

VIRTUAL CARE CARBON ACCOUNTING

Why • The Case for Change

What • CASCADES Virtual Care Carbon Accounting Tool (VCCAT)

How • Strategy and Implementation

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du gouvernement du Canada.

Canada

 **CASCADES**

SUSTAINABLE HEALTH SYSTEM
COMMUNITY of PRACTICE

 **TAHSN**





NAVIGATION



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INTRODUCTION

The Playbook provides background information on the potential environmental benefits associated with virtual care provision, and contains instructions for the CASCADES Virtual Care Carbon Accounting Tool, which has been designed to allow clinics, departments, and facilities to track virtual care carbon savings.

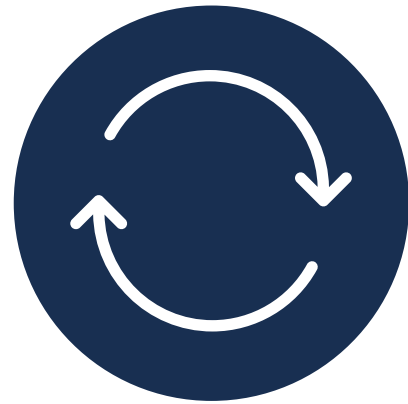
This Playbook was developed as an initiative of the Sustainable Health System Community of Practice (CoP), with support from CASCADES.

The CoP is a collaboration between the Toronto Academic Health Science Network (TAHSN) of 14 hospital systems, and the seven health science faculties of the Council of Health Sciences (CHS) at the University of Toronto, supported by the Centre for Sustainable Health Systems at the University of Toronto.

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WHY

The Case for Change



WHAT

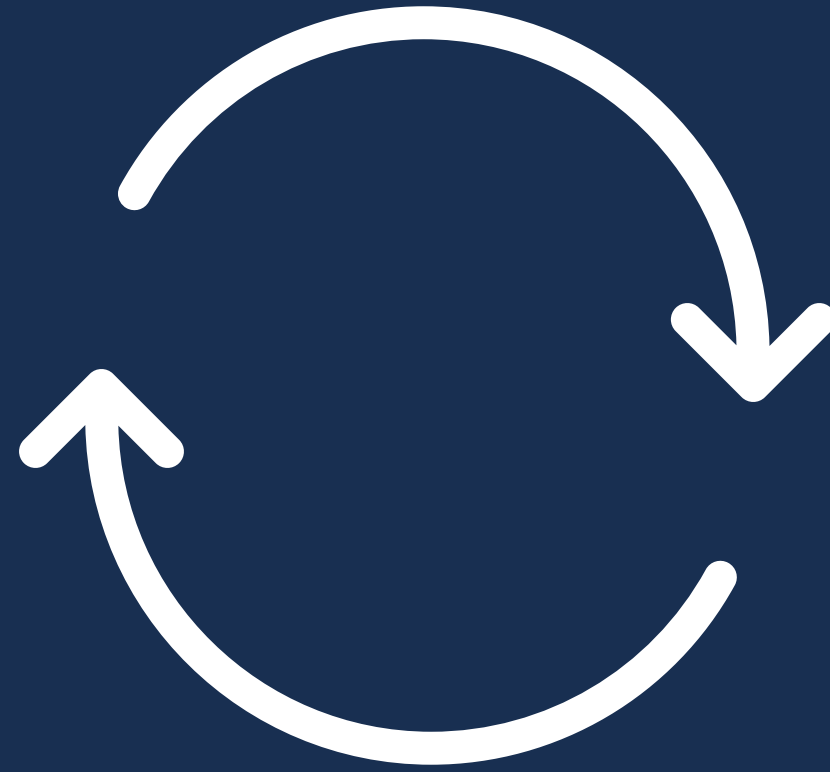
CASCADES Virtual
Care Carbon
Accounting Tool



HOW

Strategy and
Implementation





WHY

The Case for Change

- 1 Travel's Contribution to Health Sector Emmissions
- 2 Virtual Care's Carbon Reduction Potential
- 3 The Canadian Context

Patient travel contributes to health sector carbon emissions



There are many types of appointments that can be conducted virtually



In reducing patient travel, associated carbon emissions are also reduced





Travel's Contribution to Health Sector Emissions

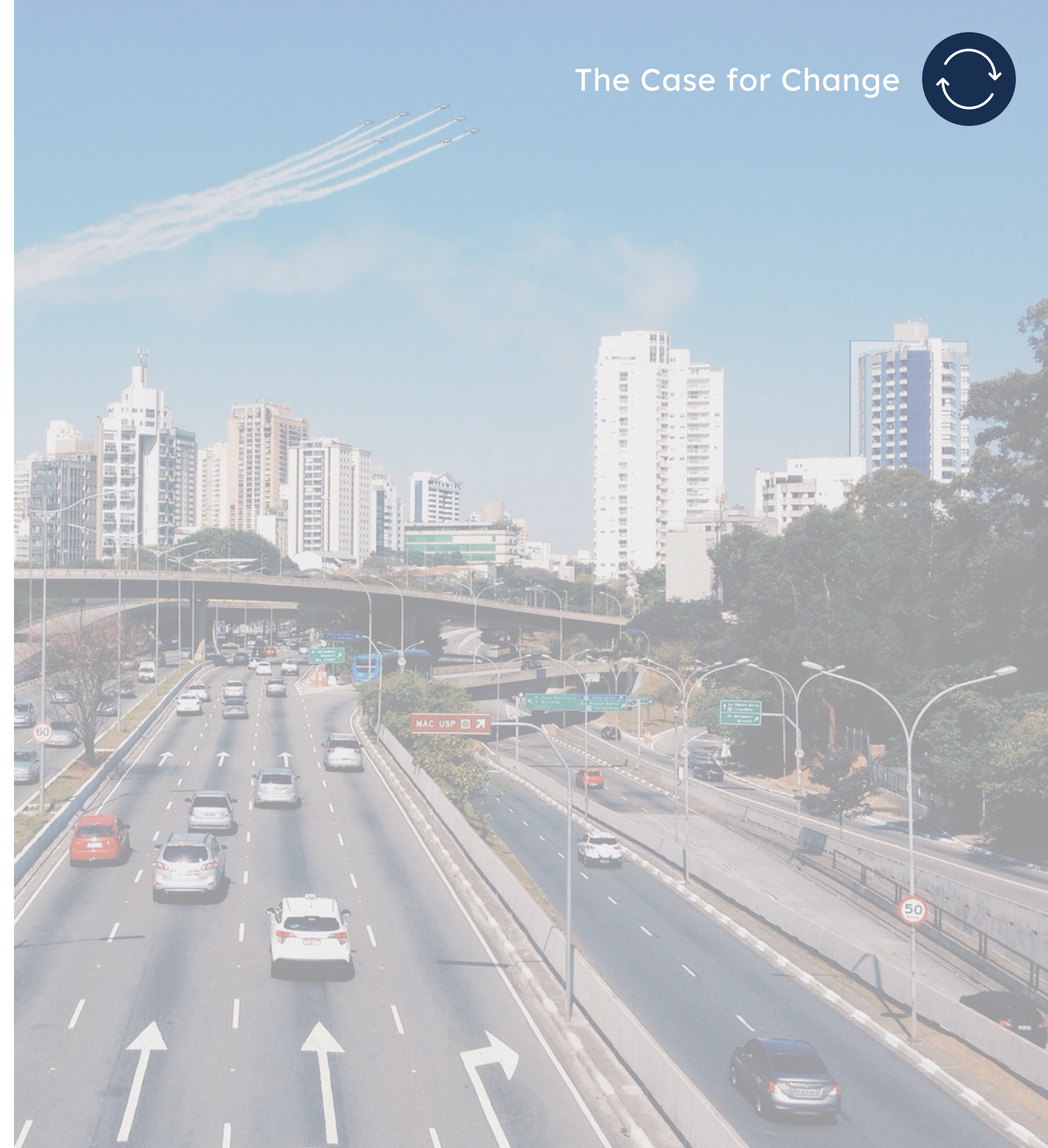


IN-PERSON CARE DELIVERY SYSTEMS NECESSITATE TRAVEL

Patients, staff, and caregivers must travel to meet at care facilities. The English National Health Service (2020) estimates that 14% of the NHS' total GHG emissions are from business, staff, patient, and visitor travel; patient travel comprises the largest source of travel emissions at 5% of total system emissions ([Figure 1: Sources of carbon emissions by proportion of NHS Carbon Footprint Plus](#)). (1)

Carbon footprints have been estimated for various types of in-person visits (these include not just travel, but also the building, heating and lighting of the facilities in question) (2):

- 125 kg CO₂e per bed-day.
- 76 kg CO₂e per outpatient appointment for acute care.
- 66 kg CO₂e per general practice visit.
- 75 kg CO₂e per ambulance emergency response.





Virtual Care's Carbon Reduction Potential



MOVING FROM IN-PERSON TO VIRTUAL CARE WHERE APPROPRIATE IS A PROMISING WAY TO REDUCE THE CLIMATE IMPACTS OF CARE

In the short term, impacts are reduced via a reduction in travel-related emissions.

In the longer term, impacts may be reduced by a decreased need to build and maintain clinical and office space, and by averted care due to improved patient outcomes (assuming virtual care improves access to care and health outcomes).

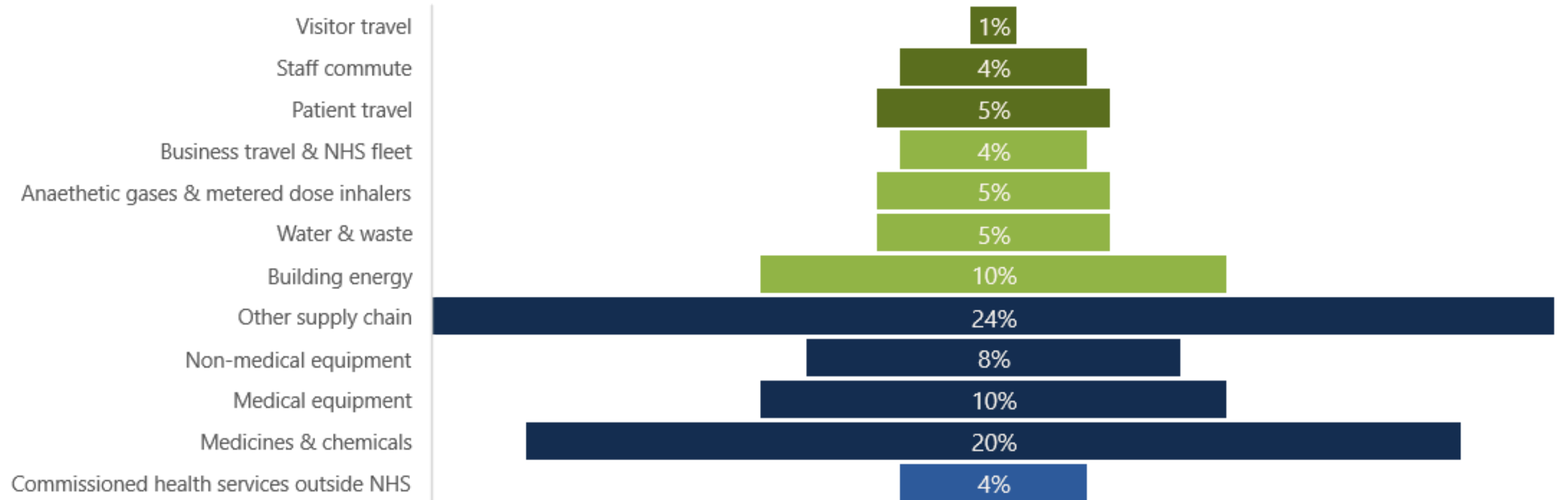


Figure 1: Sources of carbon emissions by proportion of NHS Carbon Footprint Plus (Delivering a Net-Zero Health National Health Service, NHS, 2020).





THE ENVIRONMENTAL PROMISE OF VIRTUAL CARE

PUBLIC SUPPORT FOR A GREENER OPTION

A recent survey by Canada Health Infoway found that 68% of Canadians indicated they would be more likely to opt for a virtual visit if they knew it was associated with a reduced carbon footprint. (3)

RECENT ADOPTION RATES INDICATE AVAILABLE CAPACITY

The COVID-19 pandemic has accelerated the uptake of virtual approaches to care delivery across the country. For example, virtual visits went from approximately 10-20% of all primary care visits in Canada prior to the pandemic to approximately 60% in a matter of months. (4)

Rates of virtual care provision have been declining (to around 33% between January 2021 to March 2022), as virtual care appointments are not appropriate for all visit types; however, there are several types of visits for which they are preferred by patients. (5)

RELATIVELY HIGH PERCENTAGE OF GAS-FUELED VEHICLES ON CANADIAN ROADS

Canadian drivers have been slow to purchase electric vehicles (EVs) (including battery-powered electric vehicles [BEV] or plug-in hybrid electric vehicles [PHEV]); by the end of 2018, EVs only accounted for 2.32% of Canadian vehicles. (6)

New EV registrations are on the rise (Stats Canada, 2022), but as long as internal combustion engine (ICE) vehicles dominate the Canadian market, averting car trips will reduce more emissions than in countries with a higher proportion of EVs.

Percentage of total electricity from non-emitting sources for the top four electricity-generating countries and Canada

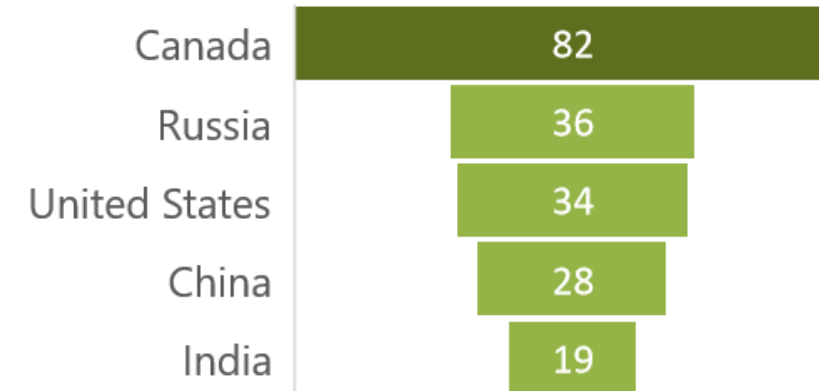


Figure 2: Natural Resources Canada (NRCan) [Energy Fact Book 2021-2022](#). The reproduction of this data has not been produced in affiliation with, or with the endorsement of NRCan.

RELATIVELY CLEAN CANADIAN ENERGY GRID

Canada has a clean (non-emitting) energy grid relative to many countries ([Figure 2, NRCan, 2021](#)), with 82% of total electricity from non-emitting sources. (7)

While the information and communications technology (ICT) used to facilitate virtual visits does have a carbon footprint, it is lower when the grid is cleaner.

Provincial variations in energy sources mean that some provinces will produce much lower emissions with ICT use than others.





WHAT

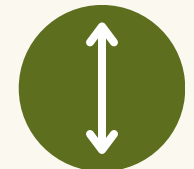
CASCADES Virtual Care Carbon Accounting Tool (VCCAT)

- 1 Description of Tool
- 2 Instructions for Use
- 3 Interpretation of Results
- 4 Assumptions and Limitations

Travel averted via virtual care



Associated carbon and financial impacts



Travel made for in-person care





Description of Tool



CASCADES VIRTUAL CARE CARBON ACCOUNTING TOOL: INTRODUCTION

The CASCADES Virtual Care Carbon Accounting Tool (VCCAT) has been designed to help healthcare sites better understand the carbon emissions and costs (to patients) associated with patient travel.

The tool will produce the following outputs related to virtual and in-person care for a time period of your choosing (note: all outputs are estimates):

[Access the VCCAT](#)

VIRTUAL

Green cells indicate data inputs and outputs related to virtual visits.

IN-PERSON

Yellow cells indicate data inputs and outputs related to in-person visits.

| Tool Outputs | Virtual Care | In-Person Care |
|--|---|---|
| Travel-related carbon emission savings/costs (in metric tonnes of CO ₂ e) for sustainable and unsustainable modes of transport | Total carbon emissions saved from patient travel averted to and from a facility | Total carbon costs of patient travel to and from a facility |
| Financial savings/cost of travel (for patients), including the cost of transit fare, gas, insurance, vehicle wear and tear, and parking (in Canadian dollars) | Total financial savings to patients from patient travel averted to and from a facility | Total financial costs to patients from patient travel to and from a facility |
| Forecasts of carbon and financial savings/costs based on visit type | The carbon and financial savings associated with virtual visits at various percentages of total visits | The carbon and financial costs associated with virtual visits at various percentages of total visits |





Instructions for Use



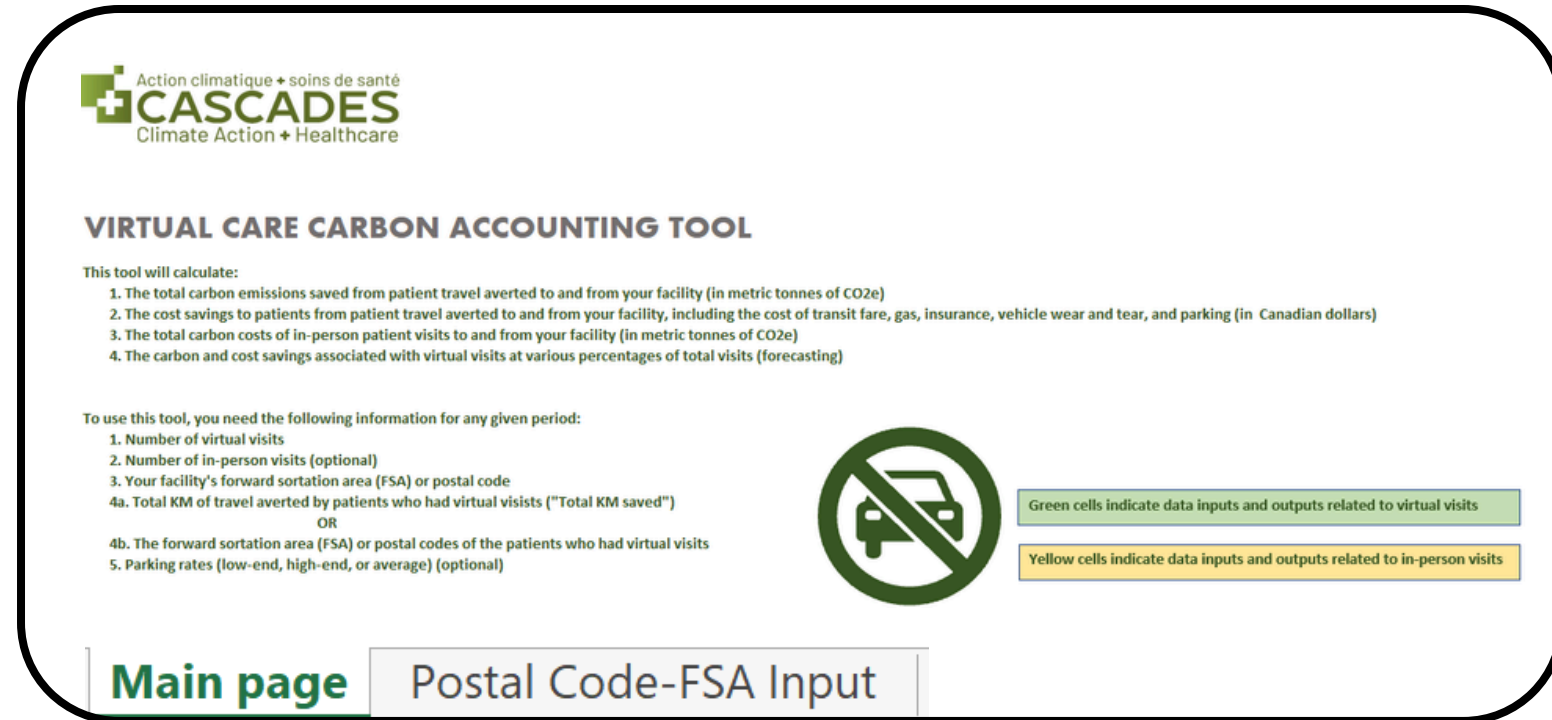
USING THE TOOL: NAVIGATING THE SPREADSHEET

Two tabs are used for data inputs/outputs:

- **MAIN PAGE**
 - All data are entered in this tab with the exception of travel data for OPTION B
 - All outputs are displayed in this tab

- **POSTAL CODE-FSA INPUT**
 - Only travel data for OPTION B are entered in this tab
 - An “FSA or postal code input” icon on the main page will take you to this tab
 - You can return to the main page by clicking on the “Back to main page” icon on the top left

NOTE:
Remaining tabs in the spreadsheet are used for calculations and should not be edited.



Virtual Care Carbon Accounting Tool

This tool will calculate:

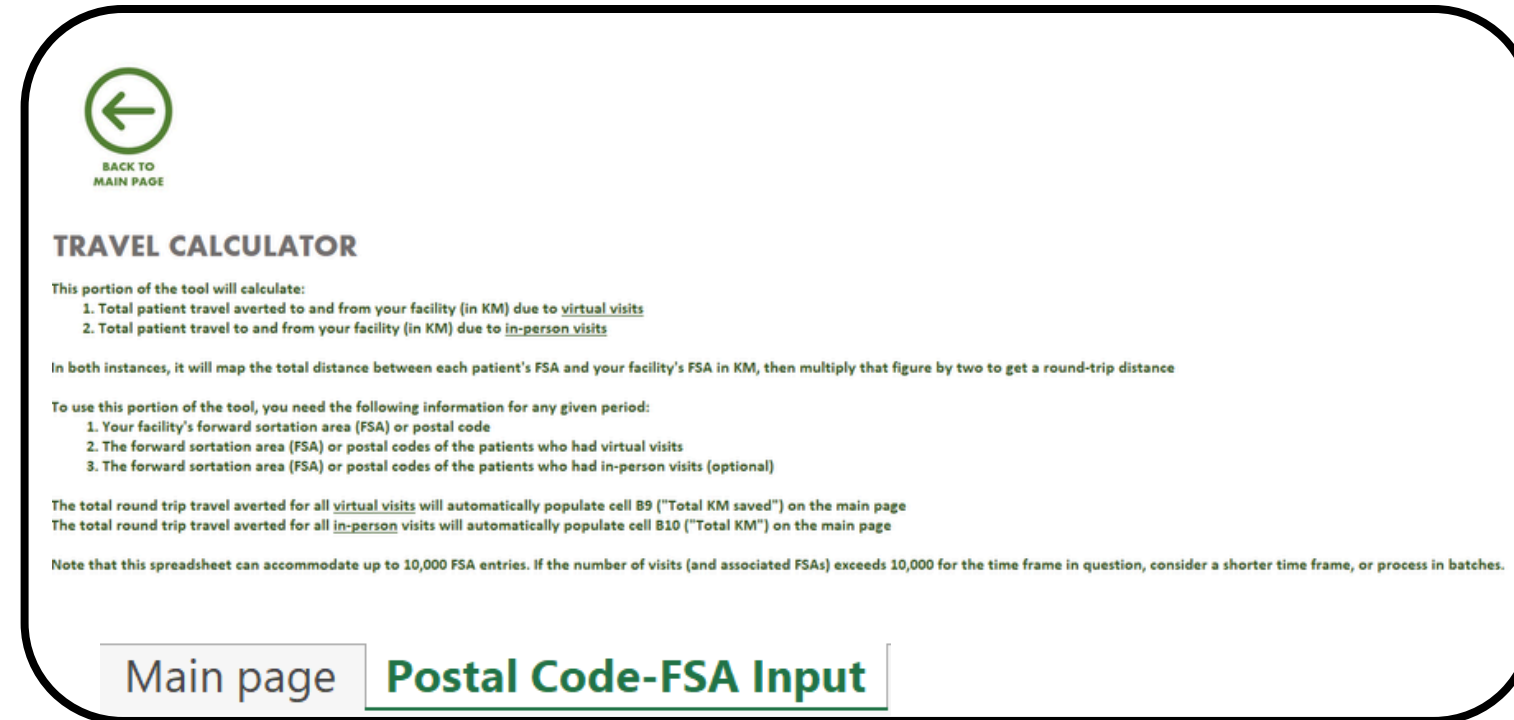
1. The total carbon emissions saved from patient travel averted to and from your facility (in metric tonnes of CO₂e)
2. The cost savings to patients from patient travel averted to and from your facility, including the cost of transit fare, gas, insurance, vehicle wear and tear, and parking (in Canadian dollars)
3. The total carbon costs of in-person patient visits to and from your facility (in metric tonnes of CO₂e)
4. The carbon and cost savings associated with virtual visits at various percentages of total visits (forecasting)

To use this tool, you need the following information for any given period:

1. Number of virtual visits
2. Number of in-person visits (optional)
3. Your facility's forward sortation area (FSA) or postal code
- 4a. Total KM of travel averted by patients who had virtual visits ("Total KM saved")
OR
- 4b. The forward sortation area (FSA) or postal codes of the patients who had virtual visits
5. Parking rates (low-end, high-end, or average) (optional)

Main page | Postal Code-FSA Input

Green cells indicate data inputs and outputs related to virtual visits
Yellow cells indicate data inputs and outputs related to in-person visits



TRAVEL CALCULATOR

This portion of the tool will calculate:

1. Total patient travel averted to and from your facility (in KM) due to virtual visits
2. Total patient travel to and from your facility (in KM) due to in-person visits

In both instances, it will map the total distance between each patient's FSA and your facility's FSA in KM, then multiply that figure by two to get a round-trip distance

To use this portion of the tool, you need the following information for any given period:

1. Your facility's forward sortation area (FSA) or postal code
2. The forward sortation area (FSA) or postal codes of the patients who had virtual visits
3. The forward sortation area (FSA) or postal codes of the patients who had in-person visits (optional)

The total round trip travel averted for all virtual visits will automatically populate cell B9 ("Total KM saved") on the main page
The total round trip travel averted for all in-person visits will automatically populate cell B10 ("Total KM") on the main page

Note that this spreadsheet can accommodate up to 10,000 FSA entries. If the number of visits (and associated FSAs) exceeds 10,000 for the time frame in question, consider a shorter time frame, or process in batches.

Main page | **Postal Code-FSA Input**



FSA or POSTAL CODE INPUT



BACK TO MAIN PAGE





DATA INPUTS: REQUIRED AND OPTIONAL DATA INPUTS FOR ANY GIVEN PERIOD

VISIT VOLUMES

- Number of virtual visits
- Number of in-person visits (optional)
- Total number of visits (optional - required for forecasting)

PARKING INFORMATION

- Parking rates (low-end, high-end, or average) (optional)

FORWARD SORTATION AREAS

- A forward sortation area (FSA) is the first three figures of a postal code

TRAVEL DATA

| Options | Data | | Notes |
|----------|---|---|--|
| | Virtual Care | In-Person Care (Optional) | |
| Option A | Total round-trip distance (in KM) between your facility and the homes of all patients who had virtual visits | Total round-trip distance (in KM) between your facility and the homes of all patients who had in-person visits | For Option A, distance would be computed externally, then inputted into the VCCAT. This has the potential to yield a more accurate measure of distance, but can be time consuming and costly. A Google Script is available for use. |
| Option B | Your facility's forward sortation area (FSA) or postal code + The forward sortation areas (FSAs) or postal codes of the patients who had virtual visits | Your facility's forward sortation area (FSA) or postal code + The forward sortation areas (FSAs) or postal codes of the patients who had in-person visits | For Option B, distance is computed within the VCCAT. The tool measures a straight line between the latitude and longitude of patient and facility FSAs; this is less accurate than mapping distance via roadways, but it is faster, has no associated costs, and does not require the use of an external platform to process patient FSAs. |





INSTRUCTIONS FOR INPUTTING DATA: VISIT VOLUMES

Input the following data points on visit volume for the chosen time frame:

- Number of virtual visits
- Number of in-person visits (optional)
- Total number of visits (optional - required for forecasting)

WHAT COUNTS AS A "VIRTUAL VISIT"?

In general, a virtual visit is an interaction between a healthcare provider and patient for a set period of time in a given day using some form of information and communications technology (ICT). Instead of traveling to a facility such as a hospital for their appointment, a patient connects with their provider by phone or video platform. Some definitions of virtual visits include emails and SMS messages between patients and providers.

Your institution may have its own definition of what constitutes a virtual visit.

| Input | Value | Instructions | Assumptions/ Limitations |
|-------------------------|-------|--|--|
| Virtual visit volumes | X | Input the total number of virtual visits for the time frame in question in the first cell | None. Extract this figure from your EMR or other database |
| In person visit volumes | X | Input the total number of in person visits for the time frame in question in the second cell | None. Extract this figure from your EMR or other database |
| Total visit volumes | X | Automatic - Value includes virtual and in-person visits for the time frame in question | Calculation based on inputs for virtual and in-person visits |

[Main page](#)

[Postal Code-FSA Input](#)





INSTRUCTIONS FOR INPUTTING DATA: TRAVEL DATA OPTION A

Input the following data points on travel for the chosen time frame:



- Total round-trip distance (in KM) between your facility and the homes of all patients who had virtual visits and
- Total round-trip distance (in KM) between your facility and the homes of all patients who had in-person visits

OPTION A: PROS AND CONS

Distance can be computed externally, then inputted into the VCCAT.

This has the potential to yield a more accurate measure of distance because full postal codes can be used (if available), and roadway distance can be calculated. However, this method can be time consuming and costly, and may require the input and processing of patient postal code on an external site.

A Google Script is available to assist in this task. The script was developed by Ronald Cheung for a project at Princess Margaret Hospital in Toronto.

| Input | Value | Instructions |
|--------------------------|-------|---|
| Total KM saved (virtual) | X | <p>Input total patient travel averted by virtual visits for the time frame in question in the first cell - this will be the distance between the FSA for your site, and the FSAs/postal codes of all patients who had virtual visits multiplied by two (for a round-trip distance).</p> <p>If you already have this figure, enter it in the cell. ← Option A</p> <p>If you do not have this figure, it can be established by clicking the icon:  FSA or POSTAL CODE INPUT</p> |
| Total KM (in-person) | X | <p>Input total patient travel for in-person visits for the time frame in question in the second cell - this will be the distance between the FSA for your site, and the FSAs/postal codes of all patients who had virtual visits multiplied by two (for a round-trip distance).</p> <p>If you already have this figure, enter it in the cell. ← Option A</p> <p>If you do not have this figure, it can be established by clicking the icon:  FSA or POSTAL CODE INPUT</p> |

[Main page](#)

[Postal Code-FSA Input](#)





INSTRUCTIONS FOR INPUTTING DATA: TRAVEL DATA OPTION B

Input the following data points on travel for the chosen time frame:


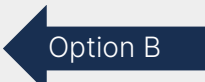


- FSA data for your facility and all patients with virtual and in-person (optional) visits
- Actual data is entered in the “Postal Code-FSA Input” tab (see next slide)

OPTION B: PROS AND CONS

Distance is computed within the VCCAT, in the Postal Code-FSA Input tab.

The tool measures a straight line between the latitude and longitude of patient and facility FSAs; this is less accurate than mapping distance via roadways and/or with full postal code. It assumes travel is from patient home to facility and back and does not account for the possibility of combined trips.

However, it is faster, has no associated costs, and does not require the use of an external platform to process patient FSAs. It uses FSA instead of full postal codes; some facilities do not store the latter.

| Input | Value | Instructions |
|--------------------------|-------|---|
| Total KM saved (virtual) | X | <p>Input total patient travel averted by virtual visits for the time frame in question in the first cell - this will be the distance between the FSA for your site, and the FSAs/postal codes of all patients who had virtual visits multiplied by two (for a round-trip distance).</p> <p>If you already have this figure, enter it in the cell.</p> <p>If you do not have this figure, it can be established by clicking the icon:  </p> |
| Total KM (in-person) | X | <p>Input total patient travel for in-person visits for the time frame in question in the second cell - this will be the distance between the FSA for your site, and the FSAs/postal codes of all patients who had virtual visits multiplied by two (for a round-trip distance).</p> <p>If you already have this figure, enter it in the cell.</p> <p>If you do not have this figure, it can be established by clicking the icon:  </p> |

[Main page](#)

[Postal Code-FSA Input](#)





INSTRUCTIONS FOR INPUTTING DATA: TRAVEL DATA OPTION B

Patient Data

Input the following data points on travel for the chosen time frame:

- Your facility's forward sortation area (FSA) or postal code
- The forward sortation areas (FSAs) or postal codes of the patients who had virtual visits
- The forward sortation areas (FSAs) or postal codes of the patients who had in-person visits (optional)

| Input | Instructions | Assumptions/Limitations |
|---------------------------|--|---|
| Patient FSAs/postal codes | <p>For virtual visits: Replace the example values in column A with the patient FSAs or postal codes associated with each virtual visit during the time frame in question.</p> <p>For in-person visits: Replace the example values in column B with the patient FSAs or postal codes associated with each in-person visit during the time frame in question. (optional)</p> | <p>Distance is mapped as a straight line between patient and facility FSA using longitude and latitude. This distance is not as accurate as mapping actual travel distance over a road network, but it is significantly easier to calculate without relying on costly and lengthy external data processing, and offers a more conservative estimate of carbon savings.</p> <p>It is assumed that patients have (for in-person visits) or would have (for virtual visits) travelled from their residing address directly to the facility and directly home afterwards. Combined trips are therefore not accounted for.</p> <p>Calculations are based on FSA as many facilities only collect the first three figures of the patient postal code. If you input full postal codes, the calculator will only consider the first three figures.</p> |

Facility Data

| Input | Value | Instructions |
|-----------------------------|-------|--|
| Facility FSA or postal code | M5T | Replace the example value in cell B6 with your facility's FSA or postal code |

Main page **Postal Code-FSA Input**

Patient Data

| Column A | Column B |
|------------------------------|--------------------------------|
| Data - Virtual Visits | Data - in person visits |
| N7V | m8z |
| M1S 5H6 | n7v |
| P0T | |
| M5T | |
| M6A | |
| P7J | |
| M8Z | |

Total round trip distance from patient FSAs to facility FSA will automatically populate the related cells on the Main Page





INSTRUCTIONS FOR INPUTTING DATA: EMISSIONS DATA

Input the following data points for the chosen time frame for emissions calculations:

- Jurisdiction (country, province, or census metropolitan area, if available)
- CO₂e/KM (optional)

| Input | Value | Instructions | Assumptions/Limitations |
|--|----------------|---|--|
| Jurisdiction | Drop down menu | Select your jurisdiction from the drop down in the first cell. You can select your municipality (or one of similar size, if yours is not available), province, or Canada. | <p>This will input the proportion of commuters using unsustainable (vehicles) and sustainable (carpool, transit, walking, cycling) transportation in your area. The total KM values inputted into cells B9 and B10 will be divided into the appropriate proportion of unsustainable and sustainable travel to calculate carbon emissions.</p> <p>Data is based on the Canada Census 2016 results for Mode of Transport by Census Metropolitan Area (CMA). Data is based on census responses, not actual population size (for example, Canada data is based on 16 million respondents).</p> |
| Average emissions factor for personal vehicle (g/km) | 260 | An average emissions factor (EF) of 260 g/km of CO ₂ e has already been entered in the second cell. If you would like to change this emissions factor, enter a new figure in the cell. | <p>This figure is an average EF for the 10 most popular cars purchased in Canada in 2021.</p> <p>This calculator was trialed using a more specific breakdown by vehicle and fuel type, but as the results were not significantly different than using one EF for all vehicles, it was deemed best to use the latter and avoid having to update multiple EFs. The single EF used here can be modified manually as fuel efficiency improves.</p> |

[Main page](#)

[Postal Code-FSA Input](#)





INSTRUCTIONS FOR INPUTTING DATA: PARKING DATA

Input the following data points on parking for your facility:

- Lower-end parking rate (optional)
- Higher end parking rate (optional)

FINANCIAL SAVINGS/COSTS TO PATIENTS

Financial savings/costs to patients also includes transit fare, gas, insurance, and vehicle wear and tear, but these items will be automatically calculated using external data points.

| Metric | Value | Instructions | Assumptions/Limitations |
|------------------------------|-------|---|--|
| Lower-end parking rate (\$) | 7 | A low-end parking rate of \$7 has already been entered in the first cell. If you would like to change this parking rate, enter a new figure in the cell. | The default value is based on a maximum evening (7pm-6am) parking rate for a Toronto-area hospital. In this case, the maximum rate would be reached if a patient parked longer than 1 hour (\$3/30 minutes); the maximum was selected because recent literature suggests patients visiting hospitals spend approximately 2 hours on site. (Curtis, 2021) |
| Higher-end parking rate (\$) | 20 | A high-end parking rate of \$20 has already been entered in the second cell. If you would like to change this parking rate, enter a new figure in the cell. | The default value is based on a maximum daily (6am-7pm) parking rate for a Toronto-area hospital. In this case, the maximum rate would be reached if a patient parked longer than 1.5 hours (\$6/30 minutes); the maximum was selected because recent literature suggests patients visiting hospitals spend approximately 2 hours on site. |

[Main page](#)

[Postal Code-FSA Input](#)






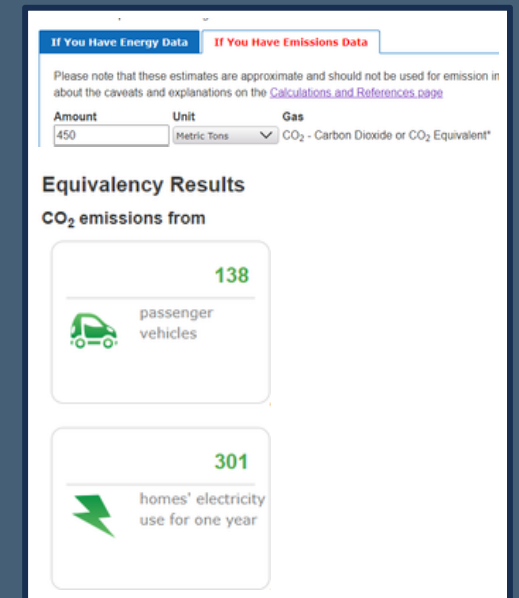
Interpretation of Results



INTERPRETING OUTPUT DATA: VIRTUAL CARE CARBON AND FINANCIAL SAVINGS

| Results - Virtual Care Carbon & Financial Savings | | | |
|---|--|-------|--|
| Savings type | Metric | Value | Notes |
| Carbon Savings Total carbon emissions saved from patient travel averted to and from a facility | Total carbon emissions saved from travel averted (tonnes) | X | These values indicate the total carbon emissions averted by avoided patient trips to and from your facility because of virtual visits. The first cell includes all carbon emissions averted. The second cell does not include public transit carbon emissions averted as transit will continue to run and produce emissions regardless of any given trip avoided. |
| | Total carbon emissions saved from travel averted (minus public transit) (tonnes) | X | Click on the NRC icon to the right to visit Natural Resources Canada's Carbon Equivalencies Calculator. Enter the values in cell B19 and/or B20 in the first field "CO ₂ - Carbon Dioxide or CO ₂ Equivalent" and keep "metric tonnes" as the unit. Click "Calculate" - the website will provide equivalent emissions that will help place your findings in context.  |
| Financial Savings Total financial savings to patients from patient travel averted to and from your facility | Travel costs saved (NO PARKING) (CAD) | X | These values indicate the total travel costs saved by patients who avoided traveling to and from your facility because of virtual visits. |
| | Travel costs saved - with parking (LOWER END) (CAD) | X | Travel costs include costs per kilometer for personal vehicles (including vehicle maintenance, license and registration, insurance, and fuel) and costs per ride for public transit in Ontario. |
| | Travel costs saved - with parking (UPPER END) (CAD) | X | The cost of parking has been omitted from the value in the first cell, but the second cell includes travel cost plus lower end parking, and the third cell includes travel costs plus higher end parking costs (based on the values entered in the data inputs section) |
| Percent virtual visits | | X | Automatic. This figure is based on the values entered in the data inputs section. |

RESOURCE:



- Natural Resources Canada's GHG Equivalencies Calculator can illustrate the significance of carbon savings.

[Main page](#) | Postal Code-FSA Input



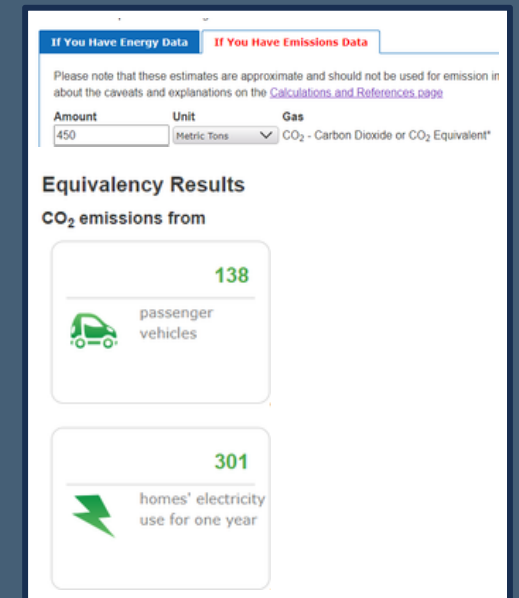


INTERPRETING OUTPUT DATA: IN-PERSON CARE CARBON AND FINANCIAL COSTS

| Results - In-person Care Carbon & Financial Costs | | | |
|--|--|-------|--|
| Cost type | Metric | Value | Notes |
| Carbon Costs Total carbon costs of patient travel to and from a facility | Total carbon emissions from patient travel (tonnes) | X | These values indicate the total carbon emissions generated by patient trips to and from your facility because of in-person visits. The first cell includes all carbon emissions generated. The second cell does not include public transit carbon emissions as transit will continue to run and produce emissions regardless of any given trip. |
| | Total carbon emissions from patient travel (minus public transit) (tonnes) | X | Click on the NRC icon to the right to visit Natural Resources Canada's Carbon Equivalencies Calculator. Enter the values in cell C25 and/or C26 in the first field "CO ₂ - Carbon Dioxide or CO ₂ Equivalent" and keep "metric tonnes" as the unit. Click "Calculate" - the website will provide equivalent emissions that will help place your findings in context. |
| Financial Costs Total financial costs to patients from patient travel to and from a facility | Travel costs (NO PARKING) (CAD) | X | These values indicate the total travel costs incurred by patients traveling to and from your facility because of in-person visits. |
| | Travel costs with parking (LOWER END) (CAD) | X | Travel costs include costs per kilometer for personal vehicles (including vehicle maintenance, license and registration, insurance, and fuel) and costs per ride for public transit in Ontario. |
| | Travel costs with parking (UPPER END) (CAD) | X | The cost of parking has been omitted from the value in the first cell, but the second cell includes travel cost plus lower end parking, and the third cell includes travel costs plus higher end parking costs (based on the values entered in the data input section) |
| Percent in-person visits | | X | Automatic. This figure is based on the values entered in the data inputs section. |



RESOURCE:



- Natural Resources Canada's GHG Equivalencies Calculator can illustrate the significance of carbon savings.

[Main page](#) | Postal Code-FSA Input





INTERPRETATING OUTPUT DATA: FORECASTING

| Tool Outputs | Virtual Care | In-Person Care |
|---|---|---|
| Forecasts of carbon and financial savings/costs based on visit type | The carbon and financial savings associated with virtual visits at various percentages of total visits | The carbon and financial costs associated with virtual visits at various percentages of total visits |

FORECASTING - VIRTUAL VISITS: CARBON AND FINANCIAL SAVINGS

| Virtual visits as percent of total visits (%) (CURRENT % in row 40) | Carbon Savings | | Cost Savings | | |
|--|--------------------------------|--|---------------------------------------|---|--|
| | Total emissions saved (Tonnes) | Total emissions saved (w/o bus) (Tonnes) | Travel costs saved (No parking) (CAD) | Total costs saved w/parking (Lower end) (CAD) | Total costs saved w/parking (Higher end) (CAD) |
| 66.7% | 1.22 | 1.19 | 2451.23 | 11970.32 | 29648.62 |
| 5% | 0.09 | 0.09 | 183.84 | 897.77 | 2223.65 |
| 10% | 0.18 | 0.18 | 367.69 | 1795.55 | 4447.29 |
| 15% | 0.27 | 0.27 | 551.53 | 2693.32 | 6670.94 |
| 20% | 0.36 | 0.36 | 735.37 | | |
| 25% | 0.46 | 0.45 | 919.21 | | |
| 30% | 0.55 | 0.54 | 1103.06 | | |
| 35% | 0.64 | 0.62 | 1286.90 | | |
| 40% | 0.73 | 0.71 | 1470.74 | | |
| 45% | 0.82 | 0.80 | 1654.58 | | |
| 50% | 0.91 | 0.89 | 1838.43 | | |
| 55% | 1.00 | 0.98 | 2022.27 | | |
| 60% | 1.09 | 1.07 | 2206.11 | | |
| 65% | 1.19 | 1.16 | 2389.95 | | |
| 70% | 1.28 | 1.25 | 2573.80 | | |
| 75% | 1.37 | 1.34 | 2757.64 | | |
| 80% | 1.46 | 1.43 | 2941.48 | | |
| 85% | 1.55 | 1.52 | 3125.32 | | |
| 90% | 1.64 | 1.61 | 3309.17 | | |
| 95% | 1.73 | 1.69 | 3493.01 | | |
| 100% | 1.82 | 1.78 | 3676.85 | | |

FORECASTING - IN-PERSON VISITS: CARBON AND FINANCIAL COSTS

| In-person visits as percent of total visits (%) (CURRENT % in row 40) | Carbon Savings | | Cost Savings | | |
|--|--------------------------|------------------------------------|---------------------------------|---|--|
| | Total emissions (Tonnes) | Total emissions (w/o bus) (Tonnes) | Travel costs (No parking) (CAD) | Total costs w/parking (Lower end) (CAD) | Total costs w/parking (Higher end) (CAD) |
| 33.3% | 0.10 | 0.10 | 317.06 | 5076.60 | 13915.75 |
| 5% | 0.02 | 0.02 | 47.56 | 761.49 | 2087.36 |
| 10% | 0.03 | 0.03 | 95.12 | 1522.98 | 4174.73 |
| 15% | 0.05 | 0.05 | 142.68 | 2284.47 | 6262.09 |
| 20% | 0.06 | 0.06 | 190.24 | 3045.96 | 8349.45 |
| 25% | 0.08 | 0.08 | 237.79 | 3807.45 | 10436.81 |
| 30% | 0.09 | 0.09 | 285.35 | 4568.94 | 12524.18 |
| 35% | 0.11 | 0.11 | 332.91 | 5330.43 | 14611.54 |
| 40% | 0.12 | 0.12 | 380.47 | 6091.92 | 16698.90 |
| 45% | 0.14 | 0.14 | 428.03 | 6853.41 | 18786.26 |
| 50% | 0.15 | 0.15 | 475.59 | 7614.90 | 20873.63 |
| 55% | 0.17 | 0.17 | 523.15 | 8376.39 | 22960.99 |
| 60% | 0.18 | 0.18 | 570.71 | 9137.88 | 25048.35 |
| 65% | 0.20 | 0.20 | 618.26 | 9899.37 | 27135.71 |
| 70% | 0.22 | 0.21 | 665.82 | 10660.86 | 29223.08 |
| 75% | 0.23 | 0.23 | 713.38 | 11422.35 | 31310.44 |
| 80% | 0.25 | 0.24 | 760.94 | 12183.84 | 33397.80 |
| 85% | 0.26 | 0.26 | 808.50 | 12945.33 | 35485.16 |
| 90% | 0.28 | 0.27 | 856.06 | 13706.82 | 37572.53 |
| 95% | 0.29 | 0.29 | 903.62 | 14468.31 | 39659.89 |
| 100% | 0.31 | 0.30 | 951.18 | 15229.80 | 41747.25 |

[Main page](#) | Postal Code-FSA Input





SHARE YOUR FINDINGS: UPLOAD RESULTS

Contribute to the community’s understanding of virtual care carbon savings by sharing your data with CASCADES:

- Click on the “Share your results with CASCADES” icon and enter the following into the shared spreadsheet



About: (all items optional)

- Institution
- Location
- Time Period
- Contact

Data:

- Results Value columns (Copy; Paste special; Values)
- Higher end parking rate (optional)



| Results – Virtual Care Savings | | |
|--------------------------------|--|-------|
| Savings type | Metric | Value |
| Carbon Savings | Total carbon emissions saved from travel averted (tonnes) | X |
| | Total carbon emissions saved from travel averted (minus public transit) (tonnes) | X |
| Financial Savings | Travel costs saved (NO PARKING) (CAD) | X |
| | Travel costs saved - with parking (LOWER END) (CAD) | X |
| | Travel costs saved - with parking (UPPER END) (CAD) | X |
| Percent virtual visits | | % |

| Results – In-Person Costs | | |
|---------------------------|--|-------|
| Cost type | Metric | Value |
| Carbon Costs | Total carbon emissions from patient travel (tonnes) | X |
| | Total carbon emissions from patient travel (minus public transit) (tonnes) | X |
| Financial Costs | Travel costs (NO PARKING) (CAD) | X |
| | Travel costs with parking (LOWER END) (CAD) | X |
| | Travel costs with parking (UPPER END) (CAD) | X |
| Percent in-person visits | | % |

[Main page](#)

Postal Code-FSA Input





Assumptions and Limitations



SPECIFIC AND GENERAL

SPECIFIC LIMITATIONS AND ASSUMPTIONS

Limitations and assumptions related to specific inputs and outputs are noted in the preceding tables.

GENERAL LIMITATIONS AND ASSUMPTIONS

The 1 to 1 assumption: It is assumed that a virtual visit equates to an in-person visit. This may not necessarily be the case.

- More information is needed on virtual visit frequency and associated diagnostic care in comparison to in-person visits.
- Future analyses may be better served by changing the unit of analysis from “visit” to “health episode,” and considering the environmental inputs and outputs associated with the treatment of a health episode virtually vs. in-person (see Figure 3 for a possible carbon accounting framework).

Omitted factors: A discussion of omitted factors that may impact virtual care’s carbon footprint are discussed on the following slide.

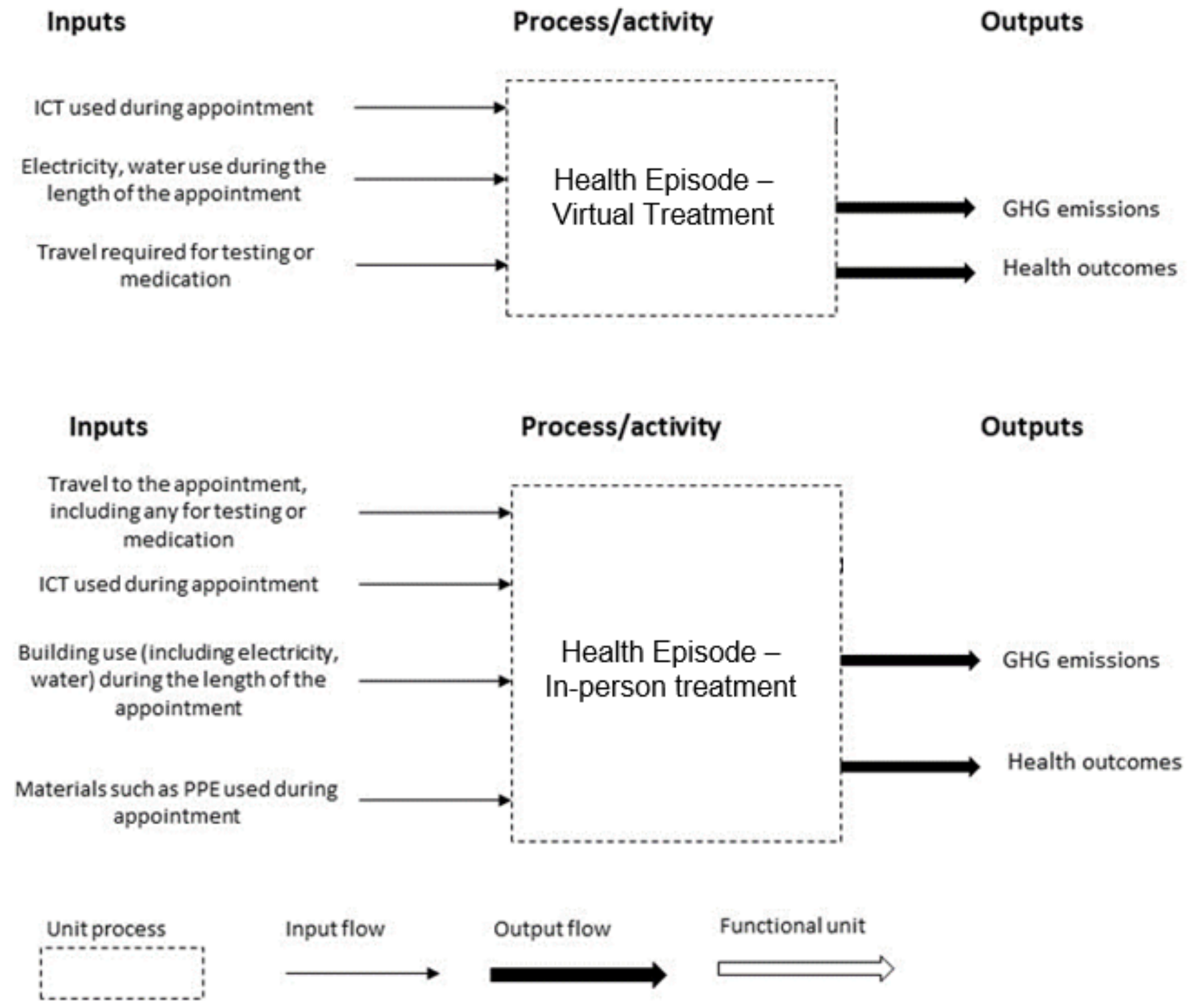


Figure 3: Draft framework for Carbon Accounting of Treatment Modality by Health Episode





THE VCCAT CAPTURES ONLY TRAVEL-RELATED CO₂E SAVINGS ASSOCIATED WITH VIRTUAL CARE; THIS APPROACH IS SHARED ACROSS STUDIES AND TOOLS THAT SEEK TO MEASURE THE ENVIRONMENTAL SAVINGS OF VIRTUAL CARE. (8)

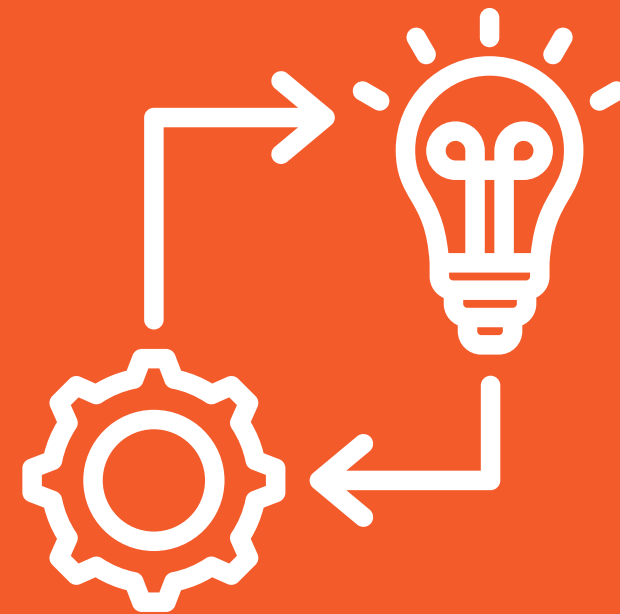
Several potentially significant but harder to measure factors that might undermine or bolster the environmental benefits of virtual care have been omitted, including:

- **INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) RELATED EMISSIONS:**
 - The technologies used to facilitate virtual visits – primarily smartphones, but also tablets and personal computers – have a carbon footprint
 - While there are emissions factors for smartphone and zoom calls per minute, there is currently a dearth of data on the length of virtual visits—a metric needed to establish ICT emissions
 - Preliminary analysis using estimated visit lengths indicates that ICT-generated emissions from virtual care are negligible but given distinctions in the composition of provincial energy grids, ICT emissions will be higher (and therefore more relevant) in some provinces
 - Moreover, the balance between travel- and ICT-related emissions can be impacted by changing circumstances. On the one hand, as hybrid and electric vehicles make up a higher proportion of Canada’s cars, emission savings from avoided travel will diminish. On the other hand, “unless we specify lower carbon digital products and services a rapid growth in data demand and digital equipment has the potential to add to [ICT] emissions.”(8)
 - Data on virtual visit length is needed to inform a more nuanced analysis
- **PRACTICE CHANGE RELATED EMISSIONS:**
 - Some providers have reported “overprescribing or increasing diagnostic testing to compensate for what they worried to be an incomplete assessment”—actions that would increase the carbon footprint of care. (9)
 - More information on practice changes and their associated carbon footprint would be needed to inform a more nuanced analysis.
- **HEALTH OUTCOME RELATED EMISSIONS:**
 - There is ongoing debate about the extent to which virtual care impacts health outcomes. In the event that virtual care contributes to better health outcomes, the carbon footprint of care will be reduced; in the event that virtual care contributes to worse health outcomes, the carbon footprint of care will increase.
 - More information on the health outcomes associated with virtual care would be needed to inform a more nuanced analysis.





HOW



Strategy & Implementation

Optimize the Environmental Performance of Information and Communications Technology

Establish organizational interest and commitment



Develop goals and indicators, and action steps to achieve them



Measure status of sustainability activity



Implement strategy



Monitor and evaluate progress, and adjust plans as needed





Optimize the Environmental Performance of ICT



MAXIMIZING THE CARBON BENEFITS OF VIRTUAL CARE

PURSUE SUSTAINABILITY AT VARIOUS SCALES



Infrastructure (internal and external):

- Increase your facility's reliance on non-emitting energy sources
- Invest in cleaner energy production provincially and nationally



Equipment:

- Invest in energy-efficient ICT
- Ensure appropriate use and disposal of ICT



Access:

- Ensure equitable and evidence-based access to virtual care and the technology that facilitates it
- Address the Digital Divide (unequal access to the internet by region and demographics)





Optimize the Environmental Performance of ICT



VIRTUAL VS. IN-PERSON VISITS

CHOOSING AN APPROPRIATE TYPE

The potential environmental benefits of a virtual visit should be one of many considerations when determining visit type.

SELECTING PATIENTS FOR VIRTUAL VISIT:

Questions to consider (Ontario Health)

- Are there any language barriers that could negatively impact the virtual visit? If so, does the patient have adequate support to participate?
- How far is the patient travelling to see me? Do they have mobility issues? Would a virtual visit be more patient centered?
- How tech savvy is the patient? Do they use an internet-enabled computer or smartphone and have email? If required, is assistance available?
- Is the patient's device compatible with the virtual visit solution?
- Is this an established patient-provider relationship?
- What is the patient's cognitive capacity? If required, do they have a caregiver that can support?
- Would a virtual visit avoid the need for patients to take time off work?
- Would a virtual visit help avoid the cost of parking for my patients?
- Would a virtual care visit result in fewer environmental impacts than a face-to-face visit? If so, is this of importance to the patient? (10)

Preferred Visit Modality for Various Types of Health Care Encounters

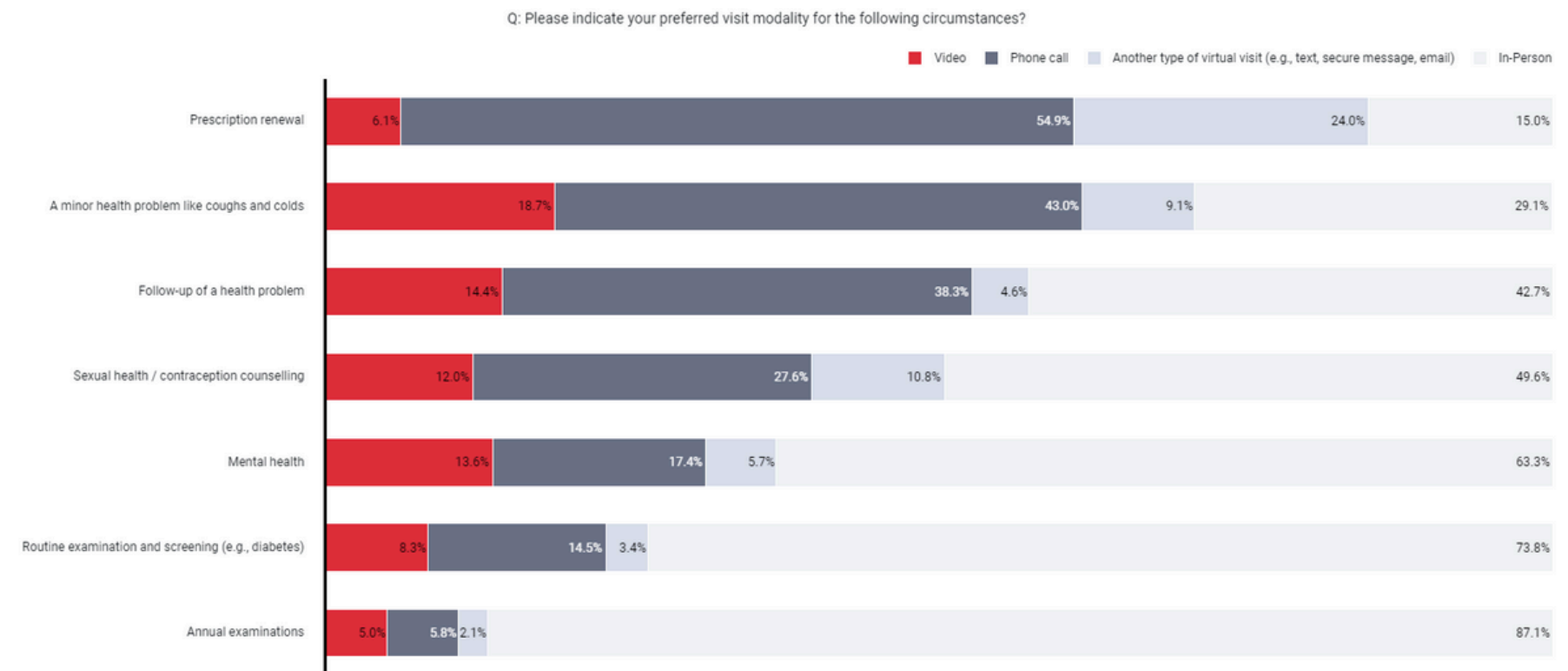


Figure 4: Canada Health Infoway (2022). Infoway Insights: Canadian Digital Health Survey.





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About this playbook

This playbook was initially developed through an initiative of the Sustainable Health System Community of Practice (CoP), with support from CASCADES

- The CoP is a collaboration between the Toronto Academic Health Science Network (TAHSN) of 14 hospital systems, and the seven health science faculties of the Council of Health Sciences (CHS) at the University of Toronto, supported by the Centre for Sustainable Health Systems at the University of Toronto.

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