GREENHOUSE GAS EMISSIONS ESTIMATION IN CANADIAN HEALTHCARE

Why • The Case for Change
What • Resources, Products and Recommendations
How • Strategy to Implement and Create Change

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Canada

CASCADES

SYNERGIE SANTÉ ENVIRONNEMENT

NAVIGATION

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INTRODUCTION

This playbook provides an overview of how greenhouse gas (GHG) emissions are measured in healthcare and information on the current state of GHG emissions estimation in healthcare organizations across Canada. It also provides guidance and resources to support health systems and care organizations with key considerations for starting, continuing, or expanding GHG emissions estimation in their organizations.

Information in this playbook is from publicly available sources and is informed by discussions and deliberations held throughout a series of workshops with expert participants from across the country. A list of working group members is available in About This Playbook section.

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WHY

The Case for Change

WHAT

Resources, Products and Recommendations

HOW

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WHY

The Case for Change

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 represents 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 to develop climate resilient and sustainable, low carbon health systems.(3) Sixty-three countries have now committed to developing climate resilient health systems and 57 have committed to creating sustainable low carbon health systems; 21 have identified a target date to achieve net-zero health systems.(4) The Canadian government committed to deliver both climate resilient and sustainable low carbon health systems in November 2021 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 aligning procurement requirements, with a goal of aligning requirements as much as possible by COP28.(5)

Estimating Greenhouse Gas Emissions

MEASUREMENT MATTERS

As part of the Health Programme commitment,(6) countries are to deliver a baseline assessment of health system greenhouse gas emissions, including from supply chains. As well, countries are to develop an “action plan or roadmap by a set date to develop a sustainable low carbon health system (including supply chains) which also considers human exposure to air pollution and the role the health sector can play in reducing exposure to air pollution through its activities and its actions”.(7)

RESOURCES:

LANCET COUNTDOWN ON HEALTH AND CLIMATE CHANGE DATA EXPLORER

The Lancet Countdown has a data platform that complements the annual Lancet Countdown Report, providing data visualizations on a range of indicators related to climate and health, including healthcare sector emissions (indicator 3.6).

Carbon dioxide is the most well-known GHG and the most prevalent in the atmosphere, (8) however, there are multiple greenhouse gases which have different Global Warming Potential (GWP) (see on the right). GHGs covered under the Kyoto Protocol and thus relevant to the UN Framework Convention on Climate Change are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). (9) Carbon dioxide equivalent (CO_2e) is a measure that converts the emissions from other GHGs into the equivalent emissions of CO_2, using their GWP value. CO_2e is used in the creation of greenhouse gas inventories as it provides a single number for multiple gases.(8)

Global Warming Potential (GWP) is a standardization tool used to compare the global warming impact of different types of GHGs over a fixed time period (usually 100 years). It measures the amount of energy a given gas will absorb compared to the equivalent mass of carbon dioxide (CO_2), which has a standardized GWP of 1.

APPROACHES TO GHG EMISSIONS MEASUREMENT

Two notable frameworks for the measurement and reporting of organizational GHG emissions are the **ISO 14064** and **GHG Protocol.**

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 provides 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 (i.e., bottom-up modeling, see side panel page 12).

The **Greenhouse Gas Protocol (GHGP)** is a commonly 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 (i.e., bottom up or top down, see side panel page 12).

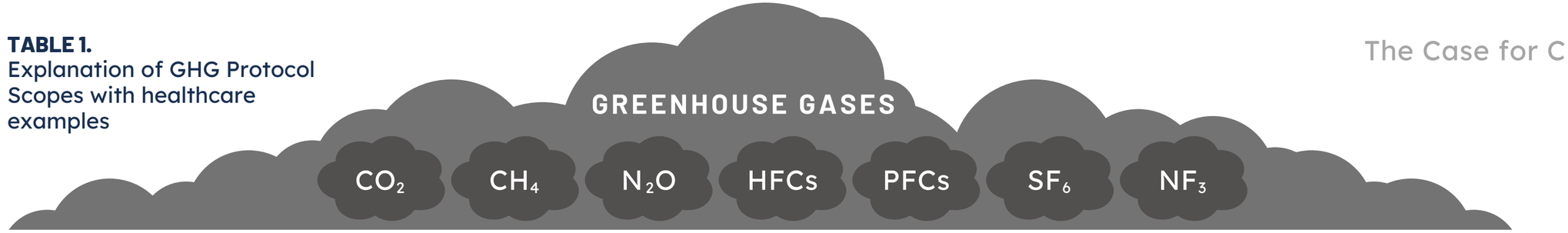
The GHGP categorizes emissions into three Scopes to capture different types of directly and indirectly controlled emissions. Emissions are also classified as "upstream" or "downstream". **Upstream emissions** are indirect emissions related to purchased or acquired goods and services. **Downstream emissions** are indirect emissions that occur after goods and services have left the control of the organization. (10)

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 Scope 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.

TABLE 1.
Explanation of GHG Protocol Scopes with healthcare examples



Upstream – Indirectly controlled emissions		Healthcare organization – Directly controlled emissions	Downstream – Indirectly controlled emissions
Scope 3	Scope 2	Scope 1	Scope 3
Production of purchased goods and services	Purchased electricity, steam, heating and cooling	Combustion of fuel on site, in furnaces, boilers, etc.	Use of Metered Dose Inhalers
Manufacturing and construction of buildings, equipment, and other capital goods		Combustion of fuel in fleet vehicles or other mobile equipment (e.g., landscaping equipment)	Use of properties owned by healthcare organizations and rented to others
Emissions associated with extraction, production and distribution of fuel used by buildings and vehicles		Release of gases on site, including anesthetic and other medical gases	Emissions attributable to the organization's investments
Transportation of goods and services to healthcare facilities		Emissions from refrigerant leaks	
Waste disposal and treatment (services purchased by healthcare organizations)			
Business travel			
Employee commuting			
Use of properties rented by the healthcare organization for own use			

Note: For all the Scope 3 categories in the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, visit this link.

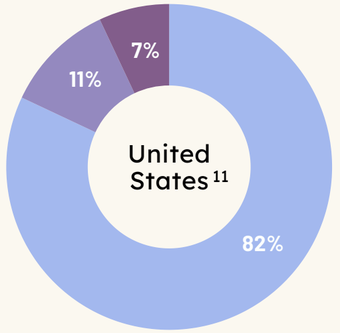
What are the Sources of GHG Emissions in Healthcare?

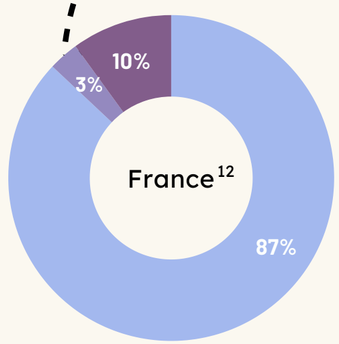
In Canada, **direct emissions** (i.e. Scope 1) from the healthcare system have been shown to represent just **1/10th** of healthcare-related GHG emissions, with **indirect emissions** (i.e. Scopes 2 and 3) contributing the other approximately **90%**.[2]

Much focus in Canadian healthcare organizations has been on estimating the GHG emissions related to buildings – either the combustion of fuels on site (Scope 1) or the use of purchased energy (Scope 2). Although not necessarily representative of the GHG emissions profile of any given healthcare facility, large-scale studies of national healthcare systems have found that Scope 3 emissions are the largest contributor to healthcare's GHG emissions. The following examples of GHG emissions' estimates at the country-level highlight the need to measure, and act on, emissions from as many sources as possible.

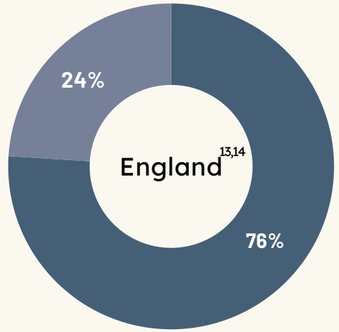
This is similar in other health systems:

- Scope 1, Direct emissions
- Scope 2, Indirect emissions
- Scope 3, Indirect emissions





Note that the relatively low share of Scope 2 emissions can be explained by France's low-carbon electrical grid.



- Closely managed activities (inc. energy consumption, fleet & business travel, water & waste, anesthetic and medical gases)
- Remainder of the supply chain, and staff, patient & visitor travel, and commissioned health services

NHS England does not report its emissions by scope. However, the proportions are broadly similar.

How Health Systems in Other Countries Approach GHG Estimation

RESOURCES:

A FRAMEWORK FOR SUSTAINABLE HEALTH SYSTEMS

It is important to understand the environmental impacts of healthcare through activities like GHG emissions estimation, so that actions can be taken to reduce these harms. However, there are multiple ways to ensure the creation of sustainable health systems. (15)

According to the work of Andrea MacNeill, Forbes McGain and Jodi Sherman, (15) the creation of sustainable health systems requires action in multiple areas:

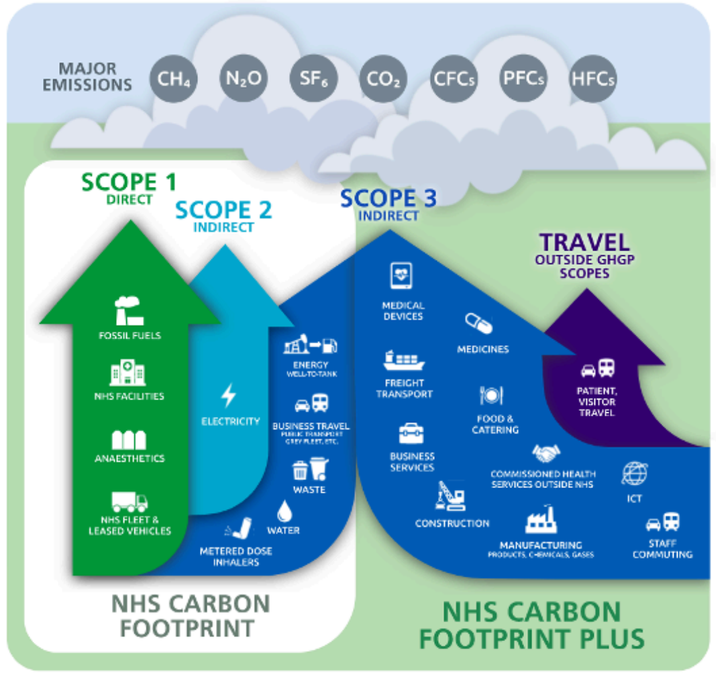
1. Reduce demand for health services: address the social determinants of health, support disease prevention by providing access to primary healthcare and public health services
2. Match the supply of health services to demand: avoid excess and inadequate capacity
3. Reduce emissions from the delivery of healthcare. This includes not only reducing emissions from facilities, fleet and, energy supply but also looking to change the way care is delivered

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 good 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

Figure 2: NHS England Carbon Footprint



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.(13) 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 they now all have a board-level "net-zero" lead.(14)

The NHS combines two established methods to calculate health system emissions using a "hybrid" approach.(13,14) See side panel for more information.

"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 as is used to calculate the UK's national consumption emissions.(16) Commissioned health services, business travel, and the NHS supply chain emissions are calculated using top-down modelling.(14)

"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.(14) 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.

TOP-DOWN AND BOTTOM-UP MEASUREMENT

TOP-DOWN

- These approaches are based on environmentally extended economic input-output analysis, using financial activity data to estimate emissions from a healthcare system
- Calculates GHG emissions based on the amount of money spent purchasing goods and services from various sectors
- In healthcare systems, this type of modelling can help identify hotspots and develop strategies to reduce emissions. However, this approach does not provide detailed information on the emissions attributable to specific goods and services used in healthcare (17)

For bottom-up approaches, **environmental life cycle assessment (LCA)** is an internationally standardized methodology for quantifying emissions of a product or a process over its life cycle (material extraction and processing, manufacturing, assembly, use, and end-of-life.)(17) LCAs are not specific to healthcare but are used in many industries.
LCA allows for comparison between different products or clinical procedures that perform similar functions. (17)

BOTTOM-UP

- This type of modelling,using physical quantities, gives more granular information that can be used to help implement emissions reductions strategies. However, the collection of information can be very time consuming
  - The complexity of health systems and their supply chains means that it is often not feasible to collect information and conduct an LCA on every product
  - Some researchers are exploring innovative statistical approaches (e.g. by estimating GHG emissions for a random sample of purchased goods and services) to help overcome these practical challenges (18)

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 the global ATACH program. To support healthcare organizations in reaching their GHG emissions reductions commitments, OCCHE has produced a compendium of federal resources. This includes, "A Primer on Measures and Actions for Healthcare Organizations to Mitigate Climate Change" (2022) 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 Action Collaborative is a public–private partnership that includes 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".(19)

On Earth Day, 2022 the White House/HHS Healthcare 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(20)) to reduce GHG emissions in federal operations and lead by example in order to achieve net-zero emissions economy-wide by 2050.(21) The pledge is a voluntary commitment to climate resilience and emissions reductions and includes cutting greenhouse gas emissions by 50 percent 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.(20)

FRANCE

Following from national deliberations over environmental policy that were codified through the Grenelle Act (2009), (22) the health sector committed to measure and improve its sustainable development performance in 2009, with the signing of 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)(23), 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)(24) 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 (25) requires greenhouse gas 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 must include Scope 1 and 2 emissions. In support of this legal article, the guide "Carrying out a greenhouse gas emissions assessment for medico-social establishments"(26) was published in 2013 and updated in 2019, based on the GHG protocol, ISO-14064 and Bilan Carbone methods.

WHAT

Resources, Products and Recommendations

What is the Current State of GHG Emissions Reporting in Canadian Health Systems?

There are a range of provincial/territorial and federal requirements for reporting and pricing GHG emissions. The focus of these regulations is Scope 1 emissions emitted by specific facilities.

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". There is variation in carbon pricing systems in Canada, but the federal government sets the minimum standards, which every jurisdiction must meet. (27)

Federally, the pricing system has two parts: the fuel charge on fossil fuels, charged to the consumer, and the Output-Based Pricing System, targeted at large industrial emitters.(27) The threshold for participating in the federal Output-Based Pricing System is 50,000 tonnes, or more, of CO_2e emitted per year (Scope 1 emissions), which applies to jurisdictions under the federal backstop program (MB, PE, YT, NU). The other provinces and territories have their own pricing systems (with emissions thresholds ranging from 10,000 to 100,000 tonnes CO_2e/year).

REPORTING REQUIREMENTS

A. FEDERAL REQUIREMENTS:

The Canadian Greenhouse Gas Reporting Program requires facilities that produce 10,000 tonnes or more CO_2e/year to submit a report on their Scope 1 emissions. A map of facilities, including healthcare organizations, that have reported their GHG emissions is available here.

B. PROVINCIAL REQUIREMENTS:

Some provinces require that emitters over a certain threshold of CO2e/year (ranging from 10,000 tonnes CO_2e to 15,000 tonnes CO_2e) report those emissions to the provincial government (verification requirement may occur at higher thresholds). Reporting requirements are at a facility level and focus on Scope 1 emissions. Some healthcare facilities may report under these regulations.

Some provinces and territories require that broader public sector organizations report their GHG emission to the provincial/territorial government, with no emissions threshold. Some healthcare organizations in these provinces and territories fall under these requirements.

TABLE 2. Provincial/territorial GHG reporting requirements

PROVINCE/TERRITORY	PROVINCIAL REPORTING REQUIREMENTS		PUBLIC AND BROADER PUBLIC SECTOR REPORTING
	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[1]
Manitoba	N/A	N/A	Yes[2]
New Brunswick	N/A	N/A	Yes[3]
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	No
Ontario	Greenhouse Gas Emissions: Quantification, Reporting and Verification Regulation	10,000 tonnes CO_2e	Yes[4]
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

1. Carbon Neutral Government Regulation
2. *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.*
3. *Service New Brunswick has completed the creation of a government-wide energy management tracking and reporting system, which allows for reporting on 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*
4. *Regulation 507/18: Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans*

What Types of GHG Emissions are Being Estimated in Canadian Healthcare Settings?

Regardless of government requirements for GHG emissions reporting, a minimum set of GHG emissions are being routinely estimated by regional health authorities, integrated health and social services centres and large hospital systems (See Table 3). This information is being used to support internal decision making. It should be noted that some healthcare organizations have estimated (or are in the process of estimating) a broader scope of emissions; such efforts are not included as routine estimation efforts in the table.

GHG EMISSIONS REPORTING IN BRITISH COLUMBIA

British Columbia has the most comprehensive GHG reporting and pricing system for the public and broader public sector. 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, mobile fuel combustion, purchased energy, and supplies (i.e., paper) (28) and the 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 3. Routine estimation of healthcare-associated GHG emissions across Canada

ENERGY-RELATED EMISSIONS		
Activity data tracked and GHG emissions estimated: with regularity across multiple jurisdictions	Stationary Combustion	Scope 1
	Purchased Electricity	Scope 2
	Purchased heating and cooling (steam, hot water, chilled water)	Scope 2
DIRECTLY CONTROLLED GAS RELEASES/EMISSIONS		
Activity data tracked and emissions estimated: with regularity in few jurisdictions	Halogenated volatile anesthetic gases	Scope 1
Activity data tracked and emissions estimated: with regularity in few jurisdictions	Nitrous oxide	Scope 1
Activity data tracked and GHG emissions estimated: rarely (few organizations track refrigerant losses; one known organization is assigning emissions)	Fugitive emissions (leaks from refrigeration, air conditioning, fire suppression systems)	Scope 1

Few= two or more jurisdictions. Rarely= one jurisdiction. Based on information received from informational interviews.

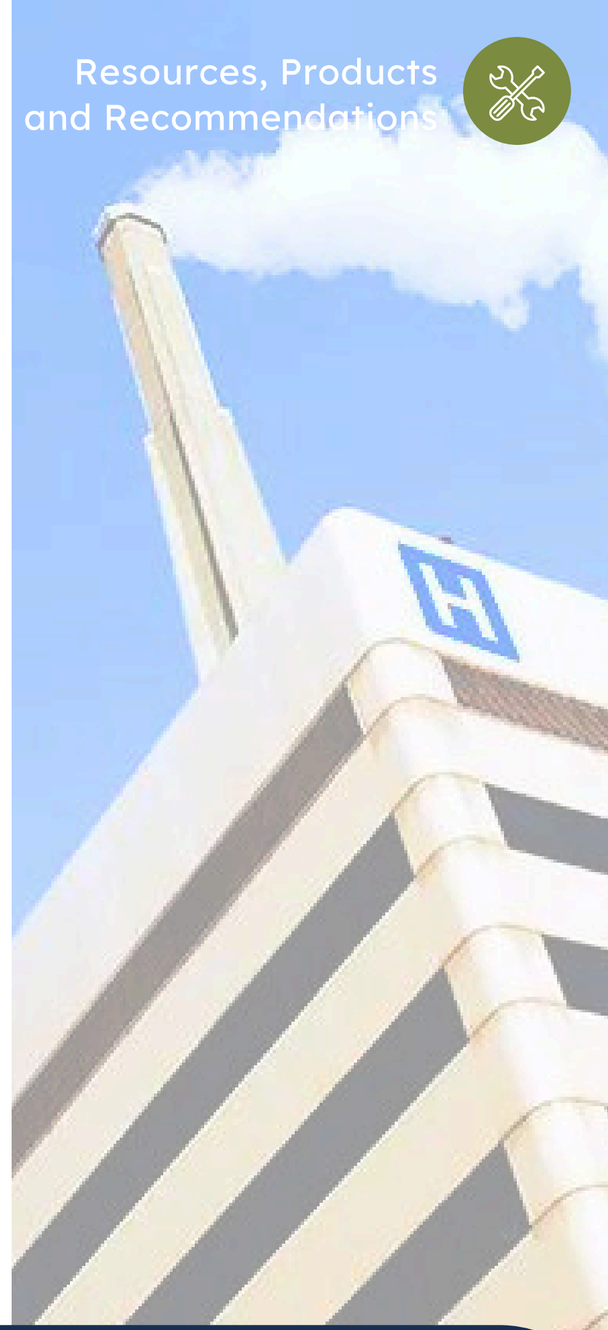


TABLE 3. (continued)

TRAVEL-RELATED EMISSIONS		
Activity data tracked and emissions estimated: with regularity in few jurisdictions	Fuel use from fleet vehicles	Scope 1
Activity data tracked and GHG emissions estimated: rarely (one known organization assigning emissions)	Business travel	Scope 3
Not currently estimated as routine activity	Upstream transportation & distribution (e.g., logistics, couriers)	Scope 3
Not currently estimated as routine activity	Employee commuting	Scope 3
Not currently estimated as routine activity	Patient travel	Scope 3[4] *Note: NHS England considers to be outside of GHG Protocol Scopes
Not currently estimated as routine activity	Visitor travel	NHS England considers to be outside of GHG Protocol Scopes

Few= two or more jurisdictions. Rarely= one jurisdiction. Based on information received from informational interviews.

4. The Greenhouse Gas Protocol's "Technical Guidance for Calculating Scope 3 Emissions" explains that customers travelling to retail stores could be included in category 9 - Downstream Transportation and Distribution. By this logic, patients travelling to healthcare facilities could be included in this category

TABLE 3. (continued)

OTHER SCOPE 3 EMISSIONS		
Activity data tracked and emissions estimated: with regularity in few jurisdictions	Waste treatment	Scope 3
Activity data tracked and emissions estimated: with regularity in few jurisdictions	Purchased paper	Scope 3
Not currently estimated as routine activity	Other purchased goods and services	Scope 3
Not currently estimated as routine activity	Use of sold products (e.g., from hospital pharmacies)	Scope 3
Not currently estimated as routine activity	End-of-life sold products (e.g., from hospital pharmacies)	Scope 3
Not currently estimated as routine activity	Fuel and energy related activities (not included in Scope 1 and 2)	Scope 3
Not currently estimated as routine activity	Investments	Scope 3

Few= two or more jurisdictions. Rarely= one jurisdiction. Based on information received from informational interviews.

Opportunities for Organization-based GHG Emissions Estimation

While many large healthcare organizations across the country routinely estimate some GHG emissions, not all healthcare organizations do. Unless included within the estimates made by health authorities, integrated health and social service centres or large hospital systems, few community or primary care clinics, long term care and retirement facilities, or other community sites (e.g., pharmacy, dental, optometry, rehabilitative care, etc.) routinely estimate any GHG emissions.

There may be opportunities for smaller healthcare organizations to start to estimate some GHG emissions, and for the larger healthcare organizations that already do this to expand the types of activities for which they estimate GHG emissions.

To help organizations that are thinking of starting, or expanding, their GHG emission estimation efforts, the **Organizational GHG Emissions Measurement: Opportunities and Guidance Chart** identifies key considerations for doing so. The chart arranges emissions sources from those seen to be the most readily estimated (at the top) to those seen to be the least readily estimated (at the bottom), acknowledging that there will not be uniformity in this across organizations. The factors that were considered in placing emissions sources closer to the top include:

- Greater agreement among our expert advisory group that the emissions source could be regularly estimated
- Clear sources of activity data
- Available and robust emissions factors (to convert activity data to emissions data)
- Policy or guidance that recommends the measurement of that emission source or provides methodological guidance within Canada or in comparable jurisdictions, including from the English NHS, organizations in the US, and France

ORGANIZATIONAL GHG EMISSIONS MEASUREMENT: OPPORTUNITIES AND GUIDANCE CHART

Download the chart here.

GHG EMISSIONS POLICY AND GUIDANCE DOCUMENTS

To assist users of the chart in considering whether and how to estimate GHG emissions from the included categories, reference has been made to some policy and/or guidance documents that recommend routine estimation or provide relevant guidance.

CANADIAN POLICY AND GUIDANCE:

- **Alberta Health Services Environmental Sustainability Policy** (2020) – routine estimation recommended
- **2020 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions: For Public Sector Organizations, Local Governments, and Community Emissions** (British Columbia Ministry of Environment and Climate Change Strategy) – routine estimation required

POLICY AND GUIDANCE IN OTHER JURISDICTIONS:

- **National Health Service – England: Delivering a 'Net Zero' National Health Service** (2022) – estimated using "bottom up" approaches
- Agency for Healthcare Research and Quality (US): **Reducing Healthcare Carbon Emissions: A Primer on Measures and Actions for Healthcare Organizations to Mitigate Climate Change** (2022) – recommended as a "core measure" for healthcare organizations to estimate
- ADEME (France): **Réalisation d'un bilan des émissions de gaz à effet de serre: Guide sectoriel établissements sanitaires et médico-sociaux** français) – provides methodological guidance
- Aga Khan Development Network – Guide to Aga Khan Development Network's **Carbon Management Tool** (2021) – provides methodological guidance
- Greenhouse Gas Protocol - **Scope 2 Guidance** (2015) and **Technical Guidance for Calculating Scope 3 Emissions** (2013) – provides methodological guidance

NATIONAL INVENTORY REPORT

Canada's National Inventory Report (NIR) is submitted annually to the United Nations Framework Convention on Climate Change as a part of Canada's official national greenhouse gas inventory. The NIR accounts for GHG emissions across many sectors and provides emissions factors for many emission sources, including:

- Natural gas
- Refined petroleum products including fuel oil and diesel
- Mobile combustion by vehicle and fuel type
- The use of halocarbons in air conditioning, refrigeration, fire extinguishing
- The use of nitrous oxide as an anesthetic and as a propellant
- Municipal wastewater treatment and discharge
- Waste incineration

The emissions factors are available here.

System-wide GHG Emissions Estimation

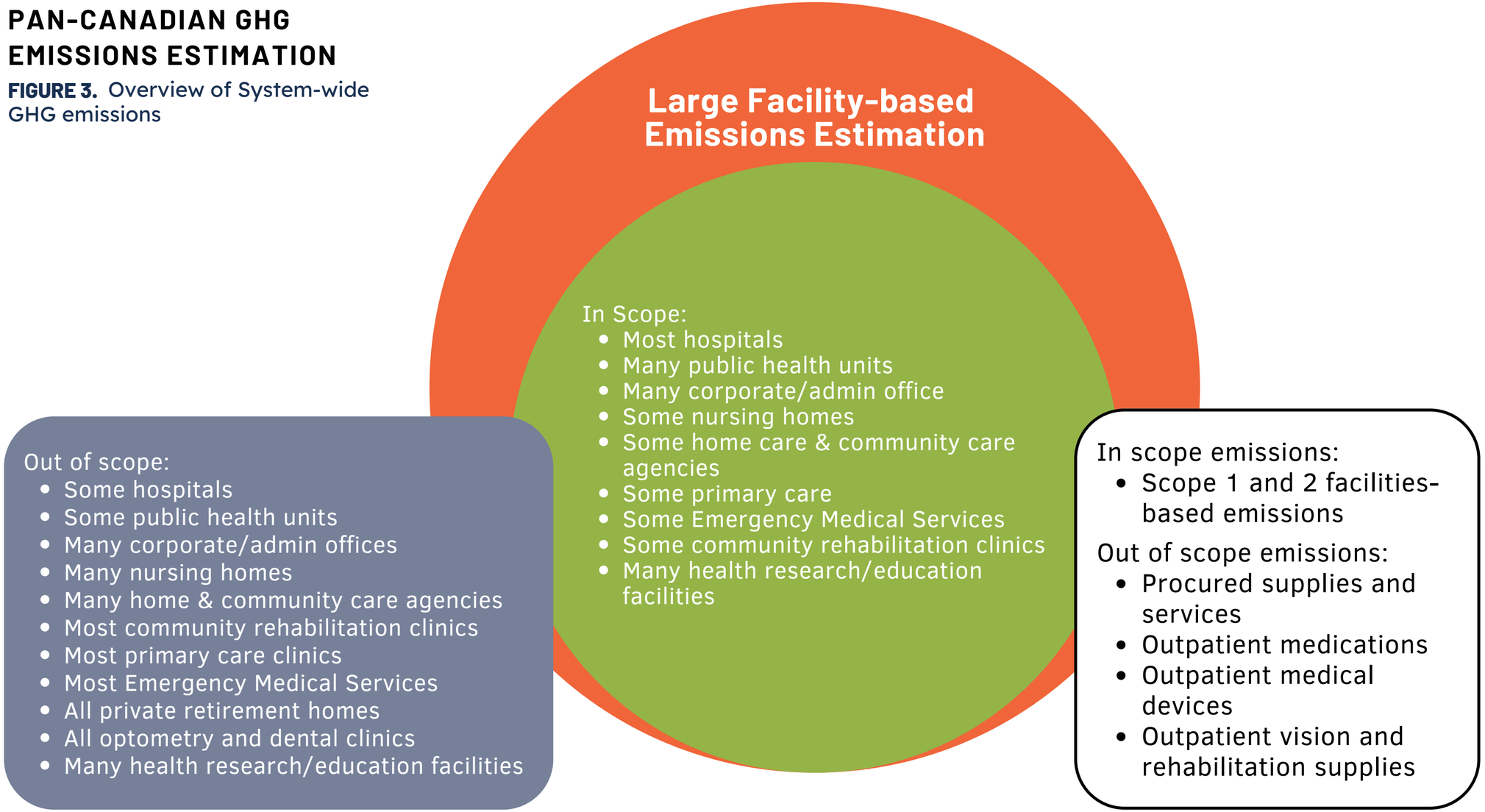
For several reasons, the estimation of GHG emissions by healthcare organizations across Canada accounts for a relatively small proportion of emissions from the whole health system.

- 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. 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, thus excluding 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 (see Figure 3).

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”.(29) CIHI databases provide a range of data and information on 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; clinical, administrative and resource utilization data from publicly funded home care and long-term care programs in Canada.

PAN-CANADIAN GHG EMISSIONS ESTIMATION

FIGURE 3. Overview of System-wide GHG emissions



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.

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.

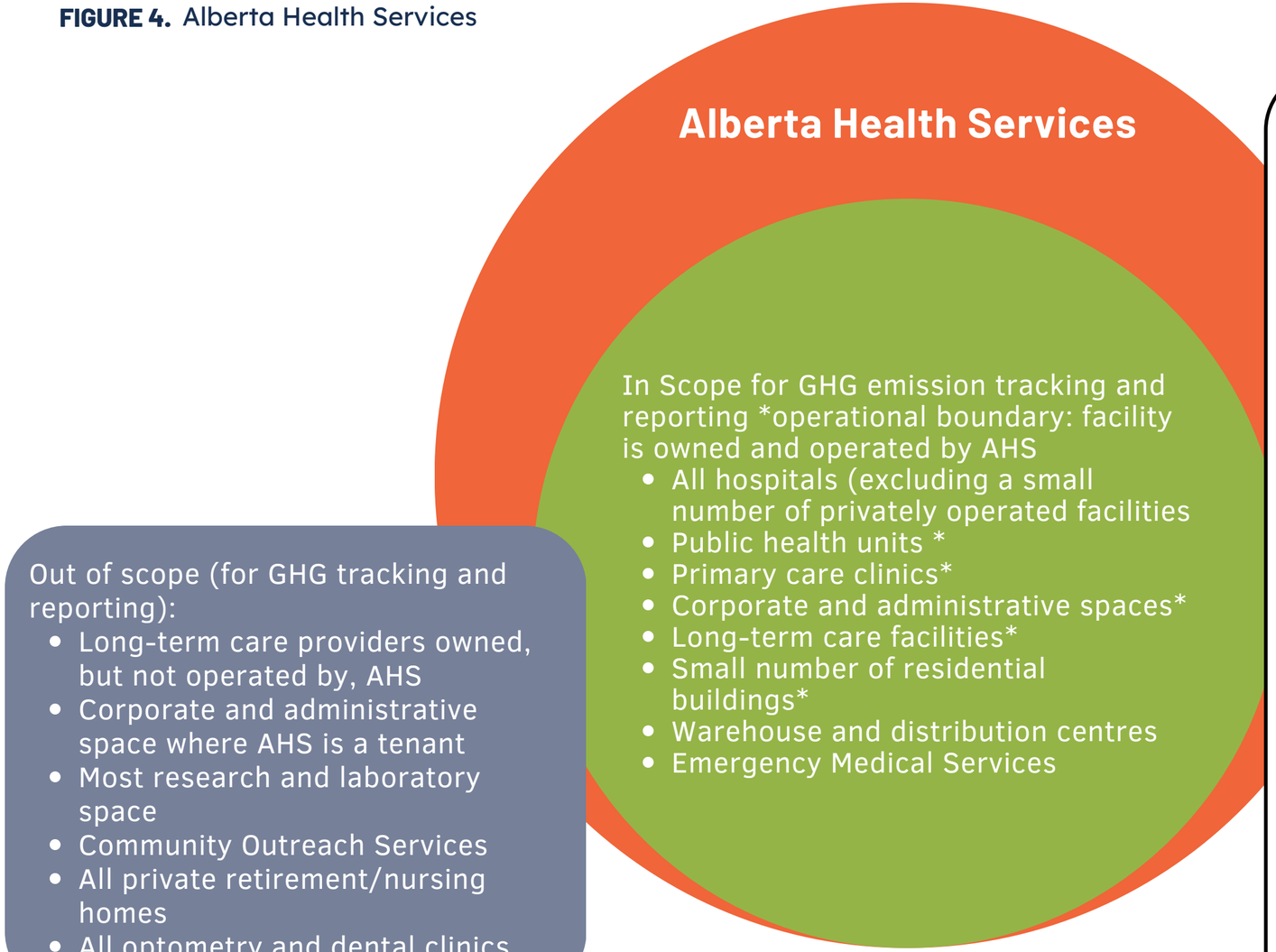
TYPES OF CARE PROVIDED:

- 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. Tracking is not done for facilities where there is no control over the utilities. Generally, this means AHS tracks emissions where it owns the entire building and excludes facilities where AHS is leasing space. 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).

FIGURE 4. Alberta Health Services



In scope emissions:

- Scope 1 and 2 facilities-based emissions
  - On-site fuel combustion
  - Purchased electricity, steam, chilled water
  - Vehicle emissions (owned and leased)
  - Anesthetic gases and nitrous oxide
- Scope 3 emissions:
  - Water and wastewater
  - Waste (for some sites)
  - Biomedical waste
  - Paper usage

Out of scope emissions:

- Refrigerants
- Emissions from light and heavy equipment
- Employee commuting
- Business travel
- Third party delivery vehicles
- Diesel for emergency generators
- Most purchased supplies and services
- Outpatient medications
- Outpatient assistive and medical devices
- Outpatient vision and rehabilitation supplies

ONTARIO - 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:

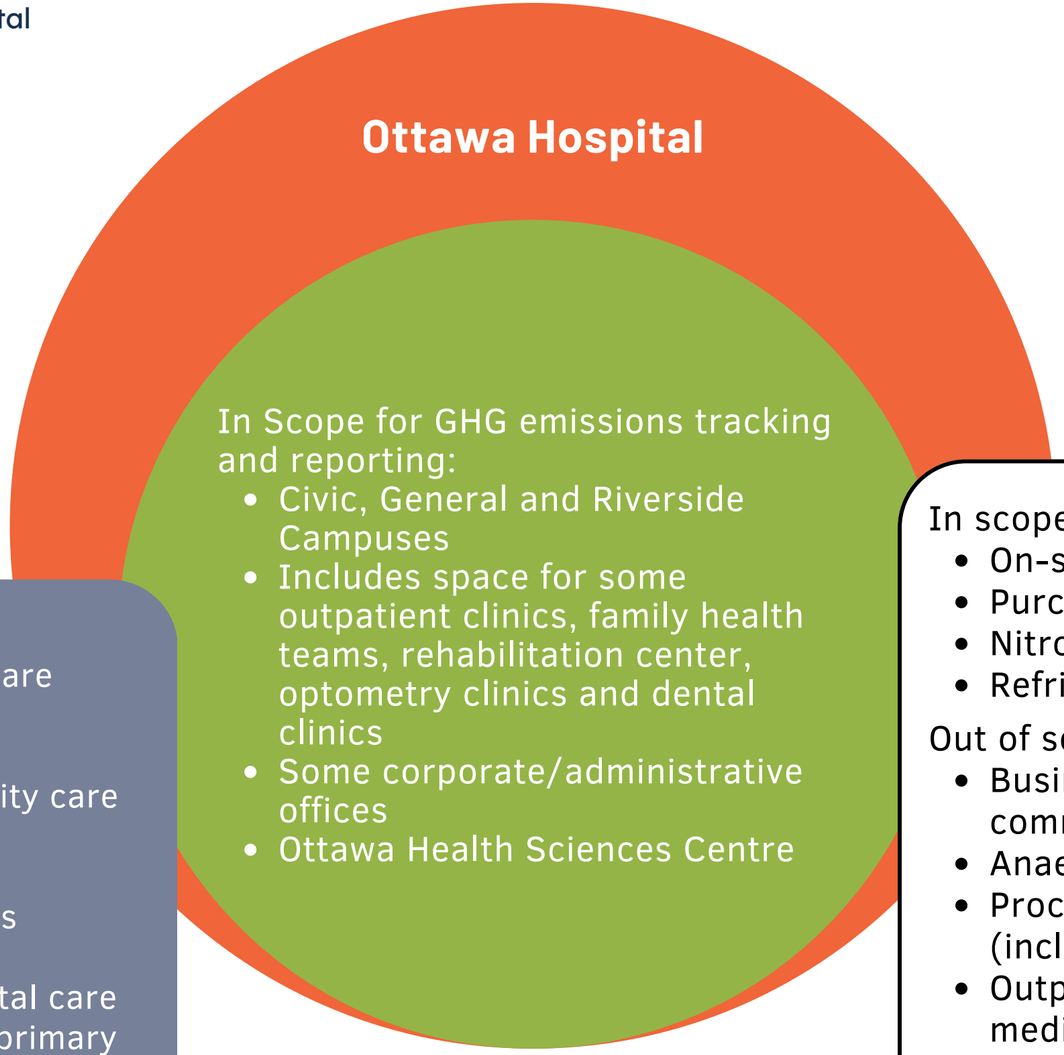
- Acute care, cancer care, neonatal intensive care, trauma care, rehabilitation services, dialysis, outpatient care, surgical procedures, ophthalmology, transitional beds for patients awaiting transfer to long-term care, family health teams, maternal/fetal care, mental health care, and other types of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

GHG EMISSIONS TRACKING:

- The 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.

The Ottawa Hospital strives to be a leader in sustainable healthcare, applying principals of planetary health to improve the well-being of its patients and its community, and 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.

FIGURE 5. The Ottawa Hospital



Out of scope:
- Private long-term care facilites
- Public health units
- Home and community care agencies
- Community-based rehabilitation clinics
- Community-based optometry and dental care
- Community-based primary health care

In scope emissions:
- On-site fuel combustion
- Purchased energy
- Nitrous oxide
- Refrigerant losses

Out of scope emissions:
- Business travel, employee commuting and patient travel
- Anaesthetic gases
- Procured supplies and services (including pharmaceuticals)
- Outpatient assistive and medical devices
- Waste generated in operations

NEW BRUNSWICK

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.

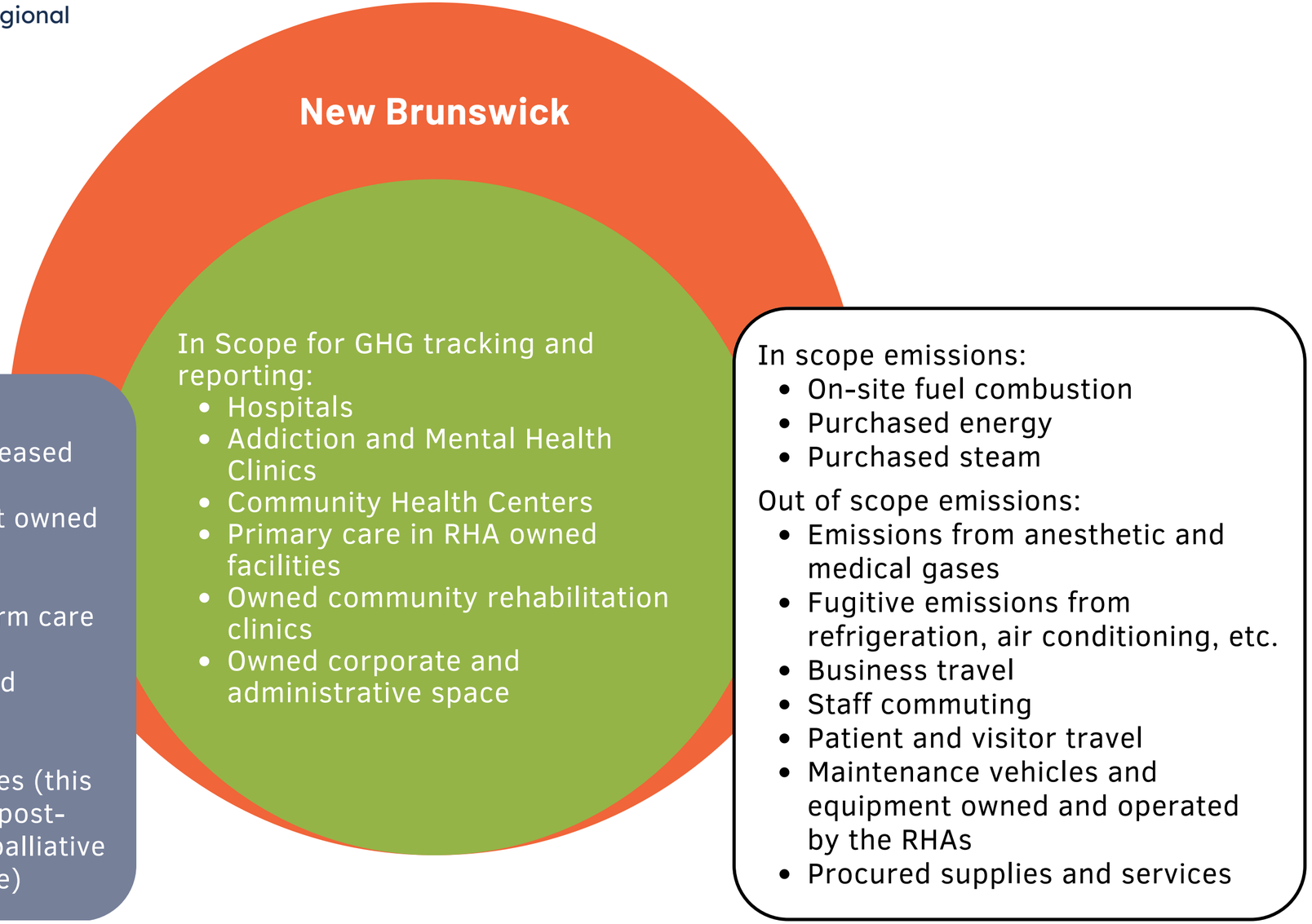
TYPES OF CARE PROVIDED:

- 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:

- GHG tracking and reporting happens through Service New Brunswick. 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.

FIGURE 6. New Brunswick Regional Health Authorities



Out of scope:

- Public health services in leased facilities
- Primary care in clinics not owned by the RHAs
- Dental or vision care
- Most nursing and long-term care homes
- Private long-term care and retirement home
- Ambulance services
- Extra-mural health services (this includes short-term care post-discharge, chronic care, palliative rehabilitation and at home)

In scope emissions:

- On-site fuel combustion
- Purchased energy
- Purchased steam

Out of scope emissions:

- Emissions from anesthetic and medical gases
- Fugitive emissions from refrigeration, air conditioning, etc.
- Business travel
- Staff commuting
- Patient and visitor travel
- Maintenance vehicles and equipment owned and operated by the RHAs
- Procured supplies and services

QUÉBEC - CISSS DE LAVAL

OVERVIEW OF HEALTHCARE ORGANIZATION AND FACILITIES:

- Laval's integrated health and social services center (Centre intégré de santé et services sociaux - CISSS) is one of 13 CISSSs in Québec.
- The CISSS de Laval includes 6 residential and long-term care centers (CHSLD),1 hospital, 1 youth center, 7 group homes, 3 rehabilitation centers for adults and 7 local community service centers (CLSC).(30)

Québec's health network also includes 9 university integrated health and social services centers (CIUSSS), 5 institutions serving a northern and indigenous population and 7 non-merged institutions.

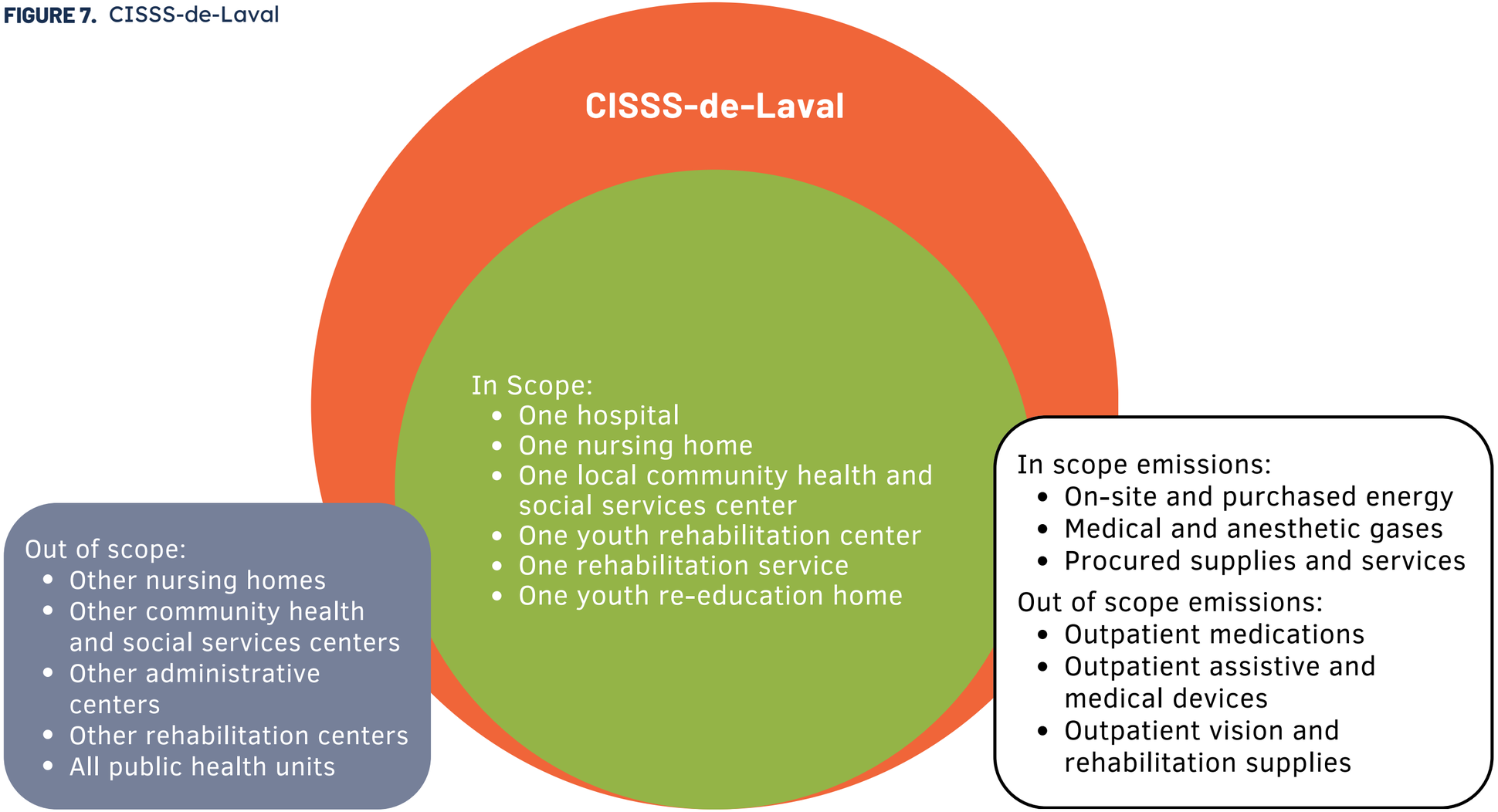
TYPES OF CARE PROVIDED:

- Acute care, mental health and addictions services, some primary care, rehabilitation for youth and adults, community healthcare, dialysis, oncology care 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. No ongoing monitoring of these emissions is planned at this time.

FIGURE 7. CISSS-de-Laval



QUÉBEC - CIUSSS-CENTRE-SUD-DE-L'ÎLE-DE-MONTRÉAL

OVERVIEW OF HEALTHCARE ORGANIZATION AND FACILITIES:

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

The Québec public health system also included 13 integrated health and social services (CISSS), 5 institutions serving a northern and indigenous population and 7 non-merged institutions.

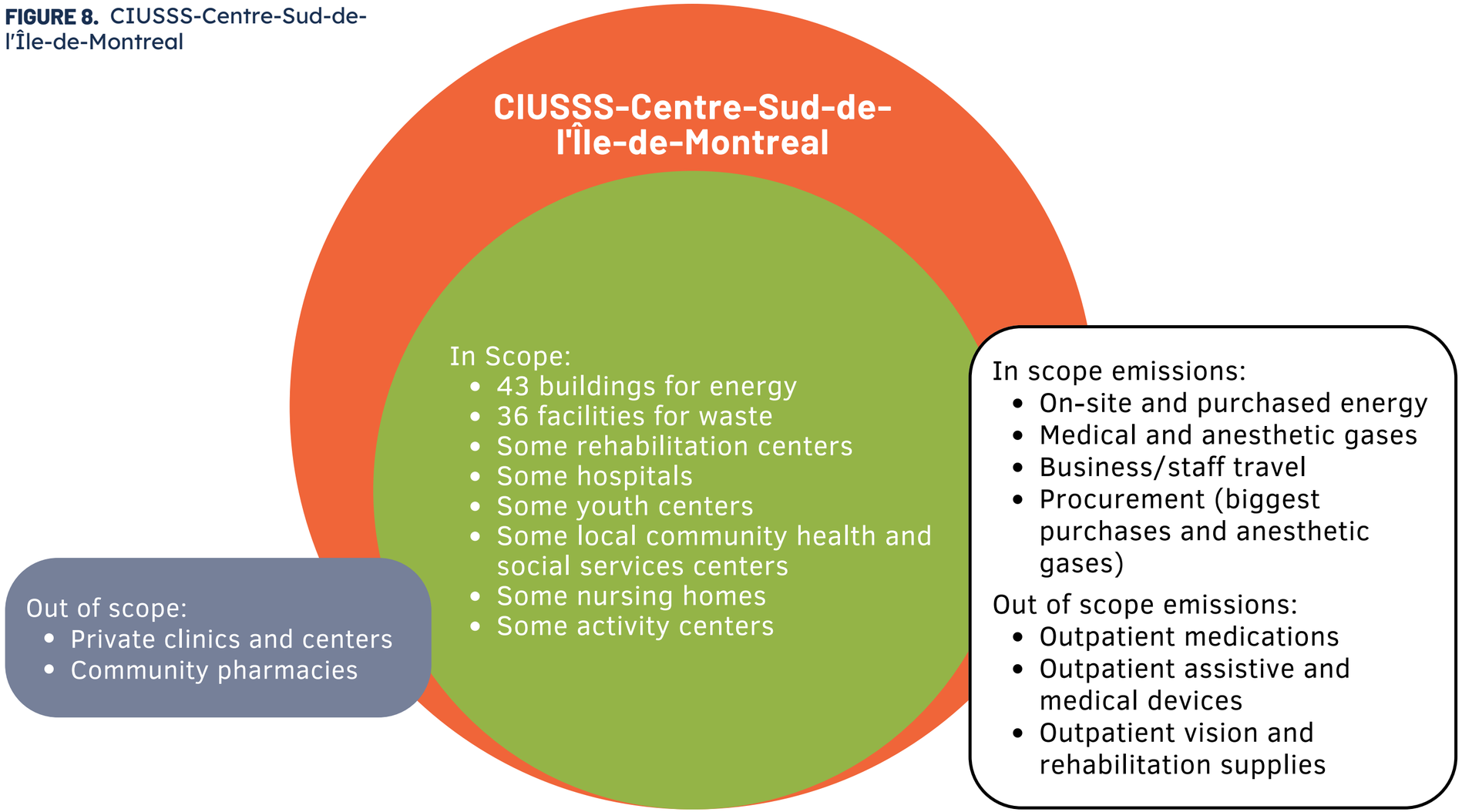
TYPES OF CARE PROVIDED:

- 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 centers, geriatric care

GHG EMISSIONS TRACKING:

- Measured emissions include 43 buildings for energy consumption and 36 for waste management and are extrapolated to the 210 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.

FIGURE 8. CIUSSS-Centre-Sud-de-l'Île-de-Montreal



Resources for GHG Estimation

Multiple tools and guidance documents are available for healthcare organizations as they work to estimate and reduce their GHG emissions. A list of some of these tools and resources is provided below. Not all are specific to healthcare, but this is noted where relevant.

GHG ESTIMATION TOOLS AND GUIDANCE

PRACTICE GREENHEALTH SCOPE 3 GHG EMISSIONS ACCOUNTING TOOL

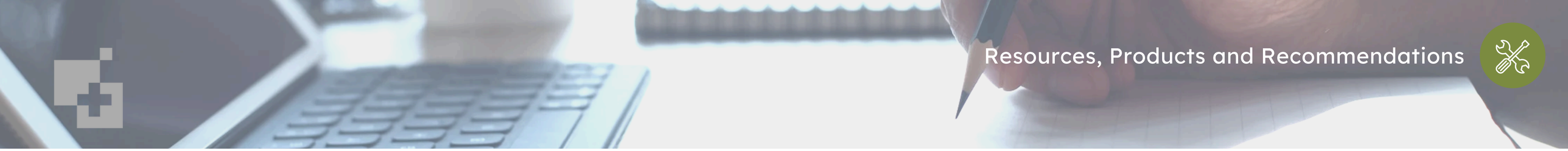
The tool uses a spend-based methodology (top-down) for health systems and hospitals to calculate Scope 3 GHG emissions. The tool was developed for US based healthcare organizations. It uses the 15 categories of the GHG Protocol Scope 3 Standard to organize emissions sources. These emission categories are spread across upstream and downstream activities. Its aim is to help hospitals and health systems identify and manage risks in their value chain, set credible and comprehensive decarbonization goals across all scopes of emissions, and achieve decarbonization across their value chain. (Member access only.)

AGA KHAN DEVELOPMENT NETWORK CARBON MANAGEMENT TOOL

The Aga Khan Development Network tool is based on the international standards of the GHG Protocol. Although it was originally designed for use in predominantly low- and middle-income countries, the tool can be used by health organizations globally. The tool identifies emissions categories in health facilities, ranging across the 3 emission Scopes. It also identifies carbon hotspots within an organization's purchased items and supply chain which helps to target actions at the most carbon intensive parts of the operation.

RESOURCES:

HealthcareLCA is a global living database of healthcare-related environmental impact assessments. Created in collaboration with CASCADES, the database is designed to support the transition to sustainable, low carbon health systems, providing 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.



SUPPLY CHAIN EMISSIONS CARBON CALCULATOR (YALE)

Developed by the Yale Center on Climate Change and Health and Northeastern University Department of Civil and Environmental Engineering, the calculator is designed for healthcare organizations to measure the emissions arising from the life cycle of the goods and services that they purchase. The tool uses spend and volume data to estimate GHG emissions for hospitals.

SIMPLIFIED GHG EMISSIONS CALCULATOR (EPA)

An Excel-based tool for small businesses and low-emitters to estimate their annual GHG emissions. This tool is not specific to healthcare. It provides estimates for Scope 1, Scope 2 and some Scope 3 categories.

SCOPE 3 EVALUATOR (GHG PROTOCOL AND QUANTIS)

The Quantis Scope 3 Evaluator is a free tool based on the GHG Protocol and specifically addresses Scope 3 emissions. It is not tailored directly to healthcare facilities and is not optimized for data collection and management processes. Results are based on simplified approaches and external validation is required.

GHG EMISSIONS CALCULATION TOOL (GHG PROTOCOL)

The GHG Emissions Calculation Tool is a free, Excel-based tool based on the GHG protocol framework that helps companies estimate their GHG emissions. It is not scope- nor healthcare- specific.

BILAN CARBONE

The Bilan Carbone method is a French method of GHG emissions accounting for all of an organization's activities. It allows the identification of significant emissions and the initiation of action plans in a continuous improvement process by equally considering direct and indirect emissions. It is not specific to healthcare facilities.

REDUCING HEALTHCARE CARBON EMISSIONS: A PRIMER ON MEASURES AND ACTIONS FOR HEALTHCARE ORGANIZATIONS TO MITIGATE CLIMATE CHANGE (AGENCY FOR HEALTHCARE RESEARCH AND QUALITY)

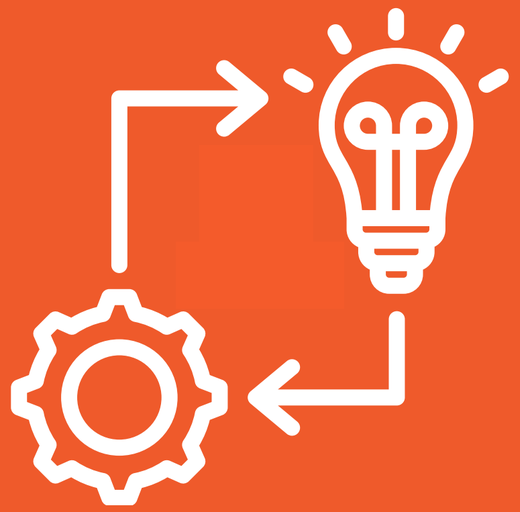
The primer was developed to help healthcare organizations meet their decarbonization goals in response to the US government’s Federal Sustainability Plan. The Primer identifies high priority measures and strategies to guide healthcare organizations looking to reduce their GHG emissions.

TRACKING TOOLS USED IN CANADIAN HEALTHCARE SETTINGS

Many tools exist to support organizations to estimate their emissions. In Canada, two tools that are made available by Natural Resources Canada (NRCan) are commonly used by healthcare organizations: ENERGY STAR Portfolio Manager and RETScreen.

PORTFOLIO MANAGER is a web-based energy management and benchmarking tool for any type of building, however, only eligible building types get ENERGY STAR scores 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). Portfolio Manager uses Canadian emissions factors to determine GHG emissions from facilities. It does not currently measure Scope 3 emissions.

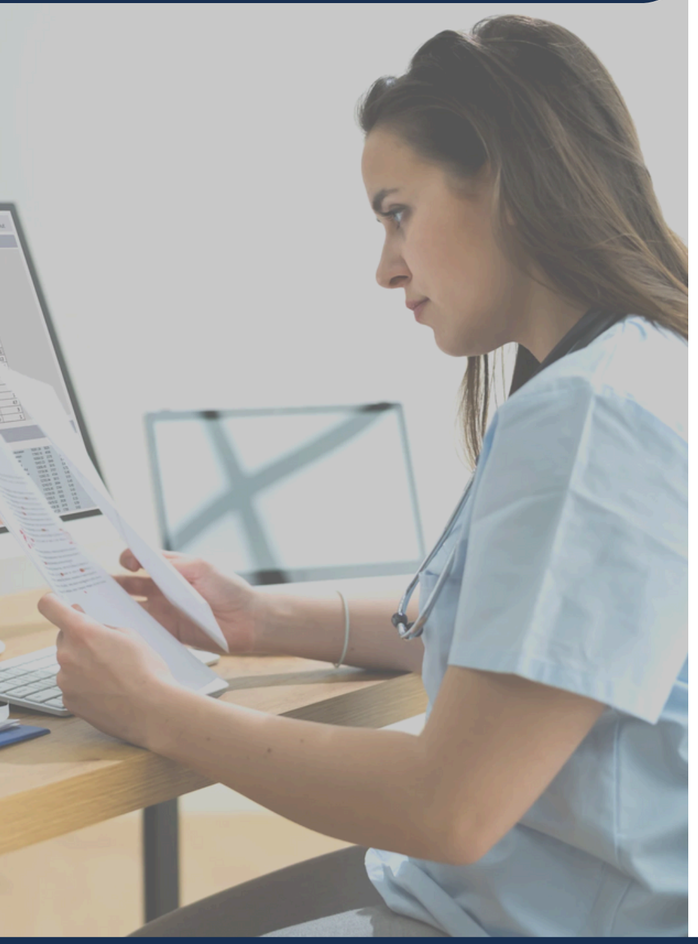
RETSCREEN CLEAN ENERGY MANAGEMENT SOFTWARE was developed and made available by NRCan. A free version is available in viewer mode along with a professional version available through paid annual subscription. RETScreen supports low-carbon planning, implementation, monitoring and reporting and can be integrated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



HOW

Strategy to Implement and Create Change

Capacity & Strategy



GHG emissions estimation requires expertise, time, and robust data systems. As with all performance monitoring, it can support improvement but can also produce a variety of unintended and dysfunctional effects.(31) Thus, it should be guided by system strategy, and resourced to achieve well-defined objectives.

Key issues for healthcare organizations to consider in deciding to pursue or extend GHG emissions estimation include:

Human Resources	Are necessary human resources available – with the time and expertise to collect and analyze the data, to produce robust estimates of GHG emissions, and to understand what the results mean in terms of change opportunities?
Data Quality	Are activity data of sufficient quality available? Are emissions factors of sufficient quality available to estimate emissions using these activity data?
Data Systems	Can data be reliably gathered, collated, and interrogated in a timely fashion? Are data systems integrated across divisions and dimensions, to permit integrated performance monitoring?
Data Value	Can the results of GHG emissions estimation be used to inform or influence relevant change processes? What priority should be placed on GHG emissions estimation relative to cognate efforts to deliver climate resilient, low carbon and sustainable health systems?

Engagement

Even the best-equipped measurement team cannot do this work alone. They require support from senior leaders, and from the many units and individuals across the organization who will have a role in collecting or interpreting the data, or in influencing or making change using the results.

ENGAGEMENT WITH SENIOR LEADERS

The engagement of senior leaders and alignment with an organization's strategic plan is an important component of the sustainable health system initiatives underway around the world. In England, for example, the NHS requires a board-level "net-zero" lead (32) be identified by all NHS trusts and Integrated Care Boards (local healthcare system). In the United States, also, the US Health Sector Climate Pledge requires the designation an executive-level lead for work on reducing emissions by 2023. (20)

In Canada, there is growing engagement by healthcare leaders in the move to sustainable health systems. Some of this is encouraged by governments. In British Columbia, for example, Mandate letters to Health Authorities from the Minister of Health have highlighted the importance of aligning health sector work with the province's climate ambition since 2019. In Quebec, the Ministry of Health and Social Services requires one sustainable development respondent per institution for 16 of the 18 health regions, for a total of 30 respondents. Each respondent is responsible for the creation and maintenance of a sustainable development committee and representatives from the health regions forming a ministerial community of practice.(33) Non-governmental organizations are also encouraging health sector leaders to engage. For example, the Health Standards Organization (HSO) has included environmental stewardship in its recent leadership and governance standards. As well, the Canadian College of Health Leaders has partnered with CASCADES to offer a Health Leadership Specialty in Sustainable Health Systems.

ENGAGEMENT WITH PEOPLE ACROSS THE ORGANIZATION

Even with strong support from leadership, the extension of GHG emissions estimation beyond the traditional focus on energy will require engagement with administrators and clinicians from across departments and roles.

Cross-organization engagement can support the identification and collection of relevant data sources and is vital to making change with any results. Clinical engagement and leadership, for example, will be necessary to support reductions from medical and anesthetic gases. For many organizations, it will be necessary to deepen engagement in traditional areas of sustainability action - e.g., facilities, environmental services – and build engagement and capacity beyond traditional sustainability areas – e.g., clinical operations, procurement, biomedical engineering, infection prevention and control, food services, etc.

ENGAGEMENT WITH SUPPLIERS

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 it requires will need to be engaged in the transition to sustainable health systems. Organizations can include emission criteria in their supplier selection processes, third party risk management programs and supplier performance/relationship management programs.

Already, 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'. 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.(34) This process could be used as an example for purchasing contracts in healthcare.

Measure What Matters*

Performance-based approaches to healthcare improvement have grown markedly in healthcare since the turn of the 21st century, securing important benefits alongside some unintended effects. Increasingly, practitioners and scholars are considering how to successfully integrate sustainability indicators into healthcare performance monitoring, including but not limited to GHG emissions estimates.

UNDERSTAND THE STRENGTHS AND LIMITATIONS OF GHG EMISSIONS ESTIMATION

GHG emissions estimates for some healthcare activities are very robust and can readily guide action, as is the case for most Scope 1 and 2 emissions. As well, CO_2e is a common metric with which to compare diverse activities, such as fuel consumed for heating and anesthetic gases released for safe and pain-free surgery. Further, tools like the Greenhouse Gas Equivalencies Calculator from NRCan can convert GHG emissions data into everyday units, such as the number of homes powered for a year or cars on the road. Such data can help communicate the significance of GHG reduction efforts to a broader audience. Notwithstanding these strengths, there are also limitations with many GHG emissions estimates in healthcare. Though evidence on the environmental impact of numerous healthcare services, procedures, and products is growing (see HealthcareLCA, produced in collaboration with CASCADES), such evidence remains limited,(35) and is subject to data quality concerns, given inconsistency in how environmental impacts in healthcare are estimated.(36) Healthcare emissions estimates are just that- estimates – often drawing heavily on highly aggregated “top-down” modelling. These estimates may help to prioritize areas for GHG emissions reduction (i.e., hot spots) or support year-on-year assessments of improvement against an organization’s own baseline (i.e., performance tracking).

SUPPORT LEARNING AND IMPROVEMENT

There are several well-known risks of performance monitoring in healthcare, including a variety of measurement challenges, for example where fixation on a target is detrimental to the achievement of the underlying ambition.(37) GHG emissions estimation is not immune to such risks, as Table 4 suggests. Measurement challenges reinforce the need to use performance-based approaches to health system sustainability to foster learning rather than for systems of accountability that enable blame or sanction.(39)

**Adapted from: Miller FA. Parker G. Performance Monitoring for a Sustainable Health System: New Wine, New Bottles? In: Braithwaite, J., Smith, K., Zurynski, Y. (Eds.). (expected 2023). Handbook on Climate Change and Health System Sustainability. London: Routledge.*

TABLE 4. Risks of GHG emphasis for sustainable health system performance monitoring (adapted from Mannion & Braithwaite, 2012) (38)

	CHALLENGE	POTENTIAL SOLUTION
FIXATION RISKS	Pursuing the target rather than the underlying ambition it reflects	
	• A common target for GHG reduction is GHG efficiency (i.e., reduced GHG intensity of an activity) within a practice or organization. Improved efficiency will not necessarily translate into absolute GHG reductions, given the risk of rebound (i.e., more activity outweighs the improved efficiency of each activity) and the upward global trends in need for healthcare	• The focus should be on absolute GHG reduction across whole systems and globally
TUNNEL VISION RISKS	Pursuing the target to the exclusion of other relevant but unmeasured impacts	
	• Attention to GHG emissions will not necessarily reduce other environmental harms, including high impact harms from low quantities of emissions (e.g., pharmaceuticals excreted to the aquatic environment) • Mitigation initiatives can sometimes compete with adaptation and resilience for funding and timing of delivery	• Multiple climate and environmental impacts are relevant • Opportunities to pursue mitigation, along with adaptation and resilience in the same action should be explored
OSSIFICATION RISKS	A rigid approach to measures and targets fails to account for or enable innovation	
	• Available estimates of GHG emissions intensity will often fail to reflect the current state (or emerging developments), for example, changes in the GHG-intensity of electricity production, or manufacturing processes. This affects the accuracy of estimates of the environmental impacts of various healthcare products or procedures and the associated actions to improve performance	• Indicators and targets should be regularly reviewed and updated
OFF-TARGET RISKS	Low quality data limits the potential to inform and guide improvement	
	• Limited availability of high-quality evidence estimating GHG emissions limits the potential for robust modelling of most healthcare emissions • Normalization factors for most GHG emissions are lacking, making inter-organizational comparison risky • The conversion of activity data into GHG estimates often involves the use of low-quality emissions intensity estimates, which degrades the potential of activity data, even if of high quality	• Few emissions estimates can support external accountability • Data may inform year-on-year improvements against baseline for individual organizations or national systems • Performance monitoring of activities (not GHG emission estimates of these same activities) may be more robust

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About this playbook

The information in this playbook is derived from publicly available sources and expert consultation. Unless otherwise specified, the information provided does not represent the views of any one individual or organization. CASCADES gratefully acknowledges the contributions and expertise of our working group members and other consulted experts. Any errors are the responsibility of CASCADES alone.

LEAD AUTHORS

- Jessica Nowlan, Innovation Lead (Atlantic Canada), CASCADES
- Sarah Machane, Innovation Lead (Quebec), CASCADES
- Fiona A Miller, Fiona Miller, PhD, Director, CASCADES; Director, Collaborative Centre for Climate, Health & Sustainable Care; Professor

WORKING GROUP MEMBERS

- Alberta Health Services, Office of Sustainability & Energy Management
- Mike Apostol, Energy Management Specialist, London Health Sciences Centre
- Nathan Ayer, Director of Analytical Services, EarthShift Global
- Akintunde Ayoade, Research Officer, Energy Efficiency and Technology Sector, Natural Resources Canada
- David Bligh, Senior Energy Manager, EfficiencyOne
- Vincent Boisvert, Senior Sustainability Advisor, CIUSSS-de-Nord-de-l'Île-de-Montréal (formerly CISSS-de-la-Montérégie-Centre)
- Kate Butler, Executive Director, Energy Management Unit, Service New Brunswick
- Alex Cimprich, School of Environment, Enterprise and Development, University of Waterloo
- Marianne Dawson, Sustainability Consultant, Fraser Health, Providence Health Care, Provincial Health Services Authority, Vancouver Coastal Health
- Craig Doersken, Executive Director, Capital and Facilities Management Portfolio, Shared Health Manitoba
- Christine Donaldson, Vice President, Pharmacy, HealthPRO Procurement Services Inc.
- Ron Drummond, Executive Director – Capital Projects and Facilities Management, The Ottawa Hospital
- Kendra Frey, Vice President, Materials Management, HealthPRO Procurement Services Inc.
- Babita Gupta, Senior Consultant, Office of the VP Research and Analysis, Canadian Institute for Health Information (CIHI)

WORKING GROUP MEMBERS

- Benoit Lalonde, Deputy Director, Technical Services Department, CISSS-de-Laval
- Michael Lithgow, Manager of Energy & Climate Action, Sunnybrook Health Sciences Centre
- Emily Lomax, Sustainability Consultant, Fraser Health, Providence Health Care, Provincial Health Services Authority, Vancouver Coastal Health
- Michael Kurz, Team Lead, Energy and Innovation, University Health Network
- Marion Nuss, Sustainable Development Advisor, CIUSSS-Centre-Sud de l'Île-de-Montréal
- Katelyn Poyntz, Director, Project Engineering & Energy Engineering and Plant Services, Unity Health
- Taimur Qasim, Canadian Standards Association
- Jennifer Reynolds, Co-Executive Director, Nourish
- Jérôme Ribesse, Deputy CEO, Synergie Santé Environnement
- Ed Rubinstein, Director, Environmental Compliance, Energy and Sustainability, University Health Network
- Jared Saunders, Specialist – Energy & Sustainability, Saskatchewan Health Authority
- Nathaniel Schrader, Energy Manager, EfficiencyOne
- Linda Varangu, Senior Advisor, Climate Change, Canadian Coalition for Green Health Care
- Richard Webster, Data Science Team Lead, CHEO Research Institute
- Steven B. Young, School of Environment, Enterprise and Development, University of Waterloo

OTHER EXPERTS CONSULTED

- Matthew Eckelman, Associate Professor, Civil and Environmental Engineering, Northeastern University
- Sarah Ouanhnon, Senior Net Zero Delivery Lead, NHS England
- Tom Andrew, Net Zero Senior Analytical Manager, NHS England
- Joseph McCannon, Senior Advisor, Office of Climate Change and Health Equity, U.S. Department of Health and Human Services

GRAPHIC DESIGN by: Luz A. Paczka Giorgi

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