Calculating a Healthcare System’s Carbon Footprint

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Agenda

• Background
  – Landscape
  – Leadership support

• What does greenhouse gas accounting look like for a healthcare system?
  – Steps
  – Data Needs

• Next steps for Carilion
- 13,580 employees
- 7 hospitals
- 282 practice sites
- 788 physicians
- 41,426 admissions
- 924,020 primary/velocity care visits
- 150,076 emergency department visits

Great location.

Western Virginia is an amazing place to call home. When you live here, you’re an easy drive or a quick flight away from many other great places, too.
Landscape

- **Joint Commission**
  Developed new Sustainable Healthcare Certification

- **US Dept. of Health & Human Services (HHS)**
  In partnership with the White House launched Health Sector Climate Pledge, including a 50% GHGe reduction by 2030 and net zero emissions by 2050.

- **Centers for Medicare and Medicaid Services (CMS)**
  Proposed Decarbonization and Resilience Initiative designed to address threats posed by climate change to the nation’s health and health care system by collecting, monitoring, assessing, and addressing hospital carbon emissions and their effects on health outcomes, costs, and quality. (January 2026)

- **Securities and Exchange Commission (SEC) Climate Disclosure Rule**
  The SEC adopted new rules that compel large companies to disclose their greenhouse gas emissions and tell investors how their business is affected by climate change.

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“Sustainability, decarbonization in particular, is critical to the health agenda, especially because climate change is having a direct and inequitable effect on the health and well-being of people.”

Jonathan B. Perlin, MD, PhD, MSHA, MACP, FACMI, President and Chief Executive Officer of The Joint Commission
Education

- CleanMed Session 2022
- GHG Protocol Corporate Standard Training
- National Academy of Medicine Carbon Clinics
- Conversations with other institutions (Providence, OSF)
- Start
Leadership Buy In

- CEO
- Oversight committee request
- Senior Executive sponsors
- Defined scopes and data needs
- Executive Summary leave behind
  - Purpose
  - Definitions
  - Landscape
  - Benchmarks
  - Recommendation
  - Cost
  - Timeline

Executive Summary

Carilion Clinic GHG Accounting
June 20, 2022

PURPOSE

There are growing efforts nationally and internationally to measure and mitigate health care emissions, with particular emphasis on greenhouse gas accountability. The health care industry is among the most carbon-intensive service sectors in the United States. It is responsible for 8.5 percent of the country’s greenhouse gas emissions and similar fractions of toxic air pollutants, largely stemming from fossil fuel combustion. These emissions arise directly from health-care facilities, as well as indirectly from the supply chain of health-care goods and services. Health damages stemming from US health care pollution have been demonstrated to be on the same order of magnitude as deaths from preventable medical errors. Leading to calls for expansion of the definition of patient safety to include safeguarding public health from health care pollution.

Carilion Clinic does not have an established process or history of greenhouse gas accounting. We have committed to sustainability goals that have the potential to help us move and demonstrate incremental improvement in our carbon footprint in the coming year, but we cannot demonstrate success in this reduction without the baseline footprint. It is impossible to manage what you do not measure.

To address this gap, the Department of Sustainability, in partnership with the Carilion Clinic Environmental Stewardship Council Executive Oversight Committee and other relevant stakeholders, recommends initiating a process for tracking Scope 1, Scope 2, and partial Scope 3 emissions for Carilion Clinic.

DEFINITIONS

- Greenhouse gas (GHG) emissions – gases that trap heat in the atmosphere. The most prominent GHG is carbon dioxide (CO2), but methane (CH4) and others also lead to climate change.
- Carbon dioxide equivalents (CO2e) are measured in carbon dioxide equivalents (CO2e), the amount of CO2 that has the equivalent global warming impact.
- Kyoto Protocol - Operationalizes the United Nations Framework Convention on Climate Change by committing industrialized countries and economies in transition
GHG Accounting

• Establish enterprise-wide carbon footprint (Scope 1, 2 and 3)
• Understand drivers and areas of opportunity
• Set decarbonization goals
Scopes Defined

### Common greenhouse gas emission sources in health care

**SCOPE 1**
- Onsite energy
- Fleet vehicles
- Waste anesthetic gas
- Refrigerants

**SCOPE 2**
- Purchased electricity
- Purchased steam

**SCOPE 3**
- Business travel
- Employee commute
- Waste disposal
- Meat procurement
- Medical devices and equipment
- Pharmaceuticals
- Other

*Source: Practice Greenhealth*

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**Carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF₃), and sulphur hexafluoride (SF₆)**

Scope 3 Other: These are the most common emissions for health care, but there are other relevant categories in Scope 3. To review all 15 categories covered in Scope 3, visit the [GHG Protocol Scope 3 Guidance](#).
Scope 1

Greenhouse gas emissions that arise from sources owned or directly controlled by Carilion.

- **Onsite energy**: Fossil fuels burned on-site like natural gas or propane.
- **Fleet vehicles**: Gasoline or diesel from our fleet (ambulances, shuttles, trucks).
- **Waste anesthetic gas**: Waste anesthetic gases – unused gas exhaled by the patient, vented directly from hospital rooftops to the outdoor atmosphere.
- **Refrigerants**: Refrigerants or coolants that inadvertently leak from HVAC or refrigeration equipment.
Scope 2

GHG emissions that Carilion causes indirectly through the consumption of acquired energy.

Any electricity Carilion purchased to run operations and power our buildings.
Scope 3

GHG emissions sources of a representative nonprofit U.S. health care system (2019 data)

- Direct GHG emissions
  - Greenhouse gas (GHG) emissions from sources that are owned or controlled by the reporting entity. Health care examples include stationary combustion, waste anesthesia gases, refrigerants, and mobile fleet vehicles.
  - **Scope 1** includes all direct GHG emissions.

- Indirect GHG emissions
  - GHG emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity.
  - **Scope 2** includes indirect GHG emissions from consumption of purchased or acquired electricity, steam, heat and cooling.

- **Scope 3** includes all other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc.
COMPLETING THE INVENTORY
Starting the Inventory

Steps

Tools used

Tips and tricks

Decision Points
Steps to complete

1. Determine Boundaries
2. Tools & Framework
3. Get Organized
4. Contact Stakeholders (Scope 1 & 2)
5. Contact Stakeholders (Scope 3)
6. Make Sense of the Data
7. Enter Data and View Results
Determine Boundaries

- Total Carilion portfolio: 7.8 million sq ft
- 41 Buildings in scope (6.3 million sq ft)
- 121 Buildings not included (1.1 million sq ft)
  - Why not included:
    - <20k square feet
    - Selling, empty, VT owned/operated
- 81% of total portfolio included in inventory

Baseline: CY 2021

Boundaries:
- All hospitals
- Carilion Clinic owned buildings that are 20,000 square feet or larger
Health Care Emissions Impact Calculator

Get Organized

Serves as:
• Checklist
• Links to data
• Contact list
• Action Item Register
• Status updates
• Boundaries and decision points

Inventory Management Plan: 50+ page document that provides details on every data point.

<table>
<thead>
<tr>
<th>Location</th>
<th>Units used</th>
<th>Data Contact</th>
<th>Notes</th>
<th>Data Location/Links</th>
<th>Status/Action Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRMH</td>
<td>KwH</td>
<td>AEP, Joyce Brubaker</td>
<td>Includes AEP. Use totals the dashboard calculates based on bill dates.</td>
<td>1. Dashboard: <a href="https://synapnis.telemarketing.com/#/site/carianclinics/views/CC_IC_SustainabilityQoUaPartyEnergyDataSheet#!/id=1">link</a></td>
<td>Entered into CRMH spreadsheet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Includes lights from Terrace View and Riverwalk parking garage. Riverwalk starts with 1/7/2021 (12 bill total). Terrace View starts with 1/7/2021 (12 bill total). Calculation = dashboard total = TVPG + RWPG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CNRV</td>
<td>KwH</td>
<td>AEP, Sherry Miley</td>
<td>Includes AEP. Use totals the dashboard calculates based on bill dates.</td>
<td>1. Dashboard: <a href="https://synapnis.telemarketing.com/#/site/carianclinics/views/CC_IC_SustainabilityQoUaPartyEnergyDataSheet#!/id=1">link</a></td>
<td>Entered in CNRV spreadsheet.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. What’s included/not included: Facility GHH Accounting Detailed Spreadsheet.xlsx</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Account details/Region: Utility Account Requests (1).xlsx</td>
<td></td>
</tr>
</tbody>
</table>
Start With Scope 1 & 2

Scope 1 & 2 in progress

Scope 3

Tips & Tricks
Do not try to complete all three scopes at one time.
This is an iterative process.
## Contacting Stakeholders – Scope 1 & 2

| Natural Gas, Heating Oil, Propane, etc. | • Utility Companies  
• Facilities/Engineering & Maintenance |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel for Fleet</td>
<td>• Logistics</td>
</tr>
</tbody>
</table>
| Refrigerants                          | • Facilities/Engineering & Maintenance  
• Vendors                               |
| Anesthetic Gases                      | • Materials Management/Pharmacy  
• Nitrous Oxide Vendor                  |
| Purchased Electricity                 | • Utility Companies  
• Facilities/Engineering & Maintenance |
| Purchased Steam, Heat and Cooling     | • Utility Companies  
• Facilities/Engineering & Maintenance |
SCOPE 1 & 2
Stationary Combustion & Electricity

Usage in all included buildings:

– Natural Gas
– Liquified Petroleum Gases
– Gasoline
– Gas/Diesel Oil
– Fuel oil/Bunker
– Kerosene
– Coal
– Wood
– Biodiesel
– Electricity
Tracking this data on a regular basis in a software or dashboard will make this section extremely easy.
Fugitive Emissions

- Centralized equipment
- Extinguisher
- Freezer
- Vaccine freezers
- Mini-split
- Multi-split
- Refrigerator
- Vaccine refrigerator
- Vending machine

Tips & Tricks

Does not include:
- Loading refrigerants into new equipment
- Removing refrigerants from equipment

Update tracking logs to include the relevant information.

<table>
<thead>
<tr>
<th>Date of Service</th>
<th>Type of Equipment</th>
<th>Type of Gas</th>
<th>Quantity Reloaded</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/7/2021</td>
<td>Mini Split</td>
<td>R-22</td>
<td>22 lb</td>
<td></td>
</tr>
</tbody>
</table>
Mobile Combustion

Usage in all fleet vehicles:

– Natural Gas
– Gasoline
– Diesel Oil
– Biodiesel
– Biogasoline/Bioethanol

Decision Point

Include all vehicles (leased and owned).
Entered at the system level on CRMH’s inventory.
Anesthetic Gases

• Waste anesthetic gases – unused gas exhaled by the patient, vented directly from hospital rooftops to the outdoor atmosphere
• Materials Management/Pharmacy
• Medical Gas Vendor

2021 PERCENT GHG EMISSIONS BY ANESTHETIC GAS

- Sevoflurane: 6%
- Desflurane: 34%
- Isoflurane: 1%
- Nitrous Oxide: 59%

Decision Point
Purchased data
Purchased Steam, Heat or Cooling

This section pertains to the emissions from purchased district steam, heat or cooling.

17. Does your facility use District Steam?
   - Yes
   - No
   - Maybe - I will need to check

18. Does your facility use District Hot Water?
   - Yes
   - No
   - Maybe - I will need to check

19. Does your facility use Chilled Water (electric driven chiller)?
5 Contact Stakeholders

Good and Services
- Finance
- Dining & Nutrition

Fuel & Energy
- Scope 1 and 2 data
- Aviation Vendor (helicopters)

Upstream Transportation & Distribution
- Vendors that deliver supplies
- Delivery services

Waste
- Sustainability Dashboard
- Vendors
- Facility Managers

Business Travel
- HR Travel Department
- Accounts Payable
- C-Suite Executive Assistants
- Finance

Employee Commuting
- Human Resources

Leased Assets
- Property Management (non-hospital buildings)

Downstream Transportation & Distribution
- Data and Analytics

Use of Sold Products
- Pharmacy

Investments
- Finance

Leadership buy-in/support will help this process.
Category 5: Waste

Data readily available for hospitals.

Non-hospital data:
• Only included largest vendor and facilities with MSW or recycling compactor (provide weights)

Construction & Demolition weights are not included.
Category 6: Business Travel

HR Travel Department Data (Employee Travel)
Conference, education, business trips
Recruitment

Mileage reimbursements
Category 1&2 – Purchased Goods & Services

Tips & Tricks

• Don’t try to drill down to the dollar. Get comfortable with “majority spend”.
• Match to the “best fit” category
• Make differentiations between categories and stick to it.

General Ledger and Capital Goods Spend

• 150+ rows of with a high-level description/title of the category and the spend

| Miscellaneous manufacturing - Surgical and medical instruments |
| Miscellaneous manufacturing - Surgical appliance and supplies |
Category 11 – Use of Sold Products

- Pharmacy report
  - Inpatient dispensed
  - Sold at retail
  - Prescribed by pharmacy

- Pharmacy resident project
Category 7 – Employee Commuting

• HR Department conducted a Work Assignment survey in June 2021:
  – In-person
  – Hybrid
  – Remote

• Used status (FT, PT, FX) and FTE value to estimate # of days commuting.
Additional Categories

Category 3 – Fuel and Energy Related Activities
  – Totals of Scope 1 & 2 energy data
Category 9 – Downstream Transportation & Distribution
  – Inpatient, outpatient and telehealth visits
Category 8 & 13 – Leased Assets
  – Square footage for leased buildings

Tips & Tricks
Finalize Scope 1 & 2 data before entering

Decision Point
Non-clinical buildings are classified as outpatient.
Categories Not Included

- Category 4 - Upstream transportation & distribution
- Category 15 – Investments
Making Sense of the Data

First set of data is “messy”.

Tips & Tricks

- Rely on the stakeholder’s knowledge and expertise. Work together!
- Don’t overthink it: make decisions and document the rationale.
- Ask questions!
Should parking garages located at hospitals (but separate structure) go under the hospital’s footprint?

How do you report solar electricity?

Should refrigerants from MRIs and other equipment be included?

For inhalers, will purchasing data work rather than prescribed?

We have helicopters, but we do not own them. Do we include the fuel used for these, and if so, in which category?

Should anesthesia data be “purchased” or “used”?

For scope 3 employee business travel – do we include non-employees who Carilion pays to come onsite? Example: interviewing physicians or other candidates.
Enter data and view results

<table>
<thead>
<tr>
<th>Total System GHG Emissions</th>
<th>MTCO2e</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Stationary Combustion</td>
<td>27,388</td>
<td>22%</td>
</tr>
<tr>
<td>1.2 Mobile Combustion</td>
<td>22,192</td>
<td>18%</td>
</tr>
<tr>
<td>1.3 Fugitive Emissions</td>
<td>1,595</td>
<td>1%</td>
</tr>
<tr>
<td>1.3.1 Refrigerants &amp; Fire Suppression</td>
<td>63</td>
<td>0%</td>
</tr>
<tr>
<td>1.3.2 Medicinal / Anesthetic gases</td>
<td>3,537</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Scope 2</strong></td>
<td>57,595</td>
<td>46%</td>
</tr>
<tr>
<td>2.1 Purchased electricity</td>
<td>57,595</td>
<td>46%</td>
</tr>
<tr>
<td>2.2 Purchased steam, heat and cooling</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Scope 3</strong></td>
<td>41,265</td>
<td>33%</td>
</tr>
</tbody>
</table>

- Category 1: Purchased goods & services
  - 0 (0%)
- Category 2: Capital goods
  - 0 (0%)
- Category 3: Fuel- & energy-related emissions
  - 18,609 (15%)
- Category 4: Upstream transportation & distribution
  - 0 (0%)
- Category 5: Waste generated in operations
  - 1,648 (1%)

Graph: Total System GHG Emissions per Scope & Source

- Purchased electricity
- Purchased goods & services
- Capital goods
- Fuel- & energy-related emissions
- Upstream transportation & distribution
- Waste generated in operations
- Employee commuting
- Employee food
- Employee incidental travel
- Employee overnight travel
- Employee transportation & distribution
Lessons Learned

• Some categories have more readily available/easily measurable data than others.
• Document and explain all decisions and rationales.
• This process engages groups that had never thought about how their work relates to sustainability.
  – Example: Senior Director of Pharmacy
• Accept that you are the expert.
NEXT STEPS
Education & Communication

• This is a new concept to the organization
  – What is a greenhouse gas inventory and why did we complete it?
  – What emissions do our operations contribute?
  – How was it measured?
  – What do we do about?
  – What are we ALREADY doing?
  – What are the public health implications?
Scope 1 & 2 Mitigation Strategies

- Increase energy efficiency
- Reduce waste anesthetic gas
- Electrification of Fleet and Transportation
- Increase on-site solar/wind generation
Scope 3 Mitigation Strategies

- Environmentally Preferable Purchasing Standards
- Comprehensive transportation program to minimize the number of single-occupancy vehicles, offering subsidies and incentives to use lower-impact options
## Investments and Actions Potentially Facilitated by the IRA

<table>
<thead>
<tr>
<th>Investment</th>
<th>Examples Strategies/Actions</th>
<th>Example IRA Program(s)</th>
</tr>
</thead>
</table>
| Investing in On-Site Renewable Energy Generation | • Microgrid w/ battery storage  
• Solar array                                                          | Investment Tax Credit with Direct Pay, Low-Income Communities Adder                                            |
| Energy Efficiency Building Improvements         | • LED lighting  
• Optimizing air exchange rates                                   | Greenhouse Gas Reduction Fund, Rural Energy for America Program                                              |
| Low-Emissions Transportation                     | • Install EV charging stations  
• EV fleet acquisition                                                 | Qualified Commercial Clean Vehicles Credit, Alternative Fuel Property Credit                                   |
| Increased Building Resilience                   | • Hurricane resistant shell  
• On-site power system                                                | Stafford Act authority for low-carbon and net-zero energy projects                                           |
| Increased Community Resilience                  | • Mitigating climate and health risks from urban heat islands    | Environmental and Climate Justice Program: Community Change Grants Program                                   |
Medical Office Building is Nation's First Net-Zero Healthcare Facility - Sustainable Operations
QUESTIONS?

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