McMaster University | HEALTH FORUM

## Rapid Synthesis

# Achieving net-zero emissions in health systems through strategic funding partnerships and networks

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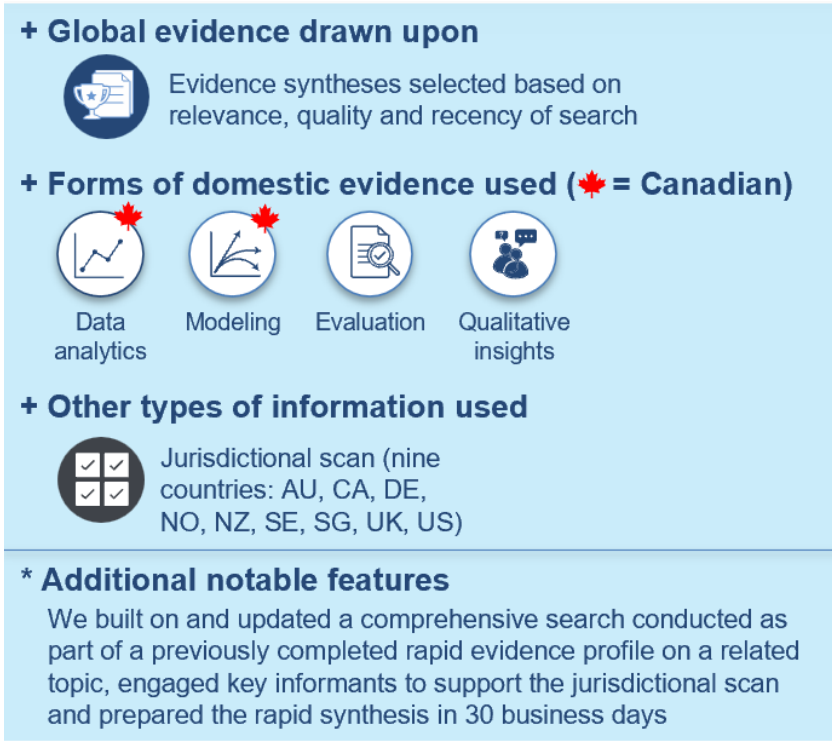
## Context

In 2015, the World Health Organization (WHO) released its operational framework for building climate resilient health systems, which emphasized a number of areas that health-system leaders globally should be focused on to ensure their health systems are prepared to deal with the direct and indirect effects of climate change – including their potential to impact human health. The framework outlined ten components for building climate resilience in health systems, centred around the WHO building blocks of health systems:

1) leadership and governance (e.g., political commitment and effective leadership to build climate resilience)
2) health workforce (e.g., workforce with capacity to understand the relationship between climate and health, and the impact of climate on the health system)
3) health information systems: vulnerability, capacity and adaptation assessment (e.g., assessments used to generate policy-relevant evidence on the scale and nature of health risks resulting from climate change)
4) health information systems: integrated risk monitoring and early warning (e.g., developing adequate capacity and flexibility to understand how climatic conditions influence health outcomes)
5) health information systems: health and climate research (e.g., building a strong system for both basic and applied research to reduce uncertainty about how local conditions may be affected)
6) essential medical products and technologies: climate resilient and sustainable technologies and infrastructure (e.g., provision of essential preventative and curative health products, like vaccines for climate-sensitive diseases)
7) service delivery: management of environmental detriments of health (e.g., promoting 'health in all policies' approach' across sectors) service delivery: climate-informed health programmes (e.g., developing health programming and operations that consider the risks climate poses to promote climate resilience)
8) service delivery: climate-informed health programmes (e.g., developing health programming and operations that consider the risks climate poses to promote climate resilience)
9) service delivery: emergency preparedness and management (e.g., implementing measures that ensures health systems are set up to deal with outbreaks and health emergencies triggered by climate variability)

### Box 1: Forms of evidence and other types of information used



10) financing: climate and health financing (e.g., investing resources to put in place measures that can support the development of climate-resilient health systems).

Whereas the components laid out in the 2015 framework appropriately positioned health systems as being *affected by* climate change, sparking the need to build climate resilience and adapt to the growing health threats created by a changing climate, the role health systems play in *contributing to* climate change through carbon emissions was largely absent. A reframing to consider the impact health systems have on climate through emissions was addressed in an update to the framework ahead of COP28 in 2023, with the newest iteration including a more explicit focus on the interventions and strategies needed to move towards low-carbon health systems. This framing is becoming increasingly common, with many groups in Canada (e.g., CASCADES) and internationally (e.g., Health Care Without Harm) advocating for a much more active role for health-system decision-makers at all levels (including government policymakers and system leaders, professional leaders and citizen leaders) in curbing carbon emissions as part of global efforts to address climate-change more generally.

In both iterations of the WHO framework, the importance of collaborative efforts among like-minded and committed stakeholders, as well as a long-term vision for sustainable funding streams that can support efforts to advance mitigation and adaptation strategies to achieve net-zero health-systems emissions are explicitly noted. However, little attention has been paid to documenting what is known about how these partnerships and networks are contributing to advancing net-zero emissions in health systems, both in Canada and internationally. At the request of the CMA Foundation to advance understanding in this area, this rapid synthesis focuses on these issues in the context of health systems as contributors to climate change through their carbon footprint, rather than on how to support climate-resilient health systems more generally. We build on a previously completed rapid evidence profile which addressed the question, "What do we know from the best available evidence and experiences about the nature and scale of health-system emissions, mitigation and adaptation strategies to achieve net-zero health-system emissions, and processes to achieve net-zero health-system emissions?" and have expanded this initial work in the following ways:

- updated the searches conducted as part of the evidence scan to identify new evidence syntheses published since the completion of the rapid evidence profile (in late 2022)
- broadened the analysis of the available evidence documents to include a focus on identifying insights about barriers to the mitigation and adaptation strategies to achieve net-zero health-system emissions, and about the role of strategic partnerships and funder networks to advance progress by overcoming these barriers
- conducted an extensive jurisdictional scan of Canadian jurisdictions in addition to nine prioritized international jurisdictions, with a primary focus on identifying strategic partnerships and funder networks, and documenting their efforts to advance net-zero health-systems emissions.

Box 1 on the previous page outlines the key sources of evidence and other types of information used to inform this rapid synthesis.

## Questions

- What are the barriers to achieving net-zero emissions in health systems, what do we know about the role of funding and investments to overcome these barriers, and how can partnerships be structured to accelerate progress toward achieving net-zero emissions in health systems?
- What strategic partnerships and/or funder networks have been established across Canadian provinces and territories to accelerate progress towards net-zero emissions in health systems, what are their core features (including, where applicable, sources of funding), in which areas are there gaps (in both the focus of partnerships/funder networks and in investments to accelerate progress), and what has been documented about lessons learned from them?
- What strategic partnerships and/or networks have been established internationally, what are their core features, and what has been documented about lessons learned from them?

## High-level summary of key findings

**Research evidence**

We identified and analyzed 41 highly relevant evidence documents (24 evidence syntheses and a protocol for an evidence synthesis, and 16 single studies), which provided insights on about 12 mitigation and adaptation strategies for achieving net-zero health-systems emissions:

- investments using a net-zero approach or requirement
- energy-use reductions: i) buildings; ii) transportation and travel
- low- or zero-carbon electricity supply and purchasing: i) renewable energy
- electrification and other fuel switching: i) appliances; ii) vehicles
- non-energy emissions solutions: i) industrial-process improvements; ii) reuse and recycling
- decarbonizing the supply chain in relation: i) food, catering and nutrition; ii) low-carbon inhalers; iii) anesthetic gases
- processes, targets and monitoring and evaluation strategies.

Strategies related to energy-use reductions (in buildings and through strategies targeted at transportation and travel) were addressed by 32 of the 41 documents identified, and non-energy emission solutions (namely industrial-process improvements and reuse and recycling) were addressed by 21 of the 41 documents identified. Collectively, these mitigation and adaptation strategies were the primary focus of the evidence documents that were identified. The bulk of the documents focused on energy-use reductions in buildings outlined strategies to reduce emissions in operating rooms (e.g., introducing occupancy sensors, performance audits), and those focused on transportation and travel primarily focused on ways to reduce travel to and from clinical interactions by patients and their providers. The bulk of documents focused on non-energy emissions solutions via industrial-process improvements assessed the benefits of producing single-use versus repeated use devices – finding generally mixed results given emissions associated with the sterilization process of reusable devices – and those focused on reuse and recycling more generally focused on a mix of assessing the impact of reuseable devices alongside more general insights about approaches health facilities could take towards more sustainable purchasing practices (particularly as it relates to resource-intensive settings like operating rooms). Appendix 3 provides detailed summaries across all strategies for which evidence was identified.

No evidence was identified that focused on the following eight mitigation and adaptation strategies:

- energy-use reductions: i) energy production; ii) industry partners; iii) land use
- low-or zero-carbon electricity supply and purchasing: i) nuclear power
- electrification and other fuel switching: i) supporting infrastructure
- non-energy emissions solutions: i) bio-sequestration; ii) carbon capture and storage; iii) fugitive-emission reduction.

Little evidence was identified that focused specifically on barriers to these strategies, and about how strategic partnerships and/or funder networks can help accelerate progress towards achieving net-zero health-systems emissions through these strategies. However, the following themes emerged during our analysis of highly relevant evidence documents within each of these domains:

- **barriers** to implementing the strategies tend to be at the individual level (e.g., staff and health professionals not being aware of how their decisions can affect emissions and sustainability more generally and a lack of behaviour-change initiatives to support shifts towards sustainable practices) and at the level of facilities (e.g., misaligned financial incentives at health facilities who stand to lose parking revenue if promoting the reduction of travel)

- **strategic partnerships** established to advance sustainability and emissions-reducing efforts centre on groups of health professionals practicing in a similar specialty (e.g., radiology) or in similar settings (e.g., in operating theatres) and mostly relate to sharing knowledge about promising practices
- **funder networks** were not mentioned in any of the evidence documents we analyzed (or how they can be used to accelerate progress on the mitigation and adaptation strategies).

**Jurisdictional scan**

We looked for examples of strategic partnerships and funder networks established to advance efforts to achieve net-zero health-systems emissions in Canada (at the federal level, and within each province and territory), and in eight additional countries: Australia, Denmark, New Zealand, Norway, Singapore, Sweden, the U.K. and the U.S.

We found that the majority of the **strategic partnerships** we identified within Canada served to create a shared framework for identifying key elements of net-zero health systems and to connect health-system actors as a way to facilitate collective action across multiple areas in net-zero mitigation and adaptation. Most strategic partnerships that were identified focused on federal-level initiatives or on provincial initiatives within Ontario and Quebec. Similarly, strategic partnerships identified in other countries and at the international level generally included those that aimed to build a shared framework of action to work towards net-zero emissions in health care systems, and often facilitated these efforts through guidance and/or checklists based on these frameworks. At the international level, the World Health Organization plays a significant role in facilitating partnerships between and within countries that produce initiatives to strengthen climate resilience and lower the emissions of health systems. At the national level, we found that Australia, New Zealand, Denmark, the U.K. and the U.S. have several partnerships that engage health professionals, patients and the community to reduce the resource footprint of the health systems.

Most of the **funder networks** we identified within Canada were broadly focused on achieving net-zero emissions and sustainability across all sectors, sometimes including health. Funder networks specifically focused on supporting net-zero initiatives in the health sector were found to be uncommon in international jurisdictions, with only two funding networks being identified in the U.K. Additional efforts are needed to strengthen partnerships, coordinate action and share lessons learned from best practices to achieve net-zero within Canada and around the world.

## Framework to organize what we looked for

We organized our findings from the evidence scan using a framework that we provide in Appendix 2, which includes categories related to health-system emissions mitigation and adaptation strategies for achieving net-zero health systems. When conducting the jurisdictional scan, we organized our findings by country, and focused on: 1) identifying the strategic partnerships and/or funder networks established to support the achievement of net-zero health systems; 2) documenting their key characteristics; 3) mapping the focus of their efforts in relation to whether they target particular health-system emissions mitigation and adaptation strategies (using the taxonomy developed to support the organization of findings from the evidence scan); and 4) identifying any lessons learned from these efforts.

## What we found

Our searches for evidence syntheses that have been published since the completion of the rapid evidence profile we built on for this evidence scan (see Box 2 and Appendix 1 for additional details about the methods used) found an additional 16 evidence syntheses about mitigation and adaptation strategies. This brought the total number of evidence documents included in our analysis to 41 (24 evidence syntheses and one protocol for an evidence synthesis, and 16 single studies). A summary of the evidence organized by the framework of mitigation and adaptation strategies to achieve net-zero health-systems emissions is provided in Appendix 3 (for general findings) and Appendix 4 (for findings specific to barriers, strategic partnerships and funder networks). Additional details about each included evidence synthesis and single study are included in Appendices 6 and 7, respectively.

A summary of the experiences from Canadian provinces and territories is provided in Appendix 7, while Appendix 8 provides a summary of the experiences from the eight international jurisdictions we included in the jurisdictional scan (Australia, Denmark, New Zealand, Norway, Singapore, Sweden, the U.K. and the U.S.).

We outline in narrative form below our key findings related to the questions from highly relevant evidence documents and based on experiences from the jurisdictional scans.

## Key findings from highly relevant evidence sources

The evidence documents identified addressed 12 of the 20 mitigation and adaptation strategies that were included in the organizing framework (see Appendix 2), with the number of evidence documents that were found to address each of the strategies outlined in Table 1 below.

### Box 2: Approach and supporting materials

We identified evidence related to the questions by drawing on a rapid evidence profile on health-system emissions mitigation and adaptation strategies to achieve net-zero emissions (which searched 17,105 documents included in a living evidence synthesis that used machine learning to map the global research on climate change and health) and added to the dataset by searching for newly published evidence syntheses not included in the original analysis in Health Systems Evidence, Social Systems Evidence and PubMed, using a combination of keywords and advanced search filters (e.g., document type). We identified jurisdictional experiences through two main pathways:

1) identifying 1–2 'key informants' who are highly likely to have knowledge of key strategic partnerships and/or funder networks focused on achieving net-zero emissions in health systems in each jurisdiction, and engaging them to provide information about the initiatives they are aware of
2) hand searching stakeholder websites for information relevant to the question, with websites being identified through a combination of Google searches that used keywords such as 'emissions' and 'health systems' and by looking at documented partnerships and networks on the websites of organizations that were already identified (either through key informants or Google searches).

We appraised the methodological quality of identified evidence syntheses (including full systematic reviews and rapid reviews) using AMSTAR. Note that quality appraisal scores for rapid reviews are often lower because of the methodological shortcuts that need to be taken to accommodate compressed timeframes. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems or to broader social systems.

This rapid synthesis was prepared in a 30-business-day timeline. A separate appendix document includes:

1) methodological details (Appendix 1)
2) a framework to organize what we looked for (Appendix 2)
3) summary tables of what is known from the evidence about mitigation and adaptation strategies (Appendix 3), and about barriers to these strategies as well as the role that strategic partnerships and funder networks can play in overcoming the barriers (Appendix 4)
4) detailed findings from each identified evidence document (Appendix 5 and 6)
5) a summary table of experiences from Canadian provinces and territories and other countries (Appendix 7 and 8)
6) a list of references (Appendix 9)

**Table 1: Summary of which mitigation and adaptation strategies were addressed by highly relevant evidence documents**

| Mitigation and adaptation strategies for which highly relevant evidence documents were found | | Total evidence documents identified | Evidence syntheses (incl. protocols) | Single studies |
|---|---|---|---|---|
| **Domain** | **Sub-domain (if applicable)** | | | |
| **Investments using a net-zero approach or requirement** | | 6 | 4 | 2 |
| **Energy-use reductions** | **Buildings** | 15 | 14 | 1 |
| | **Transportation and travel** | 17 | 14 | 3 |
| **Low- or zero-carbon electricity supply and purchasing** | **Renewable energy** | 4 | 3 | 1 |
| **Electrification and other fuel switching** | **Appliances** | 2 | 1 | 1 |
| | **Vehicles** | 3 | 0 | 3 |
| **Non-energy emission solutions** | **Industrial-process improvements** | 9 | 7 | 2 |
| | **Reuse and recycling** | 11 | 10 | 1 |
| **Decarbonizing the supply chain** | **Food, catering and nutrition** | 4 | 3 | 1 |
| | **Low-carbon inhalers** | 4 | 2 | 2 |
| | **Anesthetic gases** | 8 | 6 | 2 |
| **Processes, targets, and monitoring and evaluation strategy** | | 4 | 1 | 3 |

We did not identify any evidence documents directly addressing the following mitigation and adaptation strategies for achieving net-zero health-system emissions:

- energy-use reductions in relation to energy production, industry partners and land use
- low- or zero-carbon electricity supply and purchasing, with a focus on nuclear power
- electrification and other fuel switching, with a focus on supporting infrastructure
- non-energy emission solutions, with a focus on bio-sequestration, carbon capture and storage, and fugitive-emission reduction.

While some of the above strategies were mentioned in the evidence documents (e.g., listed within the context of broader frameworks to guide hospitals' efforts to become more sustainable), they were not the focus of the evidence documents, and were not included in an analysis about what is known for these strategies.

A summary of what is known from evidence documents (including links to each document) about the mitigation and adaptation strategies included in Table 1 is provided in Appendix 3, with a specific overview of what is known in relation to barriers, strategic partnerships and funder networks provided in Appendix 4. Below we provide the main themes emerging from the evidence in relation to each strategy in turn.

## Evidence about the health-systems emissions mitigation and adaptation strategies

*Investments using a net-zero approach or requirement*

Four evidence syntheses (one high, one medium and two low quality) and two single studies were identified that addressed this strategy. The key insights that emerged from these evidence documents are:

- there appear to be long-term cost savings associated with investments in a net-zero approach, despite the up-front costs, and the best time to implement this approach is during initial planning phases of new hospitals or buildings (and planners should place particular emphasis on targeting areas where emissions are found to be particularly high, such as in operating rooms)

- leadership and alignment of investments with organizational aims are important facilitators of successful implementation of strategies that are the target of investments.

*Energy-use reductions*

With respect to evidence-use reduction in buildings, 14 evidence syntheses (two low-quality, nine medium-quality and three high-quality) and one single study were identified. The key insights that emerged from these evidence documents are:

- several categories of strategies targeting hospitals in general have been identified as potentially promising, and most of them are focused on energy-efficient measures associated with core building operation (e.g., heating, lighting, ventilation, water reuse, insulation) as well as in building design decisions that can support efficiency more generally (e.g., using green-design principles, co-generation of energy, automatic doors and temperature monitoring) and procurement decisions that prioritize sustainable products and services
- the majority of evidence documents focus on reducing emissions by targeting operating rooms and surgical departments, which include strategies such as occupancy sensors and energy-efficient HVAC and radiofrequency scheduling and energy audits
- inter- and intra-institutional collaboration (e.g., 'green teams') can help to promote awareness of the carbon emissions associated with healthcare facilities among clinicians and staff and improve knowledge of ways that emissions can be mitigated
- there is a need to better understand (through research) the complementary behaviour-change supports required to improve the adoption of sustainability measures in healthcare facilities.

With respect to transportation and travel, 14 evidence syntheses (three low quality, nine medium quality and two high-quality) and three single studies were identified. The key insights that emerged from these evidence documents are:

- most of the available evidence focused on reducing emissions by reducing transportation and travel focus on reductions associated with clinical encounters among patients and health professionals
- reduction in transportation and travel are often facilitated through shifts to virtual visits enabled by telehealth and telemedicine interventions, and the potential reduction in emissions associated with this switch can vary widely depending on several factors (e.g., speciality, sector, geography)
- there may also be potential for reducing travel-related emissions by focusing on minimizing the number of tests ordered by clinicians (given the travel associated with transporting samples that are required for laboratory testing), and through other behaviour-change interventions that promote clinical decision-making that takes sustainability and emissions into account (e.g., being judicious about requiring in-person follow-up visits).

*Low- or zero-carbon electricity supply and purchasing – renewable energy*

Three evidence syntheses (two medium quality and one high quality) and one single study were identified in relation to this strategy. The major theme that emerged from these evidence documents was that surgical systems and health facilities should switch to renewable sources of energy when possible – although this cannot happen without broader decarbonization of the energy sector, or with laws that support the adoption of purchasing practices that prioritize green energy.

*Electrification and other fuel switching*

One evidence synthesis (medium quality) and one single study were identified in relation to electrification and other fuel switching for appliances, with the main findings from evidence documents suggesting the need to consider replacing old equipment (e.g., lighting, machinery and equipment, air conditioning, heating systems) with energy-efficient options. Three single studies were identified in relation to electrification and other fuel switching for

vehicles, and found that options included switching to ambulances and other transport vehicles that were electric or hybrid, or used biofuels. These studies also found that efforts to reduce unnecessary ambulance responses and transports could support lower emissions.

*Non-energy emission solutions*

Seven evidence syntheses (one high-quality, five medium-quality and one low-quality) and two single studies were identified about non-energy emissions solutions that focused on industrial-process improvements. The following themes were identified in these evidence documents:

- focusing on improving sterilization processes for reusable equipment (and disposables that can withstand reuse as a result of better processes) can be part of a solution to reduce carbon emissions, but there are currently mixed findings about whether standard single-use/disposables versus reusable equipment or instruments are more beneficial given the emissions associated with sterilization (e.g., transportation)
- green-purchasing initiatives can be used to guide procurement of medical equipment with an emphasis on sources that have a lower carbon footprint (e.g., as part of the manufacturing process and in the approaches they take for service and maintenance).

Ten evidence syntheses (five high quality, four medium quality and one low-quality) and one single study were identified about non-energy emissions solutions that focused on reuse and recycling. The main insights emerging from these evidence documents were:

- improving reuse and recycling of surgical instruments and textiles (when clinically appropriate), using fewer resources overall and improving waste-segregation practices are efforts that have been suggested for reducing emissions and promoting environmental sustainability in operating rooms
- hospitals and other health facilities should include reuse and recycling practices (including in approaches to purchasing and waste as part of their broader efforts to move towards environmental sustainability)
- staff and clinicians play an important role in advancing reuse and recycling efforts.

*Decarbonizing the supply chain*

Three evidence syntheses (all medium quality) and one single study were identified about decarbonizing the supply chain through food, catering and nutrition. Most of the evidence documents identified focused on the role of hospitals and other health facilities as purchasers of food products, emphasizing the need to procure food associated with fewer emissions (e.g., requiring less transportation and energy to store, and are meat-free when possible), and also noted the importance of developing strategies for dealing with food waste (e.g., through donations that can be used to develop biofuel or compost). Some of the documents also noted the importance of focusing on reducing the amount of wasted food by patients, and engaging clinicians who advise patients on their food choices (e.g., nutritionists) to take sustainability into consideration.

Two evidence syntheses (both medium quality) and two single studies focused on low-carbon inhalers as part of decarbonizing the supply chain. These documents all noted the potential emissions reductions associated with switching to low-carbon inhalers (although more evidence is needed to confirm clinical benefits), and the importance of engaging clinicians in implementing a shift towards these alternatives.

Six evidence syntheses (two high quality and four medium quality) and two single studies focused on anesthetic gases as part of efforts to decarbonize the supply chain. Taken together, these evidence documents found that switching to gases with a lower carbon footprint (e.g., sevoflurane) and to IV anesthesia (when clinically appropriate) could reduce emissions in operating rooms, and that engaging clinical staff to increase awareness and knowledge about the emissions associated with anesthesia and supporting appropriate behaviour change are important implementation strategies.

*Processes, targets, and monitoring and evaluation strategy*

One medium-quality evidence synthesis and three single studies were identified in relation to this strategy. The main themes that were identified in these documents were:

- it is important for health facilities to develop an approach to measure their carbon footprint and to have systems and indicators available to engage in ongoing monitoring of emissions
- there are toolkits and checklists available to support facilities with planning processes that support emissions reduction, for setting targets and for monitoring progress towards reducing carbon emissions
- staff and clinicians plan an important role and should be supported through training and education to engage in carbon-emissions strategies.

**Evidence about barriers to achieving net-zero emissions and about strategic partnerships and funder networks for accelerating progress**

We identified limited information from the evidence about barriers to achieving net-zero emissions and how partnerships can be structured to accelerate progress and did not identify any evidence about the role of funding and investments to overcome barriers to achieving net-zero emissions (see Appendix 4). The strategies for which we found evidence about barriers to achieving net-zero emissions and strategic partnerships for advancing progress were related to energy-use reduction in buildings, and electrification and other fuel switching efforts targeting vehicles.

The main themes to emerge about **barriers** from the evidence documents found (two medium-quality evidence syntheses) were:

- there is often a lack of awareness among clinical staff about the environmental impact of healthcare, and this was highlighted as a contributing factor to the minimal uptake of environmental sustainability practices
- when considering strategies to mitigate vehicle emissions, implementing financial incentives that are in the pecuniary interests of hospitals could be at odds with sustainability initiatives (e.g. rent received by the hospital from car parking versus lower fees for pooled cars or tax reimbursements for inter-hospital travel).

The main themes to emerge from the identified evidence documents about how **partnerships** can accelerate progress (two medium-quality evidence syntheses) were:

- there are examples of strategic partnerships established to advance sustainability and emissions-reducing efforts, which centre on groups of health professionals practicing in a similar specialty (e.g., radiology) or in similar settings (e.g., in operating theatres) and mostly relate to sharing knowledge about promising practices
- it is important to partner with clinicians to shift behavior and encourage them to reduce carbon emissions in the workplace.

Additional research is needed to explore additional partnerships and funder networks that can help to accelerate progress towards achieving net-zero emissions in health systems.

## Key findings from jurisdictional scans

We conducted a jurisdictional scan of strategic partnerships and funder networks established to advance efforts to achieve net-zero health-systems emissions in Canada (at the federal level, and within each province and territory), and in eight additional countries: Australia, Denmark, New Zealand, Norway, Singapore, Sweden, the U.K. and the U.S. We also identified some key insights from international organisations that support net-zero efforts on a global scale. A summary of findings is detailed below and a full description of what we found is included in Appendix 7 (Canadian jurisdictions) and Appendix 8 (international jurisdictions), including the main health-system emissions mitigation and adaptation strategies that were the focus of the initiatives we found. Table 2 also presents an

overview of which mitigation and adaptation strategies are the focus of the strategic partnerships and funder networks we identified as part of the jurisdictional scan (when they could be identified in the websites and resources we analyzed).

**Table 2: Summary of which mitigation and adaptation strategies were the focus of the strategic partnerships and funder networks identified in the jurisdictional scan**

| Mitigation and adaptation strategies that were the focus of partnerships and networks | | Focus of the partnerships or networks | |
|---|---|---|---|
| **Domain** | **Sub-domain (if applicable)** | **CA** | **INT** |
| **Investments using a net-zero approach or requirement** | | 6 | 6 |
| **Energy-use reductions** | **Buildings** | 4 | 6 |
| | **Energy production** | 5 | 5 |
| | **Industry partners (e.g., IT partners)** | 1 | 3 |
| | **Land use** | 0 | 2 |
| | **Transportation and travel** | 6 | 8 |
| **Low- or zero-carbon electricity supply and purchasing** | **Nuclear power** | 1 | 1 |
| | **Renewable energy** | 1 | 4 |
| **Electrification and other fuel switching** | **Appliances** | 0 | 1 |
| | **Supportive infrastructure** | 3 | 2 |
| | **Vehicles** | 2 | 4 |
| **Non-energy emission solutions** | **Bio-sequestration** | 0 | 1 |
| | **Carbon capture and storage** | 0 | 1 |
| | **Fugitive-emission reduction** | 0 | 1 |
| | **Industrial-process improvements** | 0 | 1 |
| | **Reuse and recycling** | 6 | 8 |
| **Decarbonizing the supply chain** | **Food, catering and nutrition** | 4 | 5 |
| | **Low-carbon inhalers** | 2 | 4 |
| | **Anesthetic gases** | 1 | 6 |

## Canadian jurisdictions

*Strategic partnerships*

The majority of the strategic partnerships we identified within Canada served to create a shared framework for identifying key elements of net-zero health systems and to connect health-system actors facilitating collective action across multiple areas in net-zero mitigation and adaptation. CASCADES, a pan-Canadian initiative that aims to achieve a net-zero health system, leverages community expertise to build net-zero implementation resources and training, and the Canadian Coalition for Green Health Care builds capacities across individuals and organizations engaged in developing environmentally sustainable, net-zero and climate-resilient health.

At the provincial level, healthcare networks such as the Partnerships for Environmental Action by Clinicians and Communities for Healthcare Facilities (PEACH) Health Ontario and GreenCare in Ontario and the Action Network for Sustainable Health of Quebec (Le réseau d'action pour la santé durable du Québec) (RASDQ) in Quebec connect health-system actors and climate-action leaders to foster education and knowledge exchange and promote climate change and sustainability initiatives within healthcare. Additional identified organizations that

foster collaboration on climate action include the London Health Sciences Centre (LHSC) Green Team and Foundation House in Ontario, and Ouranos and Philanthropy House in Quebec. The remaining strategic partnerships we identified focused more on a specific type of mitigation strategy facilitated by more focused initiatives. Examples include Nourish Leadership, which engages health care leaders across Canada to leverage food as a means to make health system more equitable and sustainable, Talkin' Trash with UHN, which is focused on leading climate actions related to energy, water, waste, transportation, and gardening in Ontario, and partnerships within New Brunswick and Newfoundland and Labrador that have led to the development of clean energy sources and an environmentally friendly hospital, respectively.

*Funder networks*

Most of the funder networks we identified within Canada were broadly focused on achieving net-zero emissions and sustainability across all sectors, including health. Environment Funders Canada and the Clean Economy Fund are national networks that bring together philanthropic organizations and communities working towards net-zero goals, and the University of Toronto Connaught Global Challenge Fund has funded initiatives that will facilitate research networking, team formation, and further funding opportunities to deliver a more sustainable medical ecosystem. In addition to broad sustainability goals, one unique funder network, the Trottier Family Foundation (Fondation Familiale Trottier) in Quebec, has focused on climate action by allocating $10 million to reducing greenhouse gas emissions and supporting Quebec's health care system in becoming more climate resilient (e.g., decarbonizing health care facilities, integrating climate action into the Greater Montreal health network).

**International jurisdictions**

*Strategic partnerships*

Similar to those in Canada, strategic partnerships identified in other countries and at the international level generally included those that aimed to build a shared framework of action to work towards net zero in health systems, and often facilitated these efforts through guidance and/or checklists based on these frameworks. The COP26 Health Programme, which commits to advancing health initiatives on climate resilient and low carbon, sustainable health systems, was promoted through the partnership and leadership of the U.K. Government, World Health Organization, Health Care Without Harm, and the UNFCCC Climate Champions during the 26th United Nations Climate Change Conference (COP26). This led to more than 70 countries committed at the level of minister of health to strengthen climate resilience and lower the emissions of health systems, which will be monitored by WHO-led Alliance for Transformative Action on Climate Change and Health (ATACH) coordination platform. To guide global climate change and sustainability action, the World Health Organization provides guidance on climate-resilient and environmentally sustainable health care facilities, Health Care Without Harm provides guidance and resources on decarbonization and bolstering resilient health systems for health ministries, private health institutions and health professionals globally, and the World Bank's Climate-Smart Health Care: Low-Carbon and Resilience Strategies for the Health provides outlines for several low-carbon mitigation strategies.

The Monash Sustainable Development Institute (MSDI) in Australia takes a unique approach to leveraging collaboration by facilitating capacity building through the Sustainable Healthcare in Practice micro-credential 10-week course and promoting initiatives like Climateworks Centre and BehaviourWorks Australia that work with organizations and government to shape policy design across seven systems of work contributing to net-zero. The government of New South Wales, Australia and the government of New Zealand provide guidance to encourage actors across the health sector to advance sustainable practices, and the Centre for Sustainable Healthcare (CSH) in the U.K. works to engage health professionals, patients and the community to reduce the resource footprint of the health systems. While no strategic partnerships focused solely on advancing efforts to achieve net-zero health systems in Singapore were identified, the Singapore Green Building Council is a broad-base, active network focused on sustainability efforts in the country.

A few strategic partnerships also served to advance more focused climate action goals, such as The Green Nephrology Initiative in the U.K that has systematically documented and implemented "green practices" across the whole U.K. dialysis spectrum, and Denmark's efforts to recycle used blood collection tubes to reduce medical waste. Finally, in the U.S. we found that Practice Greenhealth, a partnership that consists of hospitals, health systems, healthcare providers, design firms and not-for-profit organizations, delivers environmental solutions to health systems in the United States while Kimball Sustainable Healthcare provides expert strategies, quality programs, and effective communication to health systems conserve resources and improve environmental performance by building the tools and partnerships to prevent waste and support quality, safety and value.

*Funder networks*

Funder networks specifically focused on supporting net-zero initiatives in the health sector were uncommon in international jurisdictions. However, two funding networks were identified in the U.K., Triple Point Heat Networks Investment Management and the Investment and Impact Fund of National Health Service (NHS) England, that funded heat network schemes in health systems across England and Wales and supporting primary care networks in becoming more sustainable, respectively.

**Lessons learned from jurisdictional scan**

The following key lessons were learned from the jurisdictional scan:

- internationally, shared frameworks and guidance/toolkits/checklists are instrumental in coordinating action and sharing lessons learned and best practices
- frequent knowledge/best practice exchanges, networking and training are also crucial to strengthening partnerships
- there is growing demand across Canada for adaptation-related information and services to support net-zero initiatives, especially in the health sector, and creating business cases and guidance or 'playbooks' can help coordinate efforts towards net-zero practices and infrastructure
- ensuring that supply chains, especially food, are sustainably sourced can both improve the health sector's efforts to achieve net-zero but can also have knock-on effects more broadly.

## References (see Appendix 9)

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