typically including government departments, municipalities, post-secondary educational institutions, and healthcare organizations. These requirements include energy-related emissions, both produced on-site and purchased.

British Columbia has the most comprehensive approach to GHG emissions management for the public and broader public sector, which includes both reporting and pricing. The Carbon Neutral Government Regulation includes a price on carbon and extends GHG emissions tracking beyond energy (36). Since 2010, health authorities, along with all public sector organizations, have been creating Climate Change Accountability Reports (CCAR), which summarize GHG emissions from stationary fuel combustion, purchased energy, and supplies (e.g., paper) (37) and offsets used to reach net-zero emissions. Detailed reporting on targets and progress are found in both the CCARs and the voluntary annual Environmental Performance Accountability Reports. All health authorities have targets to reduce absolute GHG emissions by 50% below 2007 levels by 2030.

TABLE 1. Provincial/territorial greenhouse gas reporting requirements

PROVINCE/ TERRITORY	PROVINCIAL REPORTING REQUIREMENTS		PUBLIC AND BROADER PUBLIC SECTOR REPORTING (NO THRESHOLD)
	Regulation	Threshold	
Alberta	Specified Gas Reporting Regulation	10,000 tonnes CO_2e	No
British Columbia	Greenhouse Gas Emission Reporting Regulation	10,000 tonnes CO_2e	Yes[6]
Manitoba	N/A	N/A	No[7]
New Brunswick	N/A	N/A	No[8]
Newfoundland and Labrador	Management of Greenhouse Gas Regulations	15,000 tonnes CO_2e	No
Northwest Territories	N/A	N/A	No
Nova Scotia	N/A	N/A	No
Nunavut	N/A	N/A	N/A
Ontario	Greenhouse Gas Emissions: Quantification, Reporting and Verification Regulation	10,000 tonnes CO_2e	Yes[9]
Prince Edward Island	N/A	N/A	No
Québec	Règlement sur la déclaration obligatoire de certaines émissions de contaminants dans l'atmosphère	10,000 tonnes CO_2e	No
Saskatchewan	Management and Reduction of Greenhouse Gases (Reporting and General)	10,000 tonnes CO_2e	No
Yukon	N/A	N/A	No[10]

6. Carbon Neutral Government Regulation
7. The Low Carbon Government Office was established in 2018 (with the passing of the Climate and Green Plan Implementation Act) and must track and record the GHG emissions from all government departments and prescribed government agencies on an annual basis (38).
8. The New Brunswick's Climate Change Action Plan requires all Government of New Brunswick owned facilities to report on GHG emissions (see section 2.9). Service New Brunswick has completed the creation of a government-wide energy management tracking and reporting system using ENERGY STAR Portfolio Manager, which allows for reporting in GHG emissions, See Action 113: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Climate-Climatiques/nb-climate-change-action-plan-progress-report-2022-detailed-summary.pdf
9. Regulation 507/18: Public Sector Energy Reporting and Conservation and Demand Management Plans covers the following prescribed public agencies: every municipality, every municipal service board, every post-secondary educational institution, every public hospital, and every school board (39).
10. Emissions from the Yukon Hospital Corporation are included in the Government of Yukon greenhouse gas reporting.

WHAT TYPES OF EMISSIONS ARE BEING ESTIMATED IN CANADIAN HEALTHCARE SETTINGS?

Given differences in provincial and territorial GHG reporting and pricing requirements, and in health system organization, responsibility for healthcare emissions' estimation differs across the country. In some provinces[11], GHG tracking efforts are province-wide, while in others, work is regional or conducted by independent hospital corporations. The types of GHG emissions tracked also varies. Individuals from health systems across nine provinces were interviewed to develop an overview of the state of GHG emissions tracking at their institutions (see Table 2).

TABLE 2 . Overview of healthcare organizations and facilities

PROVINCE	HEALTHCARE ORGANIZATION INTERVIEWED	FACILITIES WITH TRACKED EMISSIONS
British Columbia Five regional health authorities are responsible for hospital-based care, home and community care, publicly-owned long term care homes, and support to primary care networks CASCADES sought information from the Lower Mainland authorities via the Energy and Environmental Sustainability team.	The Energy and Environmental Sustainability team, a collaboration team created to ensure a regional approach to climate resilient and environmentally sustainable care for the Lower Mainland. It comprises: • Fraser Health • Providence Health Care • Provincial Health Services Authority • Vancouver Coastal Health	Owned and leased buildings managed by the health organization: • Fraser Health: 174 buildings • PHC: 45 buildings • PHSA: 78 buildings • VCH: 184 buildings Note that the Carbon Neutral Government Regulation requires emissions be tracked for all public sector organizations.
Alberta Alberta Health Services (AHS) is responsible for delivering publicly funded healthcare. It is divided into 5 management zones, comprised of 405 facilities, including hospitals, long term care, Emergency Medical Services, and public health.	AHS Office of Sustainability and Energy Management	Facilities that are owned and operated by AHS
Manitoba Five regional health authorities are responsible for hospital-based care, home and community care, publicly-owned long term care homes, and support to primary care.	Shared Health MB, supporting the five Regional Health Authorities	Over 200 hospitals, clinics, nursing stations
Ontario Healthcare in Ontario is provided through multiple independent organizations, including hospital corporations (some of which house primary care clinics, or own and operate long term care facilities), primary care clinics, long term care facilities, community service agencies, and other clinics and facilities. CASCADES sought information from a selection of large hospital corporations (there are several hundred in the province)	London Health Sciences Centre	2 campuses: University Hospital (2 buildings), Victoria Hospital (~20 buildings), a mix of healthcare facilities and administrative space
	The Ottawa Hospital	3 campuses: Civic Campus, General Campus (houses CHEO and U Ottawa medical campus) provides acute and emergency care services. The Riverside Campus provides outpatient services
	Sunnybrook Health Sciences Centre	Bayview Campus provides acute care, long term care, research facilities, Holland Orthopedic Hospital, St. John's Rehab hospital, Pine Villa transitional care site

11. The information in this section is based on informational interviews. CASCADES attempted to speak with employees from healthcare organizations in as many jurisdictions as possible, however, interviews were not held with representatives of healthcare organizations in every province or territory. Table 2 provides an overview of the healthcare organizations that participated in informational interviews. CASCADES hopes to expand this work through the continuation of a Community of Practice.

TABLE 2 (CONTINUED). Overview of healthcare organizations and facilities

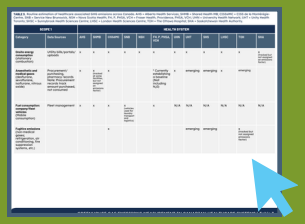
PROVINCE	HEALTHCARE ORGANIZATION INTERVIEWED	FACILITIES WITH TRACKED EMISSIONS
Ontario (continued)	University Health Network	12 buildings including, hospitals, research towers, education and other buildings
	Unity Health Toronto	3 sites: St. Joseph's Health Centre (acute care), St. Michael's Hospital (acute care), Providence Healthcare (rehabilitation services & long-term care)
Québec Healthcare is provided by Réseau de la santé du Québec, made up of: • 13 CISSS (Integrated Health and Social Services Centres) • 9 CIUSSS (Integrated University Health and Social Services Centres) • 7 CHUs (University Hospital Centres) that provide highly specialized services within and beyond their regional borders • 5 Health Centres providing services to northern regions and First Nations CASCADES sought information from a selection of large CISSS/CIUSS.	CIUSSS-Centre-Sud-de-l'île-de-Montréal One of 9 CIUSSS responsible for hospital-based care, rehabilitation centres, publicly-owned residential care centres, outpatient services, family medicine groups and primary care services offered by CLSCs (local community service centres)	• 43 buildings for energy • 36 facilities for waste • Some rehabilitation centers • Some hospitals • Some local community health and social services centers • Some nursing homes • Some activity centers • Some youth centers
	CISSS de la Montérégie-Centre One of 13 CISSSs responsible for hospital-based care, rehabilitation centres, publicly-owned residential care centres, outpatient services, family medicine groups and primary care services offered by CLSCs (local community service centres)	34 sites owned or leased by the CIUSSS: • 2 hospitals • 8 clinics • 6 various specialty services and/or administration buildings • 8 ambulatory services • 10 long term care homes
	CISSS-de-Laval One of 13 CISSSs responsible for hospital-based care, rehabilitation centres, publicly-owned residential care centres, outpatient services, family medicine groups and primary care services offered by CLSCs (local community service centres)	• 1 hospital • 1 nursing home • 1 local community health and social services center • 1 youth rehabilitation center • 1 rehabilitation service • 1 youth re-education home
New Brunswick Two health networks, Horizon Health Network and Réseau de santé Vitalité, are responsible for hospital-based care, home and community care, publicly-owned long-term care homes and support to primary care	Service New Brunswick supports provincial GHG emissions reporting from the public sector, including healthcare	Facilities owned and operated by the health networks: • Horizon – 41 owned facilities and over 100 operated facilities • Vitalité – 23 owned facilities and over 40 operated facilities
Nova Scotia Two health authorities (Nova Scotia Health and the IWK Health Centre) are responsible for hospital-based care, home and community care, publicly-owned long term care homes, and support to primary care	Nova Scotia Health	45 hospitals and community health centres and a number of smaller sites
Saskatchewan The Saskatchewan Health Authority is responsible for hospital-based care, publicly owned long term care homes, and some primary health care.	Saskatchewan Health Authority	Tracking onsite energy consumption, purchased electricity and purchased steam for 300 facilities including hospitals, primary health care clinics, long term care facilities and laboratories. GHG emissions are not currently being estimated.

FURTHER GHG EMISSIONS ESTIMATION WORK DONE IN EXAMPLE ORGANIZATIONS

Outside of the routine estimation described in Table 3 (linked supplement), some Canadian healthcare organizations have conducted more detailed inventories of their emissions across the three Scopes of the GHG Protocol.

TABLE 3:
ROUTINE ESTIMATION OF HEALTHCARE ASSOCIATED GHG EMISSIONS ACROSS CANADA

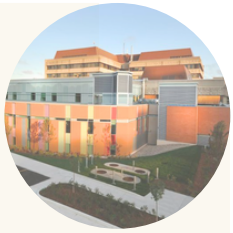
Linked supplement



CENTRE INTÉGRÉ DE SANTÉ ET DE SERVICES SOCIAUX DE LAVAL: Using the Bilan Carbone method and adapting parameters and emissions factors to the reality of the Quebec healthcare system (e.g., adding anesthetic gases, pharmaceuticals, patient travel and hazardous waste treatment), the CISSS de Laval did a comprehensive Scopes 1, 2 and 3 GHG inventory. Emissions from 7 sites were quantified, representing the different activities undertaken by the CISSS. The results were then extrapolated to estimate the emissions of the entire organization. This exercise revealed that 90% of CISSS de Laval's GHG emissions are Scope 3 emissions, with medical purchases (medicines, medical devices and anesthetic gases) and travel (business travel and employee commuting) accounting for 34% each (40).

A BRITISH COLUMBIA HOSPITAL: An organizational life cycle assessment (O-LCA) was conducted on a 40 bed hospital in British Columbia. This work was conducted by Alexander Cimprich and colleagues as part of the completion of a PhD thesis at the University of Waterloo (12). An O-LCA uses the methods of an LCA, scaled to assess the environmental impact of an organization's emissions over a specified time and includes direct and indirect emissions (12). In addition to GHG emissions, the O-LCA also considers other environmental impacts including acidification potential, smog formation potential, respiratory effects, ozone depletion potential, eutrophication potential, human toxicity (carcinogenic), human toxicity (non-carcinogenic), ecotoxicity and fossil fuel depletion.

This work highlighted energy and water use as large contributors to facility emissions, despite the facility being located in an area with a low-carbon electrical grid. The purchase of products was also a major contributor to GHG emissions and other impact categories. The O-LCA used bottom-up data for a sampling of the unique products purchased by the hospital by conducting a process LCA for approximately 200 products, representing different categories. Patient transportation, the transportation of goods, as well as solid waste treatment were not found to be significant contributors to GHG emissions or other environmental impact categories.



CHILDREN'S HOSPITAL OF EASTERN ONTARIO (CHEO): In 2021, CHEO announced its Kick the Carbon strategy, with targets to reduce operational (scope 1 and 2) carbon emissions by 5% each year, using 2018 as the baseline (41). Using the O-LCA methodology described above, in collaboration with University of Waterloo faculty, CHEO calculated their carbon footprint. This process used emissions factors from another hospital with CHEO-specific financial data. They found that the majority of emissions were indirect, from procurement and services. Combined drug and medical products emission made up ~25% of their total carbon footprint (41). Since launching this program CHEO has delivered over a 20% reduction in operational emissions and saved their hospital over $400k annually through 1) improving the efficiency of CHEOs heating/cooling (removing redundancies, automating optimization & adjusting airflow by demand), 2) Strategic timing of CHEOs heating/cooling to avoid buying electricity during peak times (when energy is more carbon intensive), and 3) installing smart LED lights with auto shutoff.

SYNERGIE SANTÉ ENVIRONNEMENT: SSE is leading an innovative pilot project with the support of the Canadian Association of Physicians for the Environment and funding from the Trottier Family Foundation. The aim of this 3-year pilot project is to work with 10 to 15 health and social service establishments in the Greater Montréal area to develop a common methodology to conduct Scopes 1, 2 and 3 carbon assessments, using common emission factors. In the first year, most of the facilities will conduct their first carbon footprints, and work with SSE specialists to identify concrete reduction targets for each emission category, to be included in their sustainable development action plans. Over a period of 12 to 18 months, the establishments will implement these actions, and in year 3, they will carry out a second carbon footprint to track the evolution of their GHG emissions. At the end of the 3 years, SSE's aim is for participating establishments to be autonomous in carrying out their assessments, and for a common methodology to be in place to enable establishments to compare themselves, but above all to ensure positive comparison between them.

TOOLS USED IN GHG EMISSIONS' ESTIMATION

Healthcare organizations in Canada use a variety of tools to track their emissions (Table 4). In Canada, two tools that are made available from Natural Resources Canada (NRCan) are commonly used by healthcare organizations: ENERGY STAR® Portfolio Manager® and RETScreen.

ENERGY STAR® Portfolio Manager® is a web-based energy management and benchmarking tool for any type of building (and is therefore not healthcare-specific), however, only eligible building types get ENERGY STAR scored for ENERGY STAR certification. In Canada, it is provided free of charge through NRCan. This tool can be used to track on-site fuel combustion (Scope 1) as well as emissions from purchased electricity, district steam, district hot water or district chilled water (Scope 2) and the production of fuel used for heating and cooling (Scope 2). Portfolio Manager uses Canadian emissions factors to determine GHG emissions from facilities. Portfolio Manager does not currently measure Scope 3 emissions.

RETScreen Clean Energy Management Software was developed and made available by NRCan. A free version is available in viewer mode along with a professional version available through paid annual subscription. It enables low-carbon planning, implementation, monitoring and reporting and can be integrated with Portfolio Manager. RETScreen can be used for energy feasibility, performance and GHG emissions analysis of new builds, retrofits, and renewable energy technologies.

Some healthcare organizations have created their own tracking tools using spreadsheets. This allows for flexibility but increases the risk of data entry errors and requires users to find emissions factors. In addition to the tools mentioned above, tools created by third party vendors are also becoming more common.

TABLE 4. GHG emissions tracking tools used in Canadian healthcare organizations

TRACKING TOOLS USED IN CANADA	PROS	CONS
ENERGY STAR Portfolio Manager	• Free and provided by the federal government • Integration with RETScreen • Can interface with utility providers for automatic upload • Potential to interface with government portals; is supported by different levels of government • Data and metrics are easily shared • Web-based portal allows for access from any location • Has modules to track other environmental impacts (e.g., waste) • Can be used for Energy Star ranking/certification • Can be used for LEED (and other green building) scoring systems	• Need to do manual data entry when there is no automatic upload; this can result in out-of-date metrics being calculated and displayed • Only Scope 1 and 2 emissions can be tracked • Not specific to healthcare • Integration with RETScreen can require manual data entry
RETScreen Clean Energy Management Software	• Information can be shared with contractors • Accounts for weather in real-time • Can be used for energy modelling and efficiency tracking • Integration with Portfolio Manager	• Emissions factors may be different from the National Inventory • Integration with ENERGY STAR Portfolio Manager can require manual data entry
Created tool (Excel spreadsheets or Power BI)	• Flexibility in reporting, meeting the needs of whoever has asked for the information • Can be used to verify information from third party reports/contractors	• Usually requires manual data entry and there is a chance of data entry errors • Emissions factors must be found, added, and updated • Limited or no support for new users • Comparison between years may be difficult
Government-supplied	• Aligns with provincial reporting requirements	• Not specific to healthcare
Vendor-supplied	• Provides flexibility • Focus is less on energy management than other tools • Ability to track emissions over time • Appealing graphics	• Licence must be purchased • Possible fees for use and software updates

PART 3 – OPPORTUNITIES, CHALLENGES AND NEXT STEPS

OPPORTUNITIES TO EXPAND GHG EMISSIONS' ESTIMATION

The previous section describes the types of emissions that are being regularly estimated in different healthcare organizations. We aimed to understand views on which existing and additional emissions might routinely be estimated by healthcare organizations across Canada[12]. To assess these views during a workshop, emissions were grouped by type of activity and included:

Energy:

- Stationary combustion (Scope 1)
- Purchased electricity (Scope 2)
- Purchased heating/cooling (Scope 2)

Travel related emissions:

- Fleet vehicles (Scope 1)
- Business travel (Scope 3)
- Upstream transportation and logistics (Scope 3)
- Patient travel (Scope 3)
- Employee commuting (Scope 3)
- Visitor travel (Scope 3)

On-site gas emissions:

- Halogenated volatile anesthetics (Scope 1)
- Nitrous oxide (Scope 1)
- Metered-dose inhalers (Scope 3)
- Fugitive emissions from refrigerant loss, fire suppression systems, etc. (Scope 1)

Other Scope 3 emissions:

- Waste
- Paper
- Other purchased goods and services

DISCUSSION OF SURVEY RESULTS

Workshop participants were asked to answer a survey, "Should organizations routinely estimate GHG emissions for this category of activities?" Figure 2 provides an overview of responses for each emissions source, and a more detailed breakdown of responses by activity type follows.

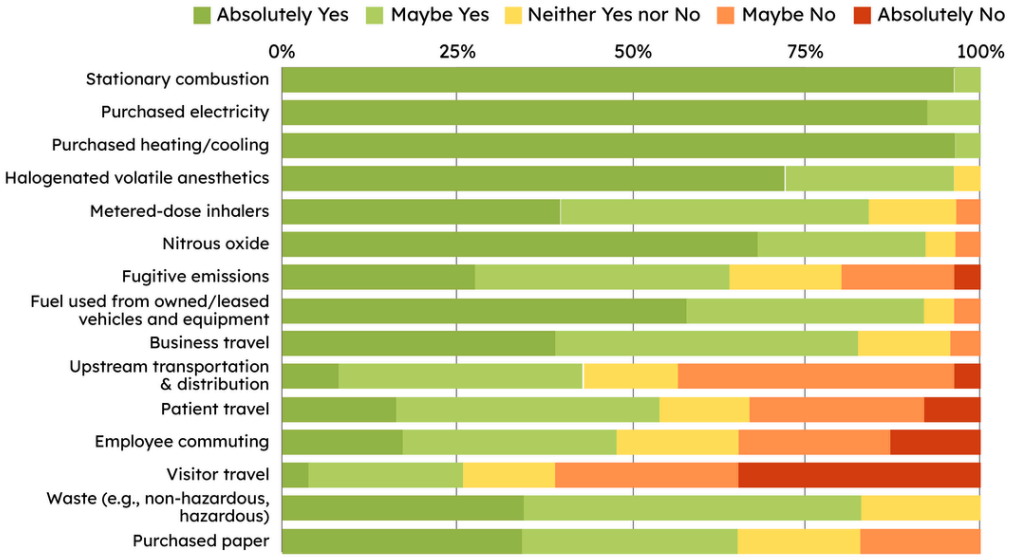


FIGURE 2. Survey results - "Should organizations routinely estimate GHG emissions for this category of activities?"

12. The information in this section is based on a survey done at a December 2022 workshop. See Table 2 for more information about participating organizations.

RESULTS BY TYPE OF ACTIVITY

TYPE OF ACTIVITY: Energy

Energy-related emissions are regularly tracked using robust activity data and emissions are assigned (See Table 3). As seen in Figure 2.1, there was consensus that these emissions sources (stationary combustion, purchased electricity, purchased heating/cooling) should be routinely tracked and included in GHG inventories.

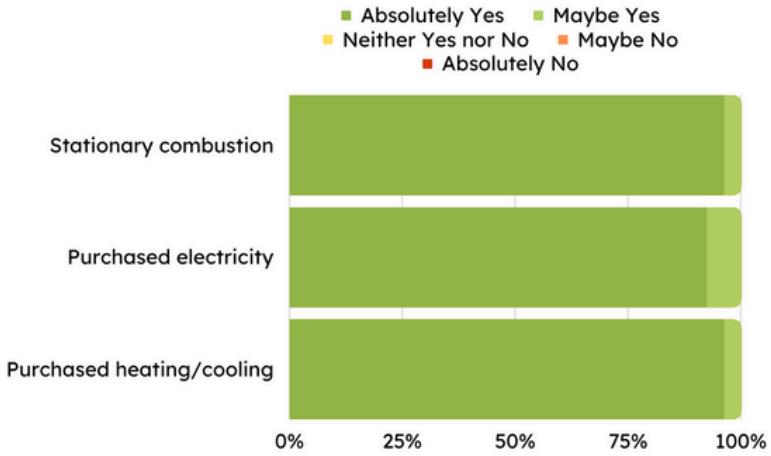


FIGURE 2.1. Survey results – Energy

→ Source of emissions: Stationary combustion (Scope 1)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	May require place-based assessment of emissions based on infrastructure in different provinces and territories.
Methodological	Additional methodological considerations may be required to account for combustion of biofuels. For example, CO_2 emissions from the combustion of biomass fall outside of the GHG Protocol's Scopes 1, 2 and 3; the Corporate Value Chain Standard specifies that these CO_2 emissions be reported separately in a memo item (42). CH_4 and N_2O emissions from the combustion of biomass must be reported.
Data collection	Where possible, providers should be asked to automatically upload this information into energy management software to reduce risk of data entry errors and the workload of the reporting organization.

→ Source of emissions:

Purchased Electricity (Scope 2) and Purchased Heating/Cooling (Scope 2)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	As energy generation mixes change and grids move toward sustainability, emissions will also change. Up to date emissions factors will be necessary.
Methodological	Emissions will be place-based.
Methodological	Carefully select emissions factors to get the most complete picture of GHG emissions associated with electricity[13].
Data collection	Given these considerations, it may be most appropriate to ask the grid operator to provide this information.

13. For more information, see Appendix B of the Greenhouse Gas Protocol's Scope 2 Guidance, found here.

TYPE OF ACTIVITY: On-site gas emissions

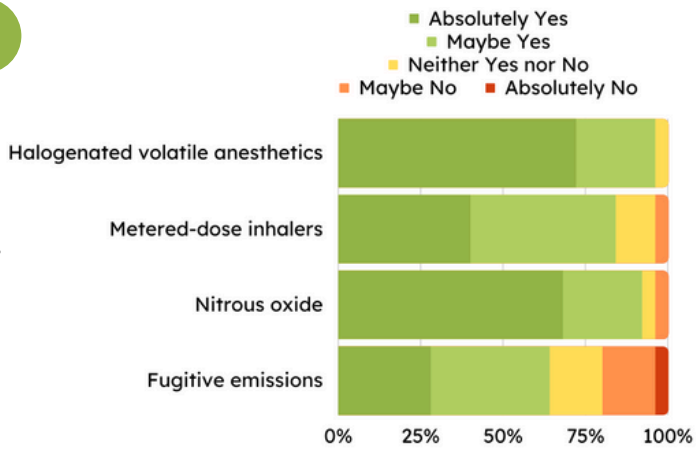


FIGURE 2.2. Survey results – On-site gas releases

On-site gas emissions were felt to be an important part of GHG emissions inventories, with some variation in the strength of support for inclusion by gas type. There was strong agreement that emissions from halogenated volatile anesthetics and nitrous oxide should be regularly estimated. The majority of respondents felt that the emissions from the use of metered-dose inhalers should be included. The responses for the tracking and estimating of emissions resulting from fugitive emissions were more varied, with some respondents answering that this source of emissions should not be included; the feasibility of data collection was one of the primary considerations.

Source of emissions: Halogenated volatile anesthetics and nitrous oxide (Scope 1)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	If technology is in place to capture gas, this needs to be considered
Methodological	Account for clinical uses as well as losses through leaks
Support	Clinical engagement will be necessary to make change

Source of emissions: Metered-dose inhalers (Scope 3)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Support	Clinical engagement will be necessary to make change

Source of emissions: Fugitive emission from refrigerant loss, fire suppression systems, etc. (Scope 1)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Data collection	Refrigeration, HVAC systems, etc., are often serviced by third parties. Getting data from these service providers may be challenging.
Data collection	Some regulations exist for reporting the release of these gases (as ozone-depleting substances) and there may be activity data as a result.

TYPE OF ACTIVITY: **Travel-related emissions**

Travel-related emissions come from a variety of sources, including those considered to be in Scope 3. There was agreement that emissions from the use of fuel in owned/leased road-registered vehicles should be regularly included in GHG inventories; there was less agreement on whether emissions from equipment should be included. There was also agreement that emissions related to business travel should be tracked and estimated. There was variability in responses for both patient travel and employee commuting – some respondents questioned the ability to influence this source of emissions and the best methods for the collection of activity data.

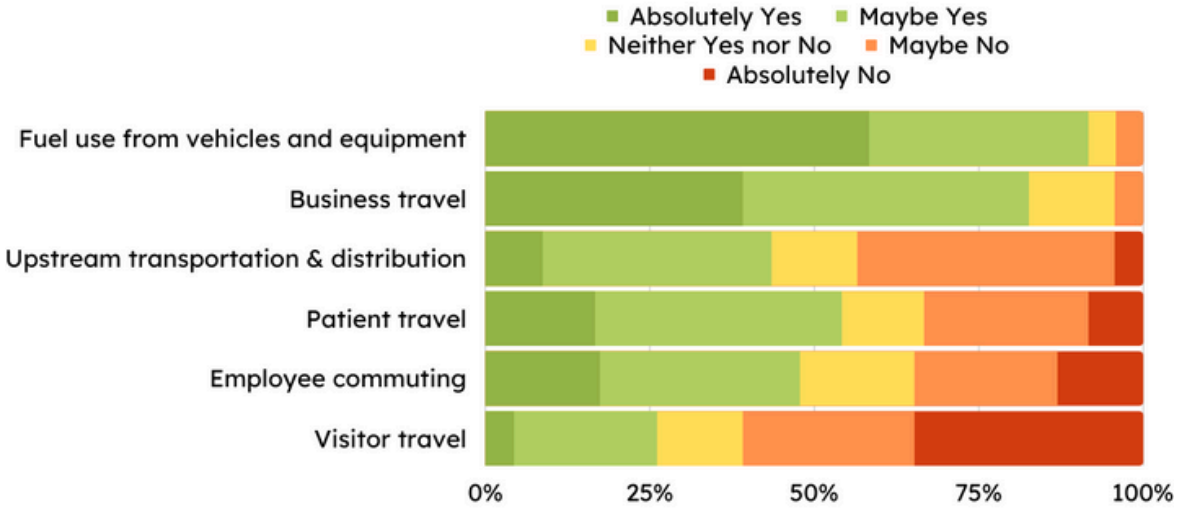


FIGURE 2.3. Survey results – Travel

Upstream transportation and distribution was not suggested for regular inclusion in GHG emissions inventories because of the difficulty in getting data and the belief that emissions estimation should be the responsibility of the distribution companies. Visitor travel was not recommended for inclusion at this time because of limited ability to influence change.

→ Source of emissions: Fleet vehicles (Scope 1)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Data Collection	This may be challenging to track for small sites and/or sites in more remote locations.
Data Collection	If fuel is purchased in a variety of ways (e.g., through purchase card, provincial depots, etc.) then data collection will be more challenging.
Methodological	Contracted services (e.g., snow removal, landscaping) are not accounted for here (these are Scope 3 emissions).

Source of emissions: Business travel (Scope 3)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	Assumptions about vehicle type, distance traveled, and so on will need to be well documented.
Methodological	Organizations will need to be clear about whether this includes only employee travel, or any travel undertaken on behalf of the organization.
Data collection	The use of personal vehicles for business travel would need to be accounted for separately.
Support	Administrative policies may be a useful lever to help reduce emissions (encouraging direct flights, train travel, and/or reducing non-essential travel).

Source of emissions: Patient travel (Scope 3)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Data collection	These data may be difficult to collect. Identifying trends in patient travel may be a starting point.
Support	There may be opportunities to get information from virtual care programs.

Source of emissions: Employee commuting (Scope 3)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	Organizations will need to consider whether emissions from teleworking are included.
Methodological	Any assumptions about commuting behaviour (e.g., travelling directly from Point A to Point B, carpooling, etc.) will need to be documented.
Support	Education and financial support programs may be a lever.

TYPE OF ACTIVITY: Other Scope 3 Emissions

Respondents were asked about two sources of emissions: off-site waste treatment and disposal and purchased paper. Respondents agreed that emissions related to waste treatment and disposal should be regularly included in GHG inventories but that there would be methodological and data collection considerations. There was also agreement for the regular inclusion of emissions from purchased paper. Tracking paper usage is straightforward and there are opportunities for reduction or replacement. Tracking emissions associated with purchased paper may serve as an introduction to emissions tracking for other purchased goods. Paper was included because it is encouraged by policy by Alberta Health Services (43) and in British Columbia (44).

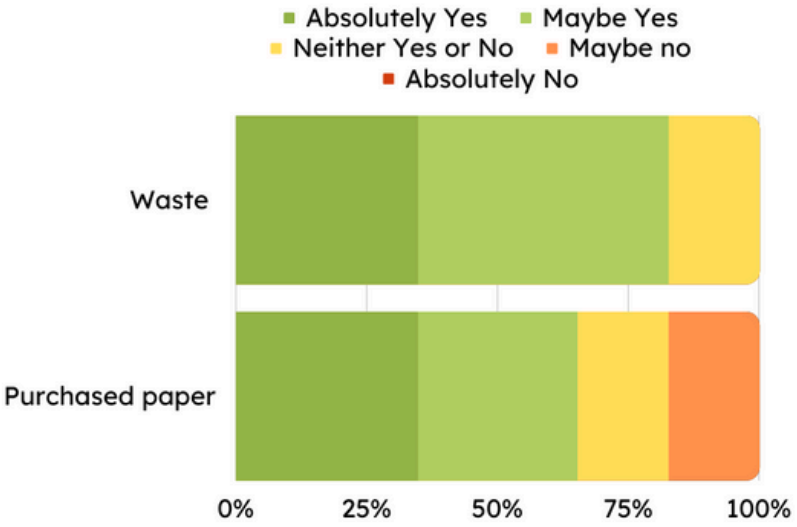


FIGURE 2.4. Survey results – Other Scope 3 Emissions

Source of emissions: Waste treatment and disposal (Scope 3)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	GHG emissions vary by waste treatment method and waste stream. Accounting for different waste streams (and disposal methods) will be necessary but may be challenging.
Data collection	Emissions factors use weight; GHG emissions from waste will be difficult if invoices do not include weight. Waste management service providers could be engaged to provide this information.
Support	Education about proper waste disposal accompanied by waste audits may be useful levers.
Impact	Opportunities for reductions exist without GHG estimation (i.e., by focusing on the activity).

Source of emissions: Purchased paper (Scope 3)

Considerations:

TYPE OF CONSIDERATION	DETAILS
Methodological	Could be included in other categories, such as waste or purchased goods

TYPE OF ACTIVITY: **Additional Scope 3 Emissions**

Respondents were asked about the routine estimation of other sources of Scope 3 emissions:

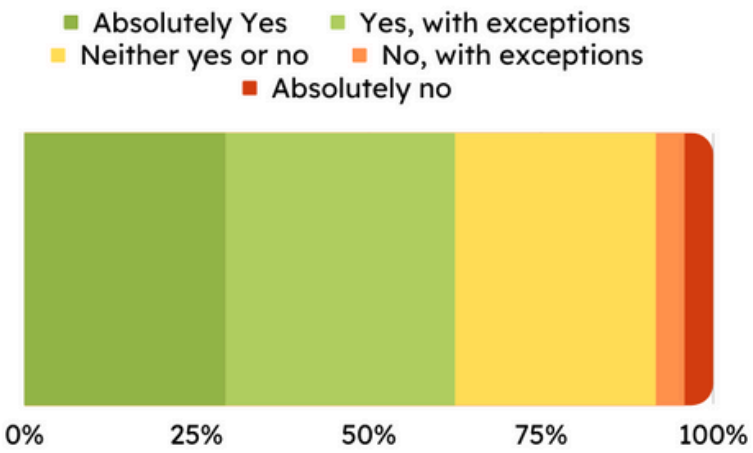


FIGURE 2.5. Survey results – Additional Scope 3 Emissions

- food (retail, patient)
- medical devices
- pharmaceuticals
- chemicals
- healthcare supplies (e.g., clinical consumables, non-drug pharmacy supplies, sterilization supplies)
- non-medical supplies (e.g., office supplies, cleaning supplies, hardware, plumbing)
- IT equipment construction (i.e., embedded emissions in materials and processes)
- services (e.g., training and education)
- fuel and energy related activities (not included in Scope 1 or Scope 2)
- investments

There was variability in responses, with caveats that access to required data will be different among these different emissions sources, that doing this estimation would be very time-intensive, and that starting with the other emissions sources detailed above may be most appropriate given current resources.

SYSTEM – WIDE GHG EMISSIONS ESTIMATION

DATA GAPS

For several reasons, the estimation of GHG emissions by healthcare organizations across Canada does not account for the full set of emissions from the whole health system. The first reason for this is the focus of current GHG-emissions estimation on energy, so most indirect emissions from the supply chain are not being tracked and quantified (see Table 3). The second reason is the considerable variation in how healthcare is organized across the country, which has implications for what types of healthcare emissions will be routinely estimated. Regional health authorities, integrated health and social services centres and large healthcare facilities (e.g., hospitals) are responsible for different types of care in different parts of

the country (as seen in Table 2). Thus, in some provinces and territories, the emissions associated with a large number of facilities will be routinely estimated. In Quebec, for example, emissions associated with many social service facilities as well as many health service facilities will be routinely estimated. In other provinces and territories, emissions will be routinely estimated for a smaller proportion of healthcare facilities. In Ontario, for example, GHG emissions estimation is routine for large hospital corporations, but excludes most other types of healthcare facilities. Thus, many parts of the healthcare system are not captured in current facility-based estimates of GHG emissions, including most primary care, community care, and privately financed healthcare services and facilities (e.g., dental care or optometry services). Because of this, even if all healthcare organizations were to estimate emissions from all sources, there would still be many data gaps.

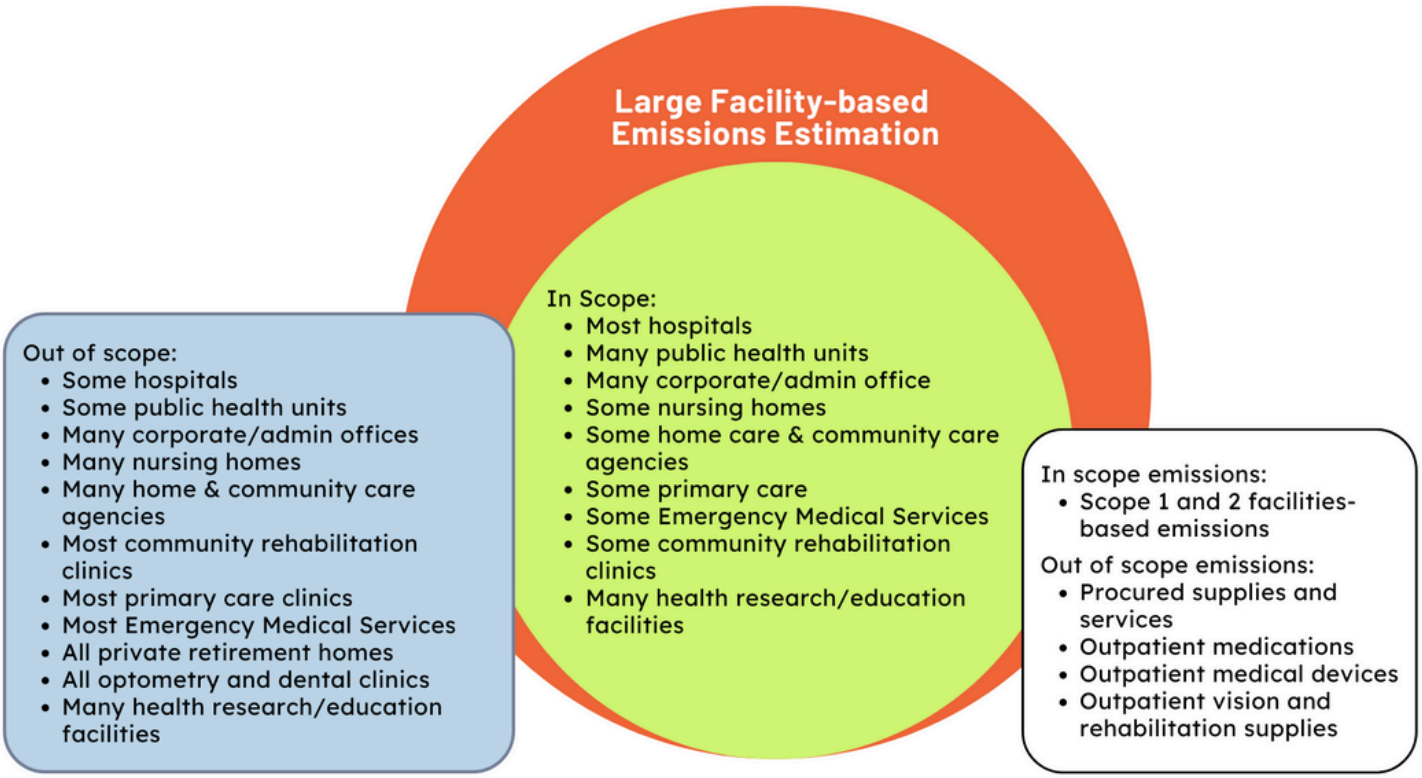


FIGURE 3. Overview of System-wide GHG emissions

POTENTIAL DATA SOURCES

There are sources of data that can help to fill these gaps. The Canadian Institute for Health Information (CIHI) has a mandate to "deliver comparable and actionable information to accelerate improvements in health care, health system performance and population health across the continuum of care" (45). CIHI collects comparable, pan-Canadian data on different aspects of the health system including system-wide health expenditures, financial and statistical information on the day-to-day operations of public hospitals, other health facilities and regional health authorities across Canada; prescription claims data from public drug programs; and clinical, administrative and resource utilization data from publicly funded home care and long-term care programs in Canada (46).

Relevant CIHI Databases include:

Canadian Management Information System (MIS) Database (CMDB): The CMDB contains financial and statistical information on the day-to-day operations of public hospitals, other health facilities and regional health authorities across Canada (47). Data are collected using the Management Information System (MIS) Standards, a framework for collecting operations-related financial and statistical data for health services organizations. Core components include:

- Chart of accounts
- Accounting principles and procedures
- Workload measurement systems
- Financial and statistical indicators
- Management applications

Examples of statistical accounts captured in CMDB[14] include fuel oil consumed, natural gas consumed, electricity consumed, kilograms of biomedical/hazardous waste disposed and/or received from other facilities. Examples of financial accounts include supplies (housekeeping including disposable supplies, cleansing agents), medical and surgical supplies, general medical supplies (such as catheters, needles, syringes, rubber goods, etc.) as well as drug supplies and anesthetic/medical gases (48).

Note that data are submitted for all jurisdictions except Quebec and Nunavut. Quebec data are collected using a different standard and are mapped on to the CMDB specifications where possible.

National Health Expenditure Database (NHEX): NHEX contains data on health spending in the public and private sectors. Private sector expenses include out-of-pocket expenditures made by individuals on health care goods and services, health insurance claims paid to individuals, non-patient related revenue received by health care institutions (such as donations and investment income), private spending on health-related capital construction and equipment, and privately-funded health research (49).

National Prescription Drug Utilization Information System (NPDUIS): NPDUIS has claims data on prescription drugs from publicly-funded drug programs from all provinces (except Quebec) and Yukon. It also has formulary and drug product information as well as information on policies of public drug plans in Canada (50).

Home Care Reporting System (HCRS): HCRS contains demographic, clinical, functional and resource utilization information on clients served by publicly funded home care programs (51). The current HCRS is being decommissioned by 2025 and will be replaced by the Integrated interRAI Reporting System (IRRS).

Continuing Care Reporting System (CCRS): CCRS contains demographic, clinical, functional and resource utilization information on individuals receiving continuing care services in hospitals or publicly funded long-term care homes (52). The current CCRS is being decommissioned by 2026 and is being replaced by the Integrated interRAI Reporting System (IRRS).

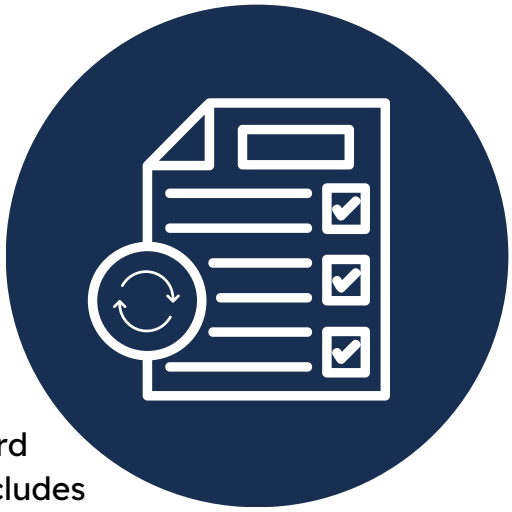
In addition to the preceding CIHI databases, the Nursing and Residential Care Facility Survey was conducted by Statistics Canada in 2021 and gathered information from all public and private sector establishments classified by NAICS code 623 (Nursing and

14. Note: Provinces/territories often maintain their own chart of accounts and choose to collect additional information not intended for submission to CIHI. The reader may wish to follow up with the ministries of health finance departments for further information.

Residential Care Facilities). The data include information on facility revenue and expenses, personnel, service, and resident demographics (53). This list is not exhaustive and other relevant sources of data may be available.

LEVERS FOR CHANGE

STANDARDS



The Health Standards Organization (HSO) "works with leading experts and those with lived experience to develop standards, assessment programs and quality improvement solutions" (54). The HSO develops health care and social service standards. The HSO updated its governance standard (CAN/HSO 1001:2022(E)) in 2022 to include environmental stewardship. The leadership standard (CAN/HSO 2001:2020(E)) was updated in 2020 and also includes environmental stewardship.

The Canadian Standards Association (CSA Group) is made up of a Standards Development organization and a Testing, Inspection, and Certification organization. The Standards Development group creates technical and management standards (55). CSA has developed and is maintaining a portfolio of HCF-related National Standards of Canada. These standards (e.g., CSA Z8000, CSA Z317.1, CSA Z317.2, etc.) contain requirements and guidance for HCFs regarding climate adaptation, sustainability, and catastrophic event management.

Creating a standardized approach to GHG emission estimation methods and source of emissions to include in estimates could help to move this work forward and support smaller healthcare facilities in doing their own estimates.

PROCUREMENT POLICIES

If healthcare organizations are to address the emissions arising from their supply chains, the many different businesses that supply healthcare with the products and services required will need to be engaged in the transition to sustainable health systems. Organizations could include emission criteria in their supplier selection processes, third-party risk management programs and supplier performance/relationship management programs.

Large buying groups, rather than individual healthcare organizations, may have more capacity to exert pressure on suppliers to provide emissions data and demonstrate emissions reductions. Consideration should also be

given to small suppliers, which may not be able to track the emissions of their products and services in the way that large suppliers can.

There is global movement to identify clear and consistent performance targets for industry. Sustainable public procurement (SDG 12.7) was expressly included in the 2030 Sustainable Development Goals in 2015, to which Canada is signatory. The WHO Alliance for Transformative Action on Climate and Health has a supply chain working group, NHS England has published a Net Zero supplier roadmap, and the US Department of Health and Human Services and NHS England have announced plans to work together toward common standards (5).

While not specifically healthcare related, the Canadian Federal Government recently issued the "Standard on the Disclosure of Greenhouse Gas Emissions and the Setting of Reduction Targets" (56). The objective of this standard is to induce major suppliers (e.g., with contract values over $25 million) to disclose their greenhouse gas emissions and set reduction targets according to the commitments in the Greening Government Strategy (57), through which the federal government has committed to be net zero in its operations by 2050, including the procurement of goods and services. This process could be used as an example for purchasing contracts in healthcare.

PAN-CANADIAN GHG EMISSIONS ESTIMATION

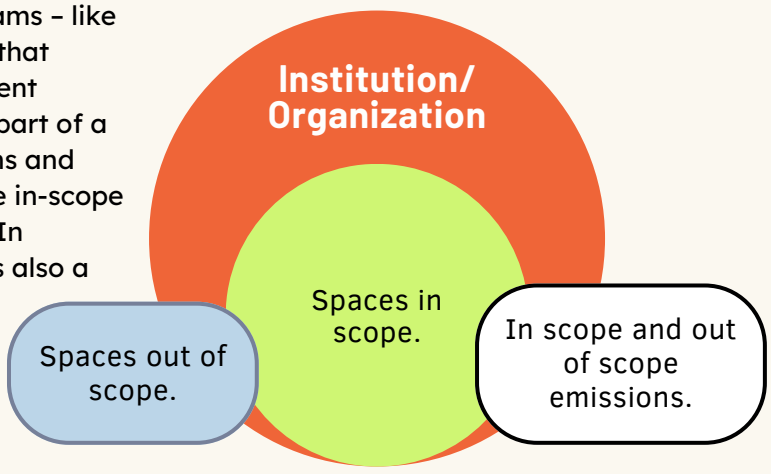
ORGANIZATIONAL SNAPSHOTS

As noted, while some GHG emissions are being tracked for many different types of healthcare facilities, even comprehensive organizational GHG inventories fail to capture all healthcare-related emissions.

The following snapshots provide more information about specific healthcare organizations across the country. They illustrate the variability in the types of healthcare services provided by these organizations as well as the variability in the types of emissions that are (or could be) tracked.

WHAT ARE ORGANIZATIONAL SNAPSHOTS?

These are diagrams – like the one below – that depict the different spaces that are part of a health institutions and whether they are in-scope or out of scope. In addition, there is also a list of emissions that are in-scope or out of scope.



Alberta Health Services

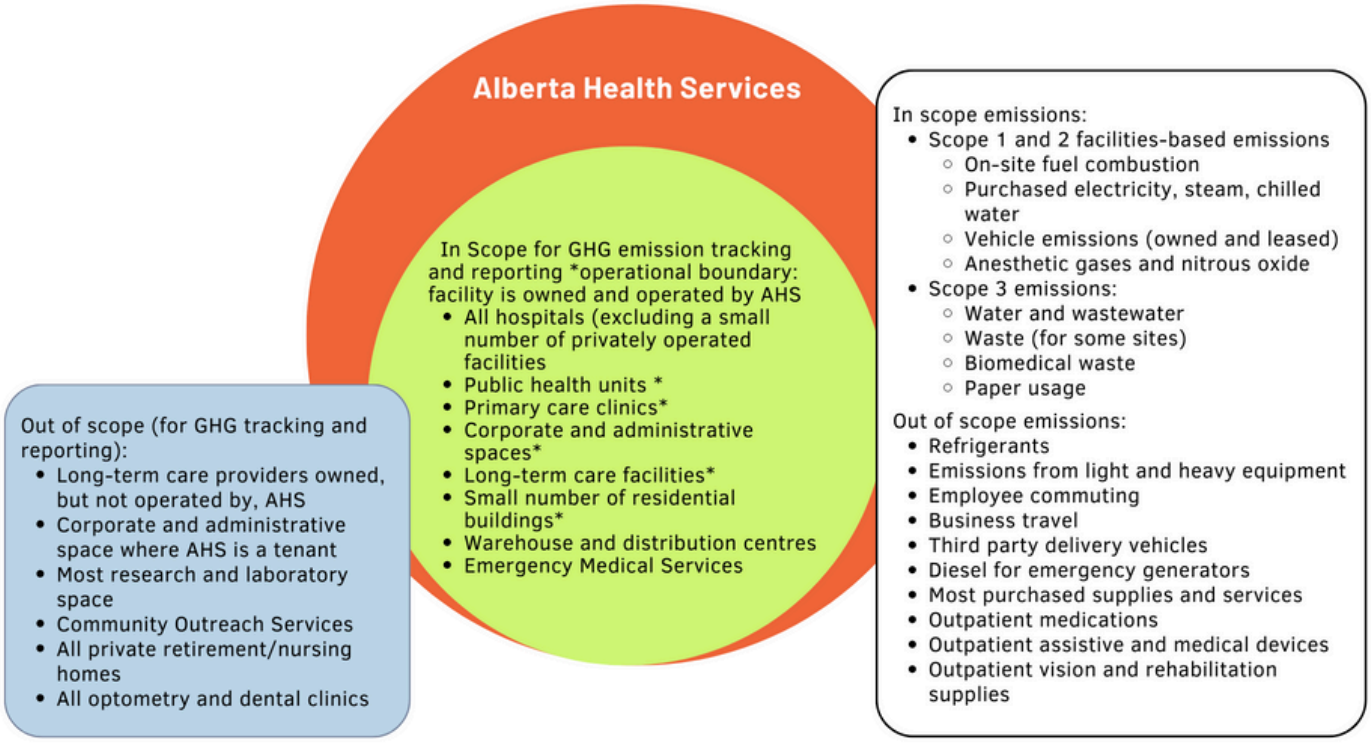


FIGURE 4. Alberta Health Services

- Overview of healthcare organization and facilities:

  Alberta Health Services is responsible for delivering publicly funded healthcare across the province of Alberta; it is divided into 5 management zones, comprised of 405 facilities, including hospitals, long-term care, Emergency Medical Services, and public health.

- Types of care provided:

  Acute care, primary care, public health services (immunizations, well baby visits, etc.), long-term care, mental health and addictions services, community-based palliative care.

- GHG emissions tracking:

  AHS tracks emissions from facilities that are owned and operated by AHS. The Office of Sustainability and Energy Management oversees the tracking and reporting of GHG emissions across AHS. An Executive Sustainability Committee, made up of representatives from different programs and locations across the province, focuses on energy use and other issues related to sustainability (like the use of anesthetic gases). In addition the Executive Sustainability Committee, there is also a Working Group Sustainability Committee.

Ontario – The Ottawa Hospital

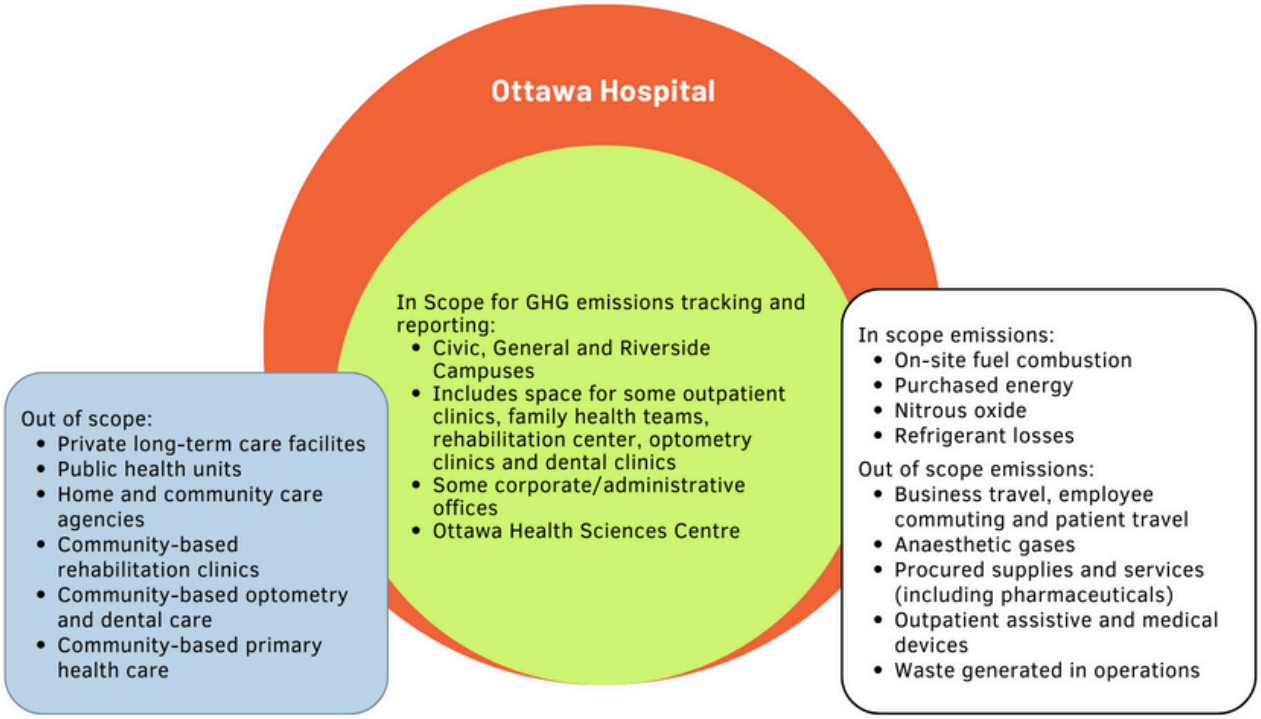


FIGURE 5. The Ottawa Hospital

- Overview of healthcare organization and facilities:

  The Ottawa Hospital has three main campuses: the Civic Campus, the General Campus, and the Riverside Campus, as well as 19 satellite sites throughout the community. The Civic Campus and the General Campus are acute care hospitals, while the Riverside Campus provides outpatient clinics, dialysis, and day surgery. The General Campus shares a site with CHEO (Children's Hospital of Eastern Ontario) and the University of Ottawa's Faculty of Medicine Medical Centre (together these make up the Ottawa Health Sciences Centre). These facilities have research and lab space which are also included in GHG estimates.

- Types of care provided:

  Acute care, cancer care, neonatal intensive care, trauma care, rehabilitation services, dialysis, outpatient care, surgical procedures, ophthalmology, transitional beds for patients awaiting transfer to long-term care, family health teams, maternal/fetal care, mental health care, and other types of care.

- GHG emissions tracking:

  The Ottawa Hospital strives to be a leader in sustainable healthcare, applying principles of planetary health to improve the well-being of its patients and its community, and to contribute positively to a healthier planet. This is a part of a profound social responsibility to the community, and the hospital takes several measures to ensure this is upheld. The hospital tracks those emissions for which it is required to submit reports. The Civic Campus and the General Campus (as part of the Ottawa Health Sciences Centre) report their emissions federally. All three campuses report their utility consumption to the Ontario provincial government.

New Brunswick

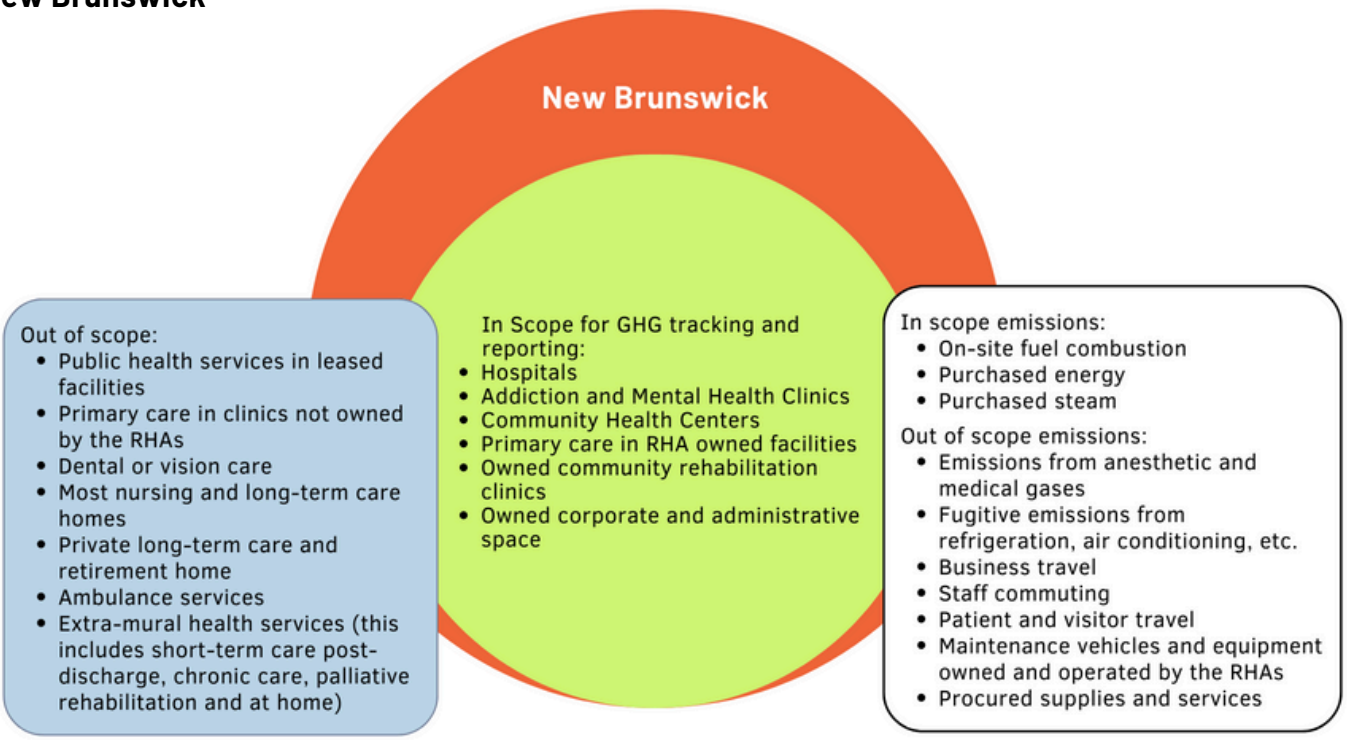


FIGURE 6. New Brunswick Regional Health Authorities

- Overview of healthcare organization and facilities:

  There are two regional health authorities in New Brunswick. Horizon Health Network (Horizon) has 5 regional hospitals and 7 community hospitals, as well as community health centres and clinics providing primary care, public health, and addiction and mental health services. In total, there are 41 owned facilities with over 100 operated facilities. Vitalité Health Network (Vitalité) has 4 regional hospitals and 7 community hospitals, as well as community health centres and smaller clinics providing services like primary care, addiction and mental health services. In total, there are 23 owned facilities.

- Types of care provided:

  Acute care, trauma care, intensive care, emergency care, addiction and mental health services, rehabilitation, community healthcare (including primary care, public health, and addiction and mental health services), dialysis, cancer care, therapeutic services (audiology, nutrition, physiotherapy, speech language pathology, etc.), outpatient clinics (diabetes care, chronic disease care, dermatology, etc.), geriatric services, and public health services.

- GHG emissions tracking:

  Through Service New Brunswick, Horizon and Vitalité report on their emissions as part of public sector reporting to the provincial Department of Environment and Local Government. Facilities that are owned and operated by the regional health authorities are included in emissions estimates. This includes clinical and administrative spaces and two on-site laundry facilities. Leased facilities are not included in reporting.

Québec - CISSS de Laval

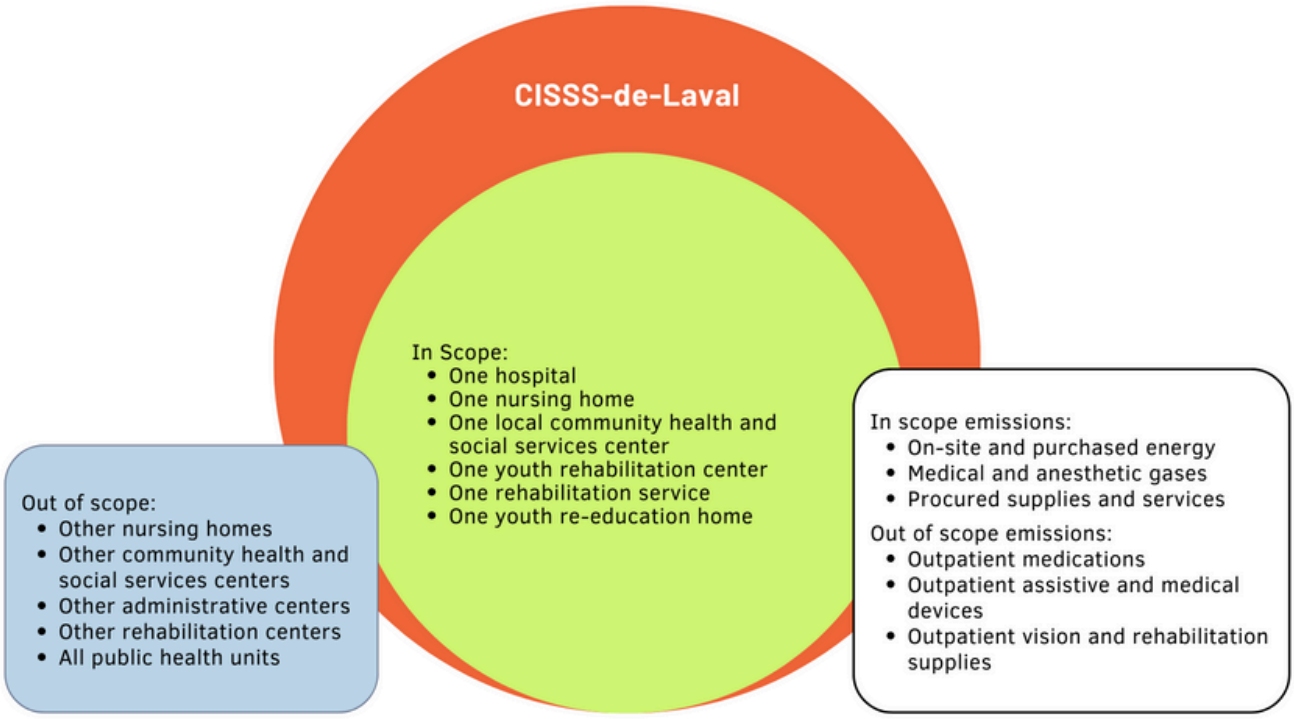


FIGURE 7. CISSS-de-Laval

- Overview of healthcare organization and facilities:

  Laval's integrated health and social services centre (Centre intégré de santé et services sociaux - CISSS) is one of 13 CISSSs in Quebec, which also includes 9 university integrated health and social services centres (CIUSSS), 5 institutions serving a northern and Indigenous population, and 7 non-merged institutions. The CISSS de Laval includes 6 residential and long-term care centres (CHSLD),1 hospital, 1 youth centre, 7 group homes, 3 rehabilitation centres for adults and 7 local community service centres (CLSC). (31)

- Types of care provided:

  Acute care, mental health and addictions services, some primary care, rehabilitation for youth and adults, community healthcare, dialysis, oncology centre, therapeutic services, public health, long-term and palliative care, youth centers, geriatric care.

- GHG emissions tracking:

  In 2021-2022 the CISSS de Laval conducted a major assessment of its GHG emissions. The process was initiated by the CISSS and financed mainly by the Ministry of Health and Social Services (Ministère de la Santé et des Services Sociaux) to prioritize the actions of the sustainable development plan. For the 2021-2022 assessment, the CISSS de Laval used a sample of seven establishments, one of each type, to allow for the extrapolation of data. There is no ongoing monitoring of emissions planned at this time.

Québec - CIUSSS-Centre-Sud-de-l'île-de-Montréal

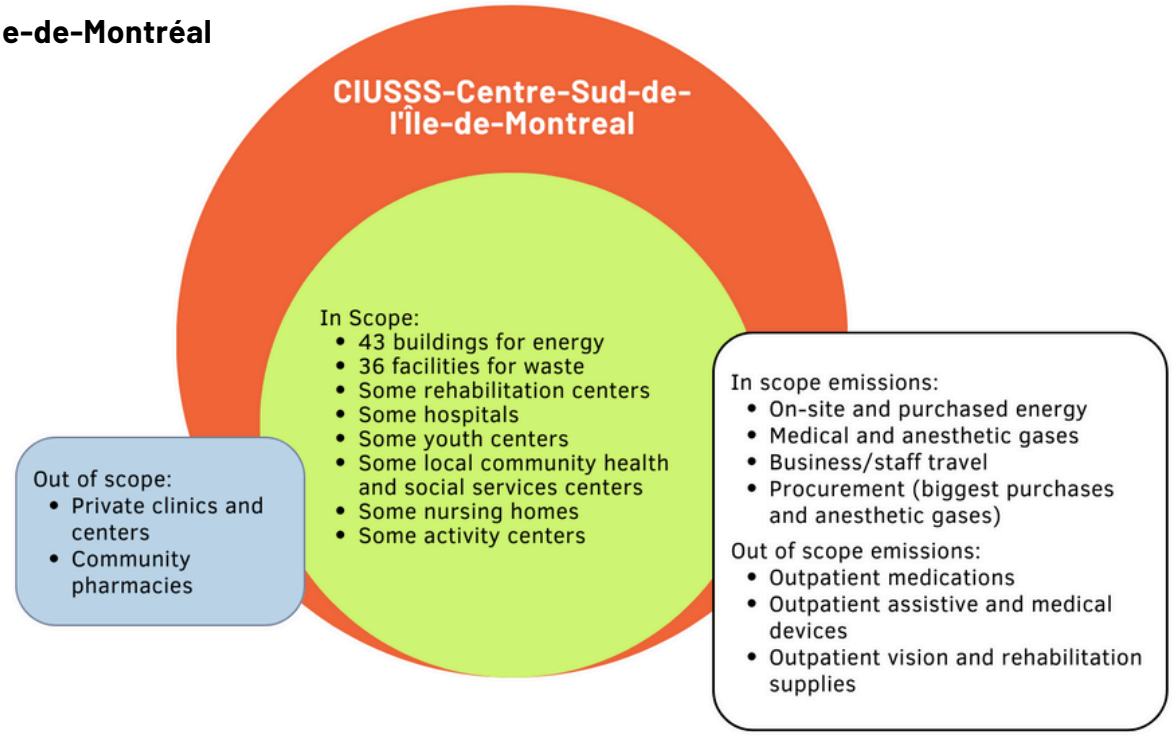


FIGURE 8. CIUSSS-Centre-Sud-de-l'île-de-Montréal

- Overview of healthcare organization and facilities:

  The university integrated health and social services centre (Centre Intégré Universitaire de Santé et Services Sociaux - CIUSSS) is one of 9 CIUSSSs in the Québec. It has more than 150 buildings, including hospitals, youth centres, residential centres, rehabilitation centres (for disabilities and addictions), supervised injection services, and administrative buildings, including public health.

- Types of care provided:

  Acute care, mental health and addictions services, some primary care, rehabilitation for youth and adults, community healthcare, dialysis, cancer care, therapeutic services, public health, long-term and palliative care, youth centres, geriatric care.

- GHG emissions tracking:

  Estimated emissions include 43 buildings for energy consumption and 36 for waste management. The data were then extrapolated to the 201 buildings of the CIUSSS. Still in progress, this assessment is meant to be a regular exercise to evaluate the environmental health and sustainable plans performance and prioritization, as well as motivating employees.

RECOMMENDATIONS

In the development of low-carbon, sustainable health systems, the health sector in Canada will need to develop a baseline assessment of a full set of relevant emissions across Scopes 1, 2, and 3. Efforts to do so should build on the work already underway, and the significant expertise already present across Canada. Progress is likely to be iterative and will require financial and human resource investment. A first series of workshops has provided the opportunity to develop a Community of Practice to support these efforts and to inform a robust understanding of health sector emissions and activities to reduce those emissions.

OPPORTUNITIES FOR FEDERAL ACTION

1. Create research funding opportunities on low-carbon, high-quality care (e.g., CIHR funding calls)
2. Work with CIHI and other data stewards to foster standardization in healthcare-related GHG emissions information collected from across Canada
   - GHG emissions estimates can vary depending on emissions factors that are used, how data are collected, how organizational boundaries are determined, etc. Some standardization in approach would be helpful.
3. Support provincial/territorial health systems to build capacity to do this work
   - GHG emissions estimation requires expertise, time, and robust data systems. Efforts to pursue GHG emissions estimation by healthcare organizations or systems should be guided by strategic plans, fit into overall goals, and be well resourced to achieve well-defined objectives. Particular consideration should be given to human resources and the availability of data and data systems.

METHODOLOGICAL RECOMMENDATIONS

1. Conduct GHG emissions estimates at the provincial/territorial level, rather than only at an organizational level
   - Organization-based estimates will not capture all of the emissions of the healthcare system. Conducting GHG emissions estimations at the level of provinces and territories will create a more comprehensive picture of health system emissions.

2. Consider sources of GHG emissions that are most ready for regular estimation
    - Currently, on-site fuel combustion emissions and associated Scope 2 emissions are regularly tracked using robust activity data at multiple healthcare organizations across the country. Other sources of emissions that may be most ready for regular estimation are outlined in Section 3 (Opportunities to expand GHG emissions estimation) and include:
        - anesthetic gases and nitrous oxide
        - fuel use for owned/leased vehicles
        - metred-dose inhalers
        - business travel
        - waste
        - purchased paper

      Focusing on these emissions sources may represent an opportunity to begin the expansion of current inventories without overburdening healthcare organizations.

3. Avoid focusing only on GHG emissions and consider other environmental impact metrics
    - A challenge with GHG emissions estimation concerns its role as the primary or sole driver of change. Attention to GHG emissions does not necessarily reduce other environmental harms. Multiple impacts should also be prioritized in environmental assessments to avoid negative trade-offs (13).
    - Even when GHG emissions cannot be readily estimated, it makes considerable sense to emphasize purchasing and consuming fewer products and services as a pathway to a low carbon health system. Waste, for example, is a useful proxy measure for supply chain emissions, even where the associated emissions are not known.
    - Finally, mitigation, adaptation, and resilience opportunities should all be explored concurrently to encourage the realization of co-benefits and to support broad engagement.

CONTINUED WORK FOR CASCADES AND SSE

1. Sustaining a pan-Canadian Community of Practice
    - At the conclusion of the workshop series, participants were asked about their interest in continuing to participate in a pan-Canadian Community of Practice on GHG emissions estimation in healthcare. All respondents said that they were and most responded that they would like to meet at least 2 or 3 times a year.
    - CASCADES and SSE would like to partner in supporting this Community of Practice through professional development and learning opportunities, as well as creating a forum for sharing and building best practices.

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