

Provincial Health Services Authority

2018
CARBON
NEUTRAL
ACTION
REPORT

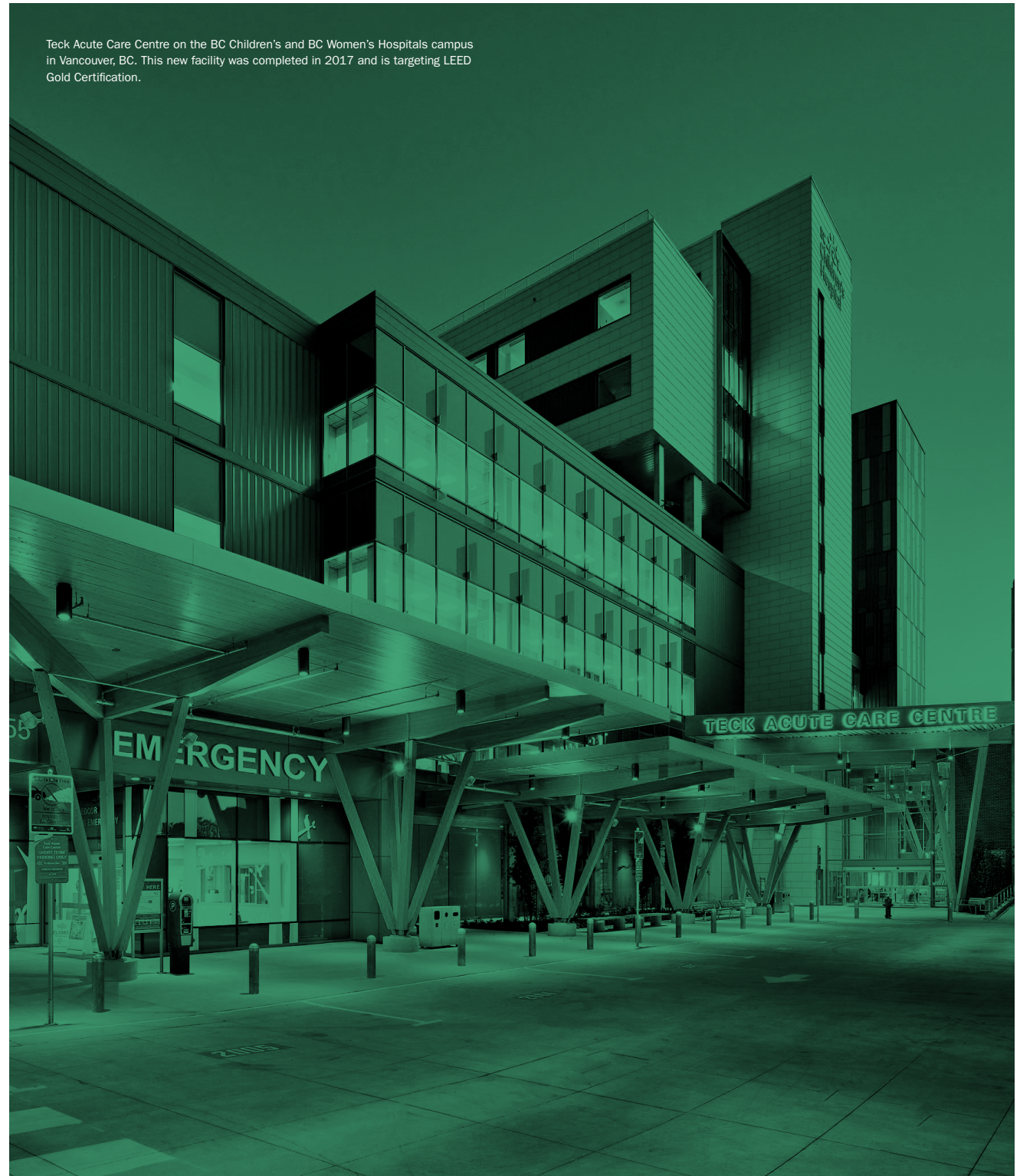


Declaration Statement

This Carbon Neutral Action Report for the period January 1 to December 31, 2018 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2018 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2019 and beyond.

In 2010 Vancouver Coastal Health, Fraser Health, Providence Health Care and Provincial Health Services Authority consolidated their efforts towards environmental sustainability to create the GreenCare Community. By June 30, 2019 Provincial Health Services Authority's final Carbon Neutral Action Report will be posted to our website at bcgreencare.ca.

Teck Acute Care Centre on the BC Children's and BC Women's Hospitals campus in Vancouver, BC. This new facility was completed in 2017 and is targeting LEED Gold Certification.



Retirement of Offsets

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, Provincial Health Services Authority (the Organization) is responsible for arranging for the retirement of the offsets obligation reported for the 2018 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment and Climate Change Strategy ensuring that these offsets are retired on the Organization's behalf, the Organization will pay within 30 days, the associated invoice to be issued by the Ministry in an amount equal to \$25 per tonne of offsets retired on its behalf plus GST.



Executive Summary

Provincial Health Services Authority, CNAR 2018

I am pleased to present the ninth annual Carbon Neutral Action Report, which highlights the Provincial Health Services Authority's (PHSA) actions to reduce our carbon footprint, and link environmental sustainability to public health and wellness.

Over the years, we have worked to raise environmental awareness amongst our staff, patients and the communities we serve. These efforts have reduced PHSA's operational impact on the natural environment while reducing operational costs too.

In 2018, PHSA had a carbon footprint of 19,341 tonnes of carbon dioxide equivalent (tCO₂e), which was offset at a total cost of \$507,701. This represents a 19.4 per cent decrease relative to the 2007 base reporting year carbon footprint for PHSA. This decrease is even more significant given that we assumed responsibility for added services, programs and staff during this period.

In 2018, PHSA completed four projects, with a total estimated savings of 290,089 kWh of electricity and 7,280 GJ of gas, which equates to greenhouse gas reduction of 370 tCO₂e. The largest of the completed

projects for 2018 was the passive heat recovery project within the BC Children's Hospital and BC Women's Hospital buildings. These efforts also yielded a \$165,419 incentive rebate from FortisBC, which is being reinvested into an energy conservation project that will further reduce PHSA's operational footprint

I want to recognize PHSA's energy management team, who work closely with our facilities maintenance and operations teams to reduce emissions, in addition to all of our staff who support these efforts. This ultimately adds to the health and wellness of our patients, employees and the communities we serve.



Carl Roy
President & Chief Executive Officer

Our CO₂ Footprint

2018 Greenhouse Gas Emissions Breakdown and Offsets Applied to Become Carbon Neutral

PHSA reports its organizational carbon footprint based on guidelines provided by the Carbon Neutral Government Regulation (CNGR) and the Climate Action Secretariat (CAS).

The CAS developed reporting guidance based on the GHG Protocol Corporate Standard. Based on these guidelines, PHSA's carbon footprint is comprised of six different greenhouse gases, which are converted into a common metric of tonnes of carbon dioxide equivalent (tCO₂e). In scope carbon emissions are grouped in three main categories:

- 1 Stationary Fuel Combustion
- 2 Mobile Fleet Combustion
- 3 Supplies (Paper)

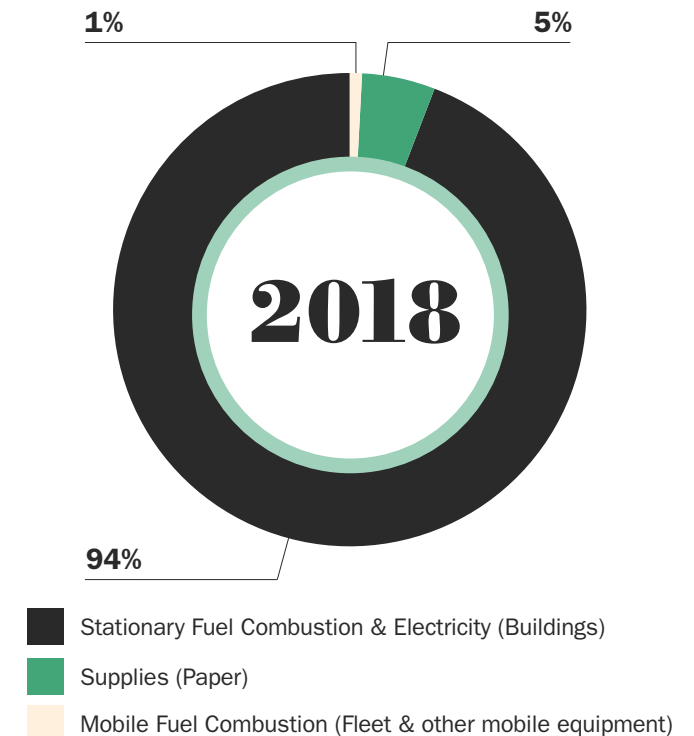
PHSA's 2018 carbon footprint offset was 19,341 tonnes of carbon dioxide equivalent (tCO₂e). That represents a 19.4 per cent decrease in PHSA's carbon footprint since 2007.

Over 90 per cent of PHSA's in-scope emissions are attributed to the building portfolio, and over 90 per cent of those emissions are associated with natural gas consumption. CAS administers the Carbon Neutral Capital Program (CNCP), through which PHSA has access to capital funding that is used to implement capital projects to reduce GHG emissions. These projects are focused on natural gas reduction in buildings.

To become carbon neutral in 2018, PHSA purchased carbon offsets at a total cost of \$507,701.



2018 PHSA Emission by Source



Changes to Provincial Health Services Authority's Portfolio

PHSA's useable facility space has increased 8.7 per cent since the 2007 base reporting year, which is largely due to the construction of the Teck Acute Care Centre. During the same period, the number of staff (measured in full time equivalents) has increased by 125 per cent. PHSA has controlled increases in facility space to accommodate increased staff by seeking opportunities to optimize existing space use while maintaining safety and efficiency.

PROVINCIAL HEALTH SERVICES AUTHORITY							
BUILDINGS, FTE AND WEATHER	2007	2013	2014	2015	2016	2017	2018
Distinct PHSA Buildings	n/a	68	74	73	76	74	74
% Owned	n/a	69%	69%	69%	68%	73%	72%
% Leased	n/a	31%	31%	31%	32%	27%	28%
Usable Square Meters ^a	388,990	355,437	358,082	358,455	358,995	418,631	422,796
Full-Time Employee Equivalents ^b	6,391	9,333	12,285	12,668	13,175	13,780	14,383
Weather (summarized in Heating Degree Days) ^c	2,870	2,820	2,627	2,489	2,537	2,922	2,720

a. Usable area excludes roof tops, interstitial spaces, and parking areas.

b. Full-Time Employee data was provided by the Ministry of Health.

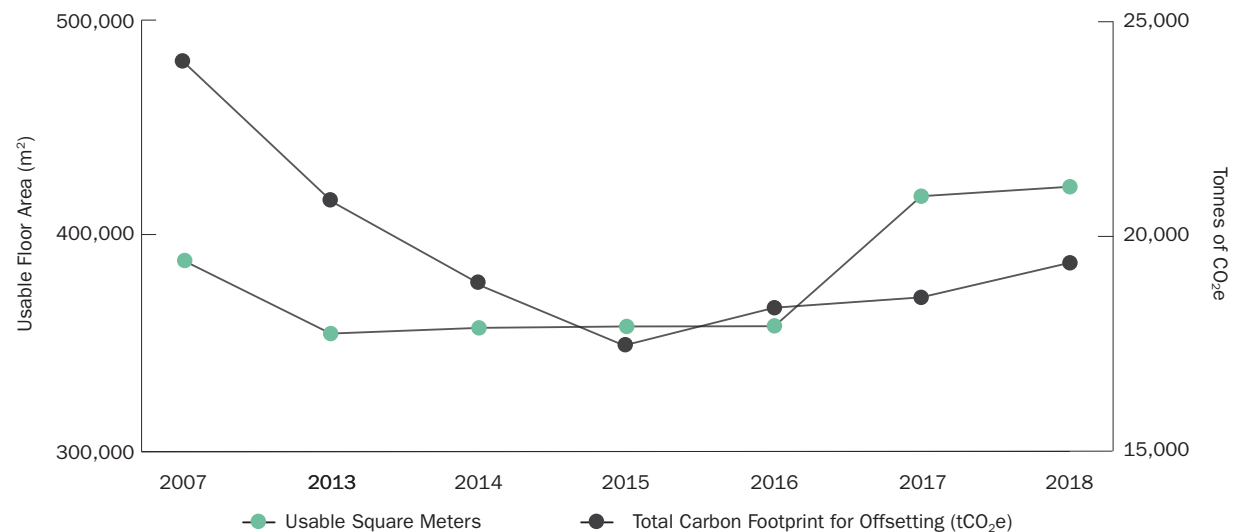
c. Heating Degree Days (HDD's) are based on YVR Airport data from Environment Canada and are intended to reflect the demand for heating. Although PHSA's facilities are located across BC, the majority of buildings in the metro Vancouver area, so HDD's for Vancouver were used.

Changes to Provincial Health Services Authority's Portfolio

Overall since 2007, PHSA's carbon footprint has decreased while usable floor area and staff have increased. As of 2018, emissions per full-time equivalent (1.34 tCO₂e/FTE) have decreased by 64 per cent since 2007, and emissions per unit of floor area (0.05 tCO₂e/m²) have decreased 26 per cent since 2007.

The carbon emissions reported are not adjusted for changes in weather. Heating Degree Days (HDDs) is a metric designed to reflect the demand for energy required to heat a building. Emissions per HDD is a metric intended to summarize overall efficiency of delivering heating. PHSA's 2018 emissions per HDD (7.1 tCO₂e/HDD) are 15 per cent lower than the baseline year.

Usable Floor Area and Emissions (2007-2018)



PROVINCIAL HEALTH SERVICE AUTHORITY

OUR CARBON FOOTPRINT (IN tCO ₂ E)		2007	2013	2014	2015	2016	2017	2018
CO ₂	Mobile Fuel Combustion (Fleet & other mobile equipment)	189	153	159	159	417	417	180
	Stationary Fuel Combustion & Electricity (Buildings)	22,930	19,893	17,933	16,426	17,027	17,442	18,472
	Supplies (paper)	891	771	828	882	893	927	703
	Total Carbon Footprint (tCO₂e)	24,010	20,818	18,921	17,468	18,338	18,558	19,355
	Emissions Which Do Not Require Offsets ^{a,b}	-9	-10	-9	-10	-16	-9	-14
	Total Carbon Footprint (tCO₂e)	24,002	20,808	18,912	17,458	18,322	18,549	19,341
	Adjustments / Corrections	0	0	0	0	0	0	0
	Total Carbon Footprint - for offsetting (tCO₂e)	24,002	20,808	18,912	17,458	18,322	18,549	19,341
\$	Purchased Carbon Offsets	\$ -	\$538,025	\$472,625	\$436,700	\$458,050	\$463,725	\$483,525
	Purchased Carbon Offsets +HST / GST ^c	\$ -	\$564,926	\$496,256	\$458,535	\$480,953	\$486,911	\$507,701
KPI	Emissions per Full-Time Employee (tCO ₂ e/FTE)	3.76	2.23	2.03	1.38	1.39	1.35	1.34
	Emissions per Facility Space (tCO ₂ e/m ²)	0.06	0.06	0.05	0.05	0.05	0.04	0.05
	Emissions per Heating Degree Day (tCO ₂ e/HDD)	8.4	7.4	7.2	7.0	7.2	6.3	7.1

a. As outlined in the Carbon Neutral Government Regulation of the Climate change Accountability Act, some emissions do not require offsets.

b. It was estimated that Fugitive Emissions from cooling equipment comprise less than 0.01% of PHSA's total emissions and for this reason, emissions from this source have been deemed out-of-scope and have not been included in our total greenhouse gas emissions profile.

Actions Taken to Reduce Our CO₂ Footprint

2018 List Of Actions Taken to Reduce CO₂ Footprint

Stationary Emissions (Buildings)

In 2018, PHSA completed four projects, with a total estimated savings of 290,089 kWh of electricity and 7,280 GJ of gas, which equates to GHG reduction of 370 tonnes of carbon (tCO₂e). These projects included the following:

- **C&W Genset HP Block Heaters:** Heat pump block heaters were installed on the five largest generator sets on BC Children's and BC Women's campus (C&W campus). This reduces the annual electricity costs required to keep the back-up generators at the temperature required for a reliable start.
- **C&W 1982 Buildings Heat Recovery:** A CNCP-funded passive heat recovery project was completed in the BC Children's and BC Women's buildings (also referred to as the 1982 buildings) on C&W campus.
- **BC Cancer's Vancouver Centre Optimization:** An optimization project at the BC Cancer's Vancouver Centre consisting mainly of controls optimization measures was completed.

- **Fraser Valley Cancer Centre Pharmacy Renovation:** A renovation of the Pharmacy within the BC Cancer's Fraser Valley Centre was completed, which included a boiler replacement.

In addition, four other energy savings projects were in progress at PHSA during 2018, with estimated savings once complete of 197,120 kWh of electricity, and 16,146 GJ of gas, which equates to GHG reduction of 810 tCO₂e. These projects include the following:

- **C&W Phase 3 Redevelopment:** A number of energy and carbon reduction strategies are being implemented as a CNCP-funded change order to the C&W Phase 3 Redevelopment Project. Construction is underway, with completion targeted for July 2019. The scope includes implementing portions of an innovative Thermal Gradient Header approach that is planned for expansion across the entire campus over time.
- **CFRI Heat Recovery:** An innovative CNCP-funded heat recovery project is in the design stage at Child and Family Research Institute block at C&W campus. This project is another installation of the Thermal Gradient Header approach.

- **BC Cancer Research Centre Optimization:** The investigation phase of an optimization project at the BC Cancer Research Centre was initiated, which will utilize advancements in software for fault detection and building controls optimization to improve energy efficiency.
- **BC Cancer's Vancouver Island Centre Optimization:** The implementation phase of an optimization project at the BC Cancer's Vancouver Island Centre consisting mainly of controls optimization measures was initiated.

Other initiatives taken to reduce emissions from buildings:

- PHSA's energy management team made further refinements to GreenCare's **Energy and Environmental Sustainability Design Guidelines** for new construction and major renovation projects intended to ensure that new buildings are built to the highest standard of energy efficiency within financial constraints.
- The energy management team continued with an **engagement strategy** with facilities maintenance and operations, focused initially at C&W campus, with plans to expand to all major owned sites over time. The focus is to identify reduction opportunities.

Actions Taken to Reduce Our CO₂ Footprint

2018 List Of Actions Taken to Reduce CO₂ Footprint

Mobile Fleet Combustion (fleet and other vehicles)

In 2018, PHSA continued to improve, promote and establish alternative transportation opportunities for PHSA staff.

- PHSA has **sixteen** (15-120v; 1-240v) **electric vehicle-charging stations** across two core sites.
- PHSA partners with Vancouver Coastal Health and Providence Health Care to provide a **shuttle service** between sites and continues to operate a staff shuttle between BC Children's and BC Women's Hospitals campus, staff off-site parking lot and King Edward Station
- PHSA has **753 bike parking stalls** which enable and encourage active transportation by bicycle

Supplies (Paper)

Initiatives to reduce paper consumption include:

- As part of the Green+Leader program, a **paper/waste reduction campaign** supports volunteers with **Paperless Meeting Toolkits** to encourage their colleagues to reduce paper use.
- PHSA **encourages teleconferencing** for meetings using web-conferencing hardware and software available at various sites.

Actions That Fall Outside the Scope of the Carbon Neutral Government Regulations

- PHSA provided **training, resources, toolkits and recognition** to support the Green+Leader program and various green teams in PHSA.
- The **Green+Leaders** behaviour change program recruited **eight new volunteers** for PHSA in 2018, making a total of **76 active staff volunteers** across PHSA, and a total of 155 PHSA staff trained since the program began in 2007.
- PHSA has at least four active “**green committees**” or green teams, which are led by Green+Leaders at those sites; these committees explore and implement a broader variety of sustainability initiatives going beyond the Green+Leaders toolkits.
- PHSA continues to support the **GreenCare Community** website, which provides tips and toolkits on using less paper, as well as other environmental sustainability initiatives linked to health and wellness. PHSA had **1,089 staff registered** on the site as of 2018.
- **Education and awareness** communication via the GreenCare Community is supplemented by stories published in PHSA news and various internal communication channels; these efforts continue to champion behaviour change and celebrate environmental sustainability successes.
- PHSA supports professional development through workshops and educational sessions sponsored by **BC Hydro** and **Fortis BC**.
- PHSA offers in-person staff education on **waste management processes** in collaboration with Business Initiatives and Support Services (BISS)^a. In 2018, 67 staff were trained.
- PHSA also offers a **Waste Management Basics Learning Module** online. In 2018, 474 staff completed the training.

a. For more information, please contact BISS Hazardous Waste Coordinator, Teri Guimond, teri.guimond@phsa.ca

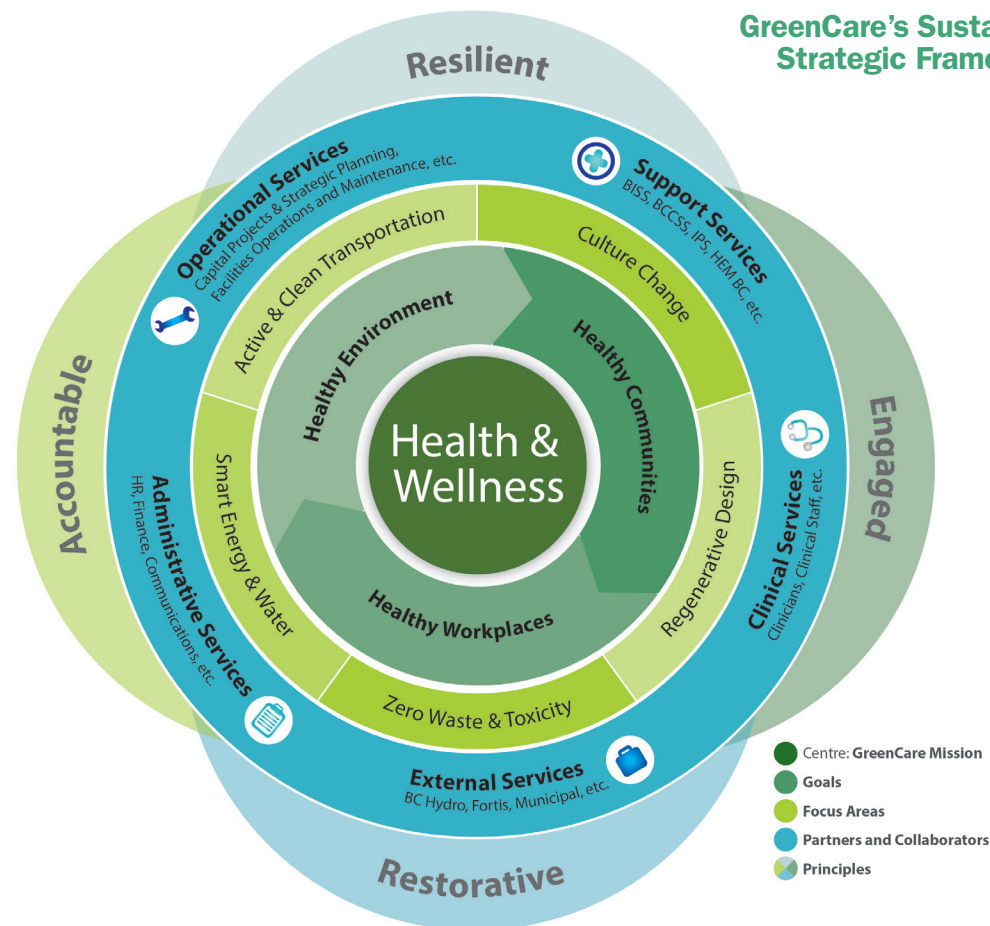


Future Actions to Reduce Our CO₂ Footprint

PHSA's plans to continue reducing GHG emissions and energy in the following ways:

- **Optimize our existing buildings:** Planning and implementing GHG and energy reduction projects in our existing building portfolio by utilizing the Carbon Neutral Capital Program (CNCP) as our primary funding source.
- **Efficient new construction:** Implementing project-specific energy and carbon performance targets to ensure that our new buildings are as energy and carbon efficient as possible.
- **Systemic change:** Implementing standards, guidelines, and processes to embed energy management principles further into standard operations.
- **Behaviour change:** Engaging and educating our staff, via the existing Green+Leaders program, GreenCare Community and the BC Hydro and FortisBC engagement programs.
- **Innovation and demonstration:** Leveraging the innovative Green Revolving Fund approach that has been initiated for PHSA to support ongoing investment in energy conservation through utility cost avoidance achieved through conservation. In addition, taking small steps now (such as learning about new technologies) to pave the way for larger innovations when an appropriate opportunity arises.
- **Align with our core mandate:** Working with GreenCare's refreshed Strategic Framework; PHSA will strive to advance health care practices that respect environmental stewardship, noting that the

environmental impact from health care facilities, operations and services influence the health of populations and patients we serve. PHSA will engage in a collaborative approach to create a sustainable and environmentally responsible health care system, which continues to advance health and wellness in its broadest sense.



Feature Project

Integrating Projects, Systems, & Teams at BC Children's and Women's Hospitals

Numerous concurrent projects have been underway at the BC Children's Hospital and BC Women's Hospital Oak Street campus since the Redevelopment Project began. A vast array of health care stakeholders as well as design and construction professionals play a role in these combined projects. Efforts have been made to ensure effective coordination and collaboration between all of the projects, and the PHSA's Energy Management team has acted as an integrating force given their involvement in most of the major projects. In 2018, there were several examples of where these efforts to integrate and collaborate paid off.

As part of an analysis of options to achieve the carbon reduction targets, a consulting team was hired to develop a site-wide strategy for carbon reduction. This team included TC Thermenex Ltd., whose innovative Thermal Gradient Header approach allows integration of heating and cooling system to enable significant reuse of waste heat across the campus. Their approach proved to be the most cost effective of the carbon reduction options explored. The results of this analysis provided an integrated and holistic vision and approach to energy and carbon management across the entire site. This vision is now being implemented in phases.

The Thermenex Thermal Gradient Header approach not only integrates heating and cooling systems, but it has also led to better integration of projects and teams. The Energy Management team hired Thermenex to consult on various ongoing projects to ensure that these projects were aligned with and able to benefit from the efficiencies of the long term vision. During one of the project discussions that ensued, Chief Engineer Zoltan Nagy-Gyorgy, was heard exclaiming something to the effect that this level of integration and collaboration was unprecedented and greatly appreciated.

This integration led to several projects adjusting their approach, most notably the Phase 3 Redevelopment Project. Implementing a significant portion of the Thermal Gradient Header began in 2018 as an extension to the Phase 3 Redevelopment Project and funded by the Carbon Neutral Capital Program (CNCP).

Project

C&W Phase 3 Redevelopment, CNCP Scope

Technology

Various strategies were employed, the most impactful of which involved an innovative approach to heat recovery.

Energy Savings

Annual savings estimated at 67 MWh of electricity and 5,306 GJ of natural gas (due to reduced steam consumption)

265 tCO₂e/year
Estimated GHG Reductions.

\$1.97 million
Incremental* cost of energy conservation features

\$48,000
estimated energy and carbon offset cost avoidance upon completion, and enables additional savings in future.

Business Case

Most cost effective option for significant carbon reduction: \$7,425 per tonne GHG reduction based on immediate carbon reduction (more cost effective considering future reductions enabled)

Benefits/Co-Benefits

~\$200,000 incentive anticipated from FortisBC; potential for improved occupant comfort in peak summer temperatures due to increased cooling capacity

*Incremental Project Cost refers to the additional cost required to install energy efficient equipment above the cost for the base project (in this case, the heat recovery scope added to the base Phase 3 Redevelopment scope)