

# "GREEN IS GREEN"

Improving the Health, Economic and Environmental Impact, Resilience and Sustainability of Canada's Hospitals through Green Infrastructure

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## **“Green is Green” Improving the Health, Economic and Environmental Impact, Resilience and Sustainability of Canada’s Hospitals through Green Infrastructure**

### **Executive Summary**

HealthCareCAN commends the Federal Government on an unprecedented commitment to improve the environment for future generations of Canadians. We commend the Minister of Environment and Climate Change on engaging civil society in determining how we do this. We also commend the First Ministers on the *Vancouver Declaration on clean growth and climate change*. Now it’s time for healthcare to step up to the plate, describe the issues, and help Canadians better understand what we can do directly to improve the environment and where we need to ask for help from the Federal Government.

When it comes to the environment, the hospital sector is a friendly giant with a dual dilemma. First, operating 24 hours a day, 7 days a week, it has significant chemical, waste, energy, water, transportation, food, pharmaceutical, physical plant, and purchasing requirements, each of which are documented to have significant impacts on the environment. *It is estimated that Canadian hospitals account for 8% of public green-house gas emissions and 11% of total public energy consumption.*

Addressing each of these elements is part of the “Comprehensive Environmental Health Agenda for Hospital and Health Systems around the World”, published by the Global Green and Healthy Hospitals consortium. We believe it is time for Canada to join the movement and include hospital considerations in its sustainable development, green infrastructure and climate change agenda.

Second, hospitals are where we turn to preserve health in times of need. They need to remain resilient in the face of climate change and disaster. This is an obvious goal. However, over the past year, we’ve seen many instances of hospital evacuations in the face of flood or fire. We need to aim for a hospital system that remains fully operational and resilient in the face of disaster. These exist and interestingly, it has been shown that planning for climate resilience also leads to more sustainable practices.

Fortunately, our hospitals are taking initiative all over the country. In this report, we give examples of the types of measures hospitals are taking and their impacts on the environment. In a survey of members physical plant infrastructure needs, our members have identified over 363 physical plant initiatives that are intended to repair, retrofit or rebuild facilities so that they are cleaner, greener, more efficient, sustainable and resilient.

Unfortunately, they are doing this against a backlog of \$15 million<sup>1</sup> in deferred maintenance because of fiscal pressures that cause the deferral of major repairs and expenses. They are playing their role with the provinces, but they need the support of the Federal Government in terms of leadership, funding support for greener construction choices, and representation. To this end, we offer the following recommendations:

1. Ensure that the healthcare sector is represented in all federal environment related planning for the environment, climate change, and sustainability.
2. Allow hospitals and health regions to apply and compete for federal green infrastructure funds. Over the past 10 years hospitals have been explicitly excluded from the Building Canada Fund.
3. Develop technological, knowledge or social infrastructure that allows for the tracking of healthcare related green infrastructure needs, best practices and eventually the scaling of selected initiatives.

## **“Green is Green” Improving the Health, Economic and Environmental Impact, Resilience and Sustainability of Canada’s Hospitals through Green Infrastructure**

### **Issue**

When it comes to the environment, the hospital sector is a friendly giant with a dual dilemma. It has a huge environmental footprint because of its necessary operations. Yet, it is where we turn to maintain our health, in health emergencies and during an environmental disaster. This issue brief (1) describes the challenges and roles of hospitals in Canada’s environmental sustainability, climate resilience, and disaster planning; (2) summarizes the results of a survey of hospital CEOs on green infrastructure needs, offers three recommendations to the federal government; and (3) outlines the contributions of the sector itself in the areas of green infrastructure, sustainability and resilience.

### **Background**

HealthCareCAN commends the Federal Government on an unprecedented commitment to improve the environment for future generations of Canadians. We commend the Minister of the Environment and Climate Change on the engagement of civil society in determining how we do this. We also commend the First Ministers on the *Vancouver Declaration on clean growth and climate change*. Now it’s time for healthcare to step up to the plate. As national assets with a crucial role for both health and economy, in research and in innovation, and as the employers of at least 655,000 Canadians, it is incumbent on the sector to help Canadians understand what we can do directly to improve environmental issues and where we need to ask for the Federal Government’s help.<sup>2</sup> We begin the brief with five challenges in this regard and the opportunities they present.

### **Challenges and Opportunities:**

1. **Reducing the Ecological Footprint of Hospitals:** The ecological footprint (EF) of a hospital is “the total area of productive land and water required on a continuous basis to produce the resources consumed and to assimilate the waste produced by a specified population, wherever that land is located... or an area-based measure of the population's demand for goods and services”.<sup>3</sup> Due to the nature of their operations, hospitals have the highest energy intensity of all publicly funded facilities.<sup>4</sup> For example, as part of their comprehensive environmental stewardship programs some organizations have calculated their EFs:

- In BC, the total EF of Lion’s Gate Hospital in Vancouver was 2,841 hectares (ha). This corresponds to a land area about 719 times larger than its actual area of 3.95 ha. The EF of the City of Vancouver, was found to be about 180 times its actual area,<sup>5</sup>
- In Ontario, London Health Sciences Centre's (LHSC) ecological footprint is 63,074 global hectares, which is about 384 times its actual footprint (building space + green space).<sup>6</sup>

We do not know the ecological footprints of all hospitals in our country. However, we do know that Canadian hospitals accounted for 21,228 carbon dioxide equivalents or 8% of greenhouse gas emissions of non-business or household emissions; and 538,031 Tera joules or 11% of non-business, non-household energy use in Canada in 2008.<sup>7 8</sup>

We also know that the problem is not unique to our country. In the US, the healthcare sector is the largest consumer of carcinogenic chemicals. In England, the NHS emits 18 M tonnes of CO<sub>2</sub> per year or 25% of all public sector emissions; and in Brazil, the healthcare sector accounts for 10% of the country’s total energy consumption.<sup>9</sup> What is unique to Canada, unfortunately, is the absence of a formalized

national effort to improve the ecological footprint of our country's hospitals. Consider what other nations are already doing:<sup>10</sup>

- Thailand's "Green and Clean" program sets out benchmarks for energy use, chemical consultation food use waste production and more.
- Indonesia's Ministry of Environment includes hospitals it in environment performance rating systems which are intended to improve all industry performance standards.
- The National Health Service in England has a "Route Map" for greening its hospitals and international corporations compete for the opportunity to rebuild these.

Why do hospitals have such large footprints? Operating and servicing patients 24 hours a day, 7 days a week, they have significant chemical, waste, energy, water, transportation, food, pharmaceutical, physical plant, and purchasing requirements, each of which are documented to have significant impacts on the environment. Addressing each of these elements is part of the *"Comprehensive Environmental Health Agenda for Hospital and Health Systems around the World"*, published by the Global Green and Healthy Hospitals consortium.<sup>11</sup> It is time for Canada to join the movement.

**Opportunity 1:** Scale and spread best practices nationally that will help to reduce the significant chemical, waste, energy, water, transportation, food, pharmaceutical, physical plant, and purchasing demands on the environment in accordance with the *"Comprehensive Environmental Health Agenda for Hospital and Health Systems around the World"*.

**2. Establishing Resiliency in the face of abrupt Climate Change:** In normal operations, a hospital has a significant environmental footprint. However, the problem becomes more complex when climate change results in disasters that require a hospital to be resilient: "extreme weather events increase the probability of "complex emergencies", where multiple system failures can occur, exceeding response capacity".<sup>12 13</sup>

Consider that during the wild fires in Fort McMurray, the hospital had to be evacuated on extremely short notice.<sup>14</sup> This was done successfully. However, what if we took a different approach to building hospitals? What if instead of evacuating them during a disaster, they became shelters for those most in need? What if we created hospitals as islands that resisted fire, flood, storm, or other environmental challenges? What if we hardened our facilities to upgrade and withstand weather issues? What if we were ready not just for incremental events, but for catastrophic ones?<sup>15</sup>

Recently, the UK undertook a study of its stock of 1,000 hospitals. Sensors were placed on the exterior surfaces to determine climate resilience. They learned that buildings built in different eras had different fault lines and vulnerabilities. They noted that the recommendations that would improve resiliency, such as operable windows and access to daylight, also help environmental sustainability.<sup>16</sup>

The Coalition for Green HealthCare reports that "extreme weather events (e.g. storms, floods, wildfires, extreme temperature events) can create emergencies by damaging infrastructure, compromising access to critical resources (e.g. food and water) and safety of patients, visitors and staff. Climate change increases risks of some infectious diseases (vector-, water- and food-borne, new and emerging) and worsens air quality. Climate-related hazards can have significant implications for demand on health care facility services."<sup>17</sup> As a result, the Coalition has created 6 resilience profiles based on issues and efforts to address those issues by hospitals in Canada.



The Coalition for Green HealthCare also indicates that “The World Health Organization has called on the health care sector to prepare for climate change impacts through efforts to increase resiliency. Health care organisations in Canada can increase resiliency by continually mainstreaming climate change into risk assessments, considering climate change when developing plans and activities and engaging in broader community discussions and initiatives around climate-related issues”.<sup>18</sup>

**Opportunity 2:** Observe and analyse how countries internationally are using financial and regulatory incentives to ensure that new healthcare facilities are built to resist extreme weather conditions and disaster and begin introducing these incentives in Canada.

**3. Deferred Maintenance at Canadian Hospitals:** In addition to the natural and normal functioning of a hospital and its impacts on the environment, there is a more insidious problem affecting the environmental impacts of hospitals in Canada. This is the issue of deferred maintenance (DM). Deferred Maintenance is the practice of postponing maintenance activities such as repairs in order to save costs or meet budget targets. Conservative estimates using existing hospital audits of accumulated deferred maintenance peg the problem in the range of \$4 B and \$28 B with an average of \$15.4 B. Estimates of the minimum annual investment required to keep DM in Canadian hospitals flat-lined is between \$2.8 B and \$3.21 B annually. What if we don’t address it? Estimates suggest that the current replacement value (CRV) for all hospitals in Canada is approximately \$160 B.<sup>19</sup> While this is problematical from an economic standpoint, the environmental implications are far worse. It means that old and out of date materials and technologies are used when these could be upgraded and repaired in ways that are better for the environment and more resilient in the face of disaster.

**Opportunity 3:** Include hospitals in the Federal Green Infrastructure Fund planning.

**4. Problematic perceptions of jurisdictional issues:** How did our deferred maintenance problem get so big? Large scale physical plant infrastructure investments differ from other healthcare investments because they can last 30-40 years. However, the last time that the Federal Government invested deliberately in health delivery infrastructure, was through the 1966 Health Resources Fund Act and the 1948 Hospital Construction Fund Act. Since hospitals are built to last 30-40 years, a federal injection into health infrastructure was due around 2004. It was that year that the Kirby Committee recommended that the Federal Government invest \$4 billion dollars into a health capital fund but this recommendation was not implemented. That same year, evidence based design was introduced. This is the study of how physical facilities impact health and environmental outcomes. Since then, over 1,200 scholarly articles have discussed how modernized physical plants prevent errors, reduce infections, improve recovery, shorten length of stay, lighten workload, and improve morale and the environment. However, the problem has become too big for the provinces to handle alone.

**Opportunity 4:** Include hospitals in the Federal Green Infrastructure Fund planning.

**5. The need to raise the ambition level and share best practices:** The last challenge is best described in the words of the *Vancouver Declaration*, where premiers have a call to “raise the ambition level” of environmental policies. In the context of hospitals this is important. Internationally, we are behind and yet, nationally we have exemplary practices that can be shared, scaled, and spread. Table 2 shows a selection of examples in the public domain. As we move from “catch up” to “green and clean” hospitals, the vision is moving from hospitals that degenerate natural capital, to ones that are regenerative forces for the community, not only preventing harm, but helping and healing the people, the environment and the economy.<sup>20</sup>

**Table 2: Case Studies exemplifying ideas that can be shared and spread**

<b>London Health Sciences Centre, Ontario</b> <i>"Since 2000, our energy awareness initiatives have reduced the hospital's energy consumption by \$1.8 million each year, and our greenhouse gas emissions have been reduced by 14 million kilograms each year."</i> <sup>21</sup>	<b>Nanaimo General Hospital, British Columbia</b> <i>"Nanaimo Regional General Hospital responded to future climate uncertainty by designing resiliency into its new building's fabric."</i> <sup>22</sup>	<b>Regina General Hospital, Saskatchewan</b> <i>"When unusually high humidity levels brought on by climate change forced the closure of operating rooms at the Regina General Hospital, delay in solving the problem was not an option."</i> <sup>23</sup>
<b>St. Michael's Hospital, Ontario</b> <i>St. Michael's energy and demand management plan includes the replacement of aging infrastructure that is beyond its useful life and utilizes old technologies to reduce waste and improve efficiency"</i> <sup>24</sup>	<b>St. Joseph's General Hospital, British Columbia</b> <i>"When high turbidity levels in Comox Valley's water reservoir forced a boil water advisory, Nutritional Services staff at St. Joseph's Hospital respond with a contingency plan to keep the food and drink safe."</i> <sup>25</sup>	<b>Winnipeg Health Sciences Centre, Manitoba</b> <i>"As a result of repeated flooding incidents over the years, staff at Winnipeg's Health Sciences Centre have become very proficient at protecting the safety of patients, staff and property."</i> <sup>26</sup>

**Opportunity 5:** Create an infrastructure allowing for the identification and discussion of leading environmental practices to assist hospitals in sharing experiences nationally, and then scale these through funding incentives and infrastructure opportunities.

## Survey Results and Implications

In February 2016, HealthCareCAN surveyed its members, research hospitals and other healthcare organizations from across Canada, to identify "shovel ready" infrastructure projects over the next three years. Member CEOs were asked to identify whether the project was a repair/retrofit, expansion, or new building; the purpose of the project; and the estimated cost of the project. The results were collated, and the projects with a clear environmental impact were analyzed. The survey has revealed the following results:

**Table 1: HealthCareCAN Survey Results: Projects by Purpose**

Projects by Purpose	# (%) of all Projects	\$ of Projects
Repairs and Energy Retrofits	363 (82%)	\$2,090,292,599
New Buildings	42 (9%)	\$2,388,100,000
Expansions	39 (9%)	\$1,502,577,549
<b>Total</b>	<b>444 (100%)</b>	<b>\$5,980,950,148</b>
Projects focussed on environmental/energy Efficiency	264 (59%)	\$999,768,315

### Examples of green projects with their projected impacts within projects submitted in survey:

- 55 roof replacements and building envelope upgrades that can reduce waste and total energy consumption by up to 2-5% per replacement with improved insulation and finishes, moisture barriers and structural improvements<sup>27</sup>
- 12 lighting retrofits and electrical upgrades such as the installation of high-efficiency LED lighting that can each reduce electricity use by up to 30%

- 24 projects that will replace low efficiency boilers with high efficiency condensing boilers that can each reduce a facility's annual utility costs by 19%
- 23 projects that will replace existing natural gas heating systems with more efficient electrical heat pump heating systems
- 13 projects that will implement demand-controlled ventilation systems, chiller and air conditioning upgrades that can improve overall efficiency of each facility by an estimated 5-10%, reduce utility costs by 18%, save 138,000 gigajoules of energy and reduce carbon emissions by more than 7,000 tons per facility.
- 81 new construction projects that present the opportunity to implement green infrastructure and other energy-conscious technologies from the ground up.

## Key Takeaways

Much of Canada's current hospital Infrastructure has aged beyond its useful life, utilizing dated technology that severely impacts the health of our environment, and by result, our population. Fortunately, today's healthcare infrastructure is entering an era of change, with a view towards minimizing the energy, carbon, and environmental footprint of hospitals and other health facilities.

The key to meeting these challenges lies in transformative technologies, repairs, retrofits, new buildings and expansions that significantly reduce the environmental footprint of these structures, reduce energy demand and decrease smog and greenhouse gas emissions.

As our survey illustrates, Canada's hospitals are ready and willing to implement the types of changes required to ensure healthcare infrastructure is sustainable into the future. It will be important, over the coming years, for hospitals to ensure that structures are designed and procurement is performed with an eye to energy efficiency. By selecting supplies, equipment and services, and performing renovations that minimize the hospital's environmental footprint, we help to ensure that Canada's hospital infrastructure is green for years to come.

## Recommendations

Canada is moving towards a greener and more environmentally friendly vision for healthcare. As a key component of this movement, the adoption of green infrastructure is essential. Canada's hospitals are ready and willing to implement the types of changes necessary to ensure that our healthcare organizations are able to continue providing high quality health services for decades to come. Our recommendations to the Federal Government are as follows:

1. Ensure that the healthcare sector is represented in all federal environment related planning.
2. Allow hospitals and health regions to apply and compete for federal green infrastructure funds. Over the past 10 years hospitals have been explicitly excluded from the Building Canada Fund.
3. Develop technological, knowledge or social infrastructure that allows for the tracking of healthcare related green infrastructure needs, best practices and eventually the scaling of selected initiatives.

<sup>1</sup> Roberts, Glen and Claire Samuelson. *Deferred Hospital Maintenance in Canada: There is more to 'a building' than building it.*

<sup>2</sup> The Government of Canada. *Environment and Climate Change Canada. Planning for a Sustainable Future – A Federal Sustainable Development Strategy for Canada 2016-2019: Consultation Draft.* 2016.

<sup>3</sup> Rees, William E. *Ecological Footprints and the Pathology of Consumption.* Ostry, Aleck S. and Robert F. Woollard (Ed.), *Fatal Consumption: Rethinking Sustainable Development* (pp. 30). Vancouver, British Columbia: BC Press. 2000.

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- <sup>10</sup> Ibid.
- <sup>11</sup> Ibid.
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- <sup>13</sup> Luber, George. *Climate Change and Public Health: CDC's Role*.
- <sup>14</sup> CTV News. 'This can't be happening': Fort McMurray hospital staff describe evacuation. May 9, 2016.
- <sup>15</sup> Pan American Health Organization. *Health Care Facility Climate Change Resiliency Workshop Report*. September 8, 2015.
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- <sup>17</sup> The Canadian Coalition for Green Health Care. *Climate Change Resiliency for Health Care*. 2016.  
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