

Provincial Health Services Authority's 2016 Carbon Neutral Action Report



Declaration Statement

This Carbon Neutral Action Report for the period January 1 to December 31, 2016 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2016 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2017 and beyond.

By June 30, 2017 Provincial Health Services Authority's final Carbon Neutral Action Report will be posted to our website at bcgreencare.ca

The cover photo is of the BC Cancer Agency Centre for the North, Prince George, BC.
This new facility was certified LEED Gold in 2014.



Executive Summary



Executive Summary: Provincial Health Services Authority

Carl Roy, President & Chief Executive Officer

I am pleased to present the seventh annual Carbon Neutral Action Report, which highlights PHSA actions to reduce our carbon footprint, and link environmental sustainability to public health and wellness.

Over the years, PHSA has 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 2016, PHSA had a carbon footprint of 18,297 tonnes of carbon dioxide equivalent (tCO₂e), which was offset at a total cost of \$480,296. This represents a 24 per cent decrease from the 2007 PHSA carbon footprint. This decrease is even more significant given that PHSA assumed responsibility for added services, programs and staff during this period.

In 2016, PHSA completed six energy conservation projects, with a total estimated savings of 1,061,847 kilowatt-hours of electricity and 17,039 gigajoules of gas, which equates to a greenhouse gas reduction of 862 tCO₂e.

I want to recognize PHSA's Energy Management team, who work closely with Facilities Maintenance and Operations teams to reduce emissions, and our entire staff who support their efforts. Thanks to their work, PHSA was recognized in 2016, as one of the Greenest Employers in Canada for a fourth consecutive year. This ultimately adds to the health and wellness of our patients, employees and the communities we serve.

Date: May 31st 2017

Carl Roy
President & Chief Executive Officer
Provincial Health Services Authority



Healthy people
Healthy planet



Our CO₂ Footprint

2016 GREENHOUSE GAS EMISSIONS BREAKDOWN AND OFFSETS APPLIED TO BECOME CARBON NEUTRAL

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

CAS uses various elements of reporting, based on the Greenhouse Gas (GHG) Protocol corporate standard, which has classified carbon reporting into three scopes. Of these three scopes and various elements within each, CAS has determined PHSA's carbon footprint to comprise of six different greenhouse gases, which are converted to tonnes of carbon dioxide equivalent (tCO₂e). These gases are categorized in three main categories:

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

PHSA's 2016 carbon footprint offset was 18,297 tonnes of carbon dioxide equivalent (tCO₂e). That represents a 27 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 95 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 2016, PHSA purchased carbon offsets at a total cost of \$480,296.25.

CHANGES TO PROVINCIAL HEALTH SERVICES AUTHORITY'S PORTFOLIO

PHSA's useable facility space has decreased 7.7 per cent since 2007, which is largely due to the decommissioning of the Riverview property. During the same time, the number of staff (measured in full time equivalents) has increased by 37.9 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.

PHSA									
BUILDINGS, FTE AND WEATHER		2007	2010	2011	2012	2013	2014	2015	2016
Distinct PHSA Buildings		n/a	78	80	69	68	74	73	76
	% Owned	n/a	57%	57%	57%	69%	69%	69%	68%
	% Leased	n/a	43%	43%	43%	31%	31%	31%	32%
Usable Square Meters¹		388,990	389,883	392,728	400,444	355,437	358,082	358,455	358,995
Full-Time Employee Equivalents²		6,391	6,440	6,127	6,511	7,812	8,122	8,455	8,814
Weather (summarized in Heating Degree Days)³		2,870	2,621	2,963	2,859	2,820	2,627	2,489	2,537

¹ Usable area excludes roof tops, interstitial spaces, and parking areas.

² Full-Time Employee data was provided by the Ministry of Health.

³ Heating Degree Days (HDD's) is a measurement designed to reflect the demand for energy needed to heat a building. Although PHSA's facilities are located across BC, the majority of buildings in the metro Vancouver area, so Heating Degree Days for Vancouver were used for the comparison.

As of 2016, emissions per full-time equivalent (2.08 tCO₂e/FTE) have decreased by 44.7 per cent since 2007, and emissions per unit of floor area (0.05 tCO₂e/m²) have decreased 17.4 per cent since 2007. The carbon emissions reported are not adjusted for changes in weather. Heating Degree Days (HDDs) is a metric that reflects the demand for energy required to heat a building. The HDDs for 2016 were 12 per cent below those recorded in 2007, which reduced the demand for space heating and associated GHG emissions compared to 2007.

Provincial Health Service Authority									
Our Carbon Footprint (in tCO ₂ e)		2007	2010	2011	2012	2013 ²	2014	2015	2016
Mobile Fuel Combustion (Fleet & other mobile equipme		189	195	180	203	153	159	159	390
Stationary Fuel Combustion & Electricity (Buildings)		22,930	20,413	22,497	24,950	19,890	17,923	16,426	17,029
Supplies (Paper)		891	891	912	839	771	828	882	893
Total Carbon Footprint (tCO ₂ e)		24,010	21,499	23,590	25,992	20,815	18,911	17,467	18,312
Emissions Which Do Not Require Offsets ¹		-9	-9	-9	-10	-10	-9	-10	-15
Total Carbon Footprint (tCO ₂ e)		24,002	21,490	23,581	25,981	20,805	18,902	17,458	18,297
Adjustments / Corrections		0	0	0	0	0	0	10	0
Total Carbon Footprint - for offsetting (tCO₂e)		24,002	21,490	23,581	25,981	20,805	18,902	17,468	18,297

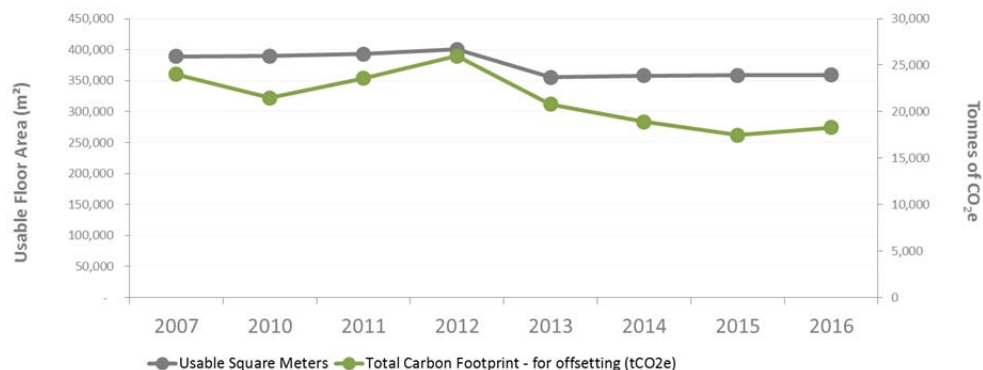
\$	Purchased Carbon Offsets	\$ -	\$ 628,000	\$ 485,700	\$ 644,750	\$ 538,025	\$ 472,625	\$ 436,700	\$ 457,425
	Purchased Carbon Offsets +HST / GST	\$ -	\$ 703,360	\$ 543,984	\$ 676,988	\$ 564,926	\$ 496,256	\$ 458,535	\$ 480,296

KPI	Emissions per Full-Time Employee	3.76	3.34	3.85	3.99	2.66	2.42	2.07	2.08
	Emissions per Meter Square Facility Space	0.062	0.055	0.060	0.065	0.059	0.053	0.049	0.051

¹ As outlined in the Carbon Neutral Government Regulation of the Greenhouse Gas Reductions Target Act, emissions do not require offsets.

Overall since 2007, PHSA's usable floor area and emissions have both reduced.

PHSA Useable Floor Area and Emissions (2007-2016)



Actions Taken To Reduce Our CO₂ Footprint

2016 LIST OF ACTIONS TAKEN TO REDUCE CO₂ FOOTPRINT

Stationary Emissions (Buildings)

In 2016, PHSA substantially¹ completed six projects, with a total estimated savings of 1,061,847 kWh of electricity and 17,039 GJ of gas, which equates to GHG reduction of 862 tonnes of carbon (tCO₂e). These projects included the following:

- **TRB Optimization:** An optimization project at the Translational Research Building on the BC Children's and Women's Hospitals campus (C&W).
- **MHB Optimization:** An optimization project at the Mental Health Building on the C&W campus consisting mainly of hydronic adjustments.
- **BCCHRI Cooling Towers:** Two cooling towers were replaced that serve the BC Children's Hospital Research Institute (BCCHRI) on the C&W campus. The new cooling towers are "induced draft" towers that consume one eighth as much energy.
- **BCCHRI Retro-Commissioning:** Phase 2 of a retro-commissioning project for the BCCHRI was largely completed, consisting primarily of ventilation adjustments.
- **BCCRC Heat Recovery Chiller:** A major heat recovery chiller project spanning two fiscal years at the BC Cancer Research Centre with significant projected energy savings through an innovative mechanical design. Refer to the Feature Project at the end of this document for more details.

In addition, four other energy savings projects were in progress at PHSA during 2016, with estimated savings once complete of 0.16 GWh of electricity, and 19,409 GJ of gas, which equates to GHG reduction of 970 tCO₂e. These projects include the following:

- **TACC New Construction:** An energy efficient design for the new Teck Acute Care Centre building at C&W campus was under construction during 2016.
- **C&W Heat Recovery:** A CNCP-funded heat recovery project at C&W campus.
- **FVCC Optimization:** An optimization project at the BC Cancer Agency's Fraser Valley Centre consisting mainly of controls optimization measures.
- **VCC Optimization:** An optimization project at the BC Cancer Agency's Vancouver Centre consisting mainly of controls optimization measures.

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 PHSA Energy Management team began to roll out an **engagement strategy** with Facilities Maintenance and Operations departments, focused initially at C&W campus, with plans to expand to all major owned sites over time. The focus is to identify reduction opportunities.

¹ One of the projects is in the final stages of commissioning

Mobile Fleet Combustion (fleet and other vehicles)

In 2016, PHSA's Transportation Demand Management Coordinator worked to improve, promote and establish alternative transportation opportunities for PHSA staff.

- PHSA has six (5-120v; 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. In 2016, the shuttle provided transportation for 19,628 staff to and from PHSA facilities, reducing up to this number of single occupancy vehicle trips.
- PHSA continues to operate a staff shuttle between C&W campus, staff off-site parking lot and King Edward Station that transported **117,172 passengers** in 2016.
- PHSA has **739 bike parking stalls**.
- PHSA **encourages teleconferencing** for meetings using web-conferencing hardware and software available at various sites.

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.

Actions that fall outside the scope of the Carbon Neutral Government

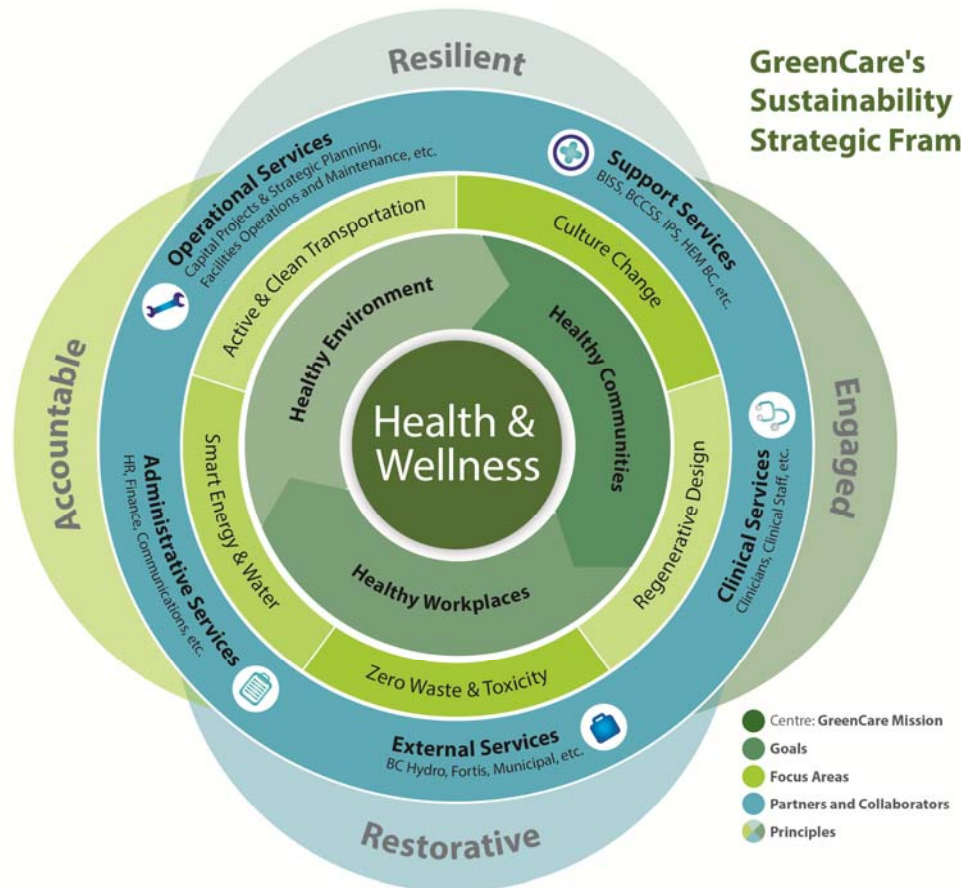
Regulations:

Other actions that fall outside the scope of CNG regulations include:

- 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 **25 new volunteers** for PHSA in 2016, making a total of **99 active staff volunteers** across PHSA, and a total of 199 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 **1052 staff registered** on the site in 2016
- **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**

Provincial Health Services Authority'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.



GreenCare's Sustainability Strategic Framework

Feature Project

BC Cancer Research Server Room Heat Recovery Project

The BC Cancer Agency Research Centre houses scientists and researchers conducting research perform various types of research to find the causes of cancer and develop better treatments. The facility has direct links to the cancer centers across the province, so discoveries at the Research Centre can be translated into clinical applications.

The chiller plant serving this building was in need of additional cooling capacity to meet the peak temperature on warm summer days and the increasing cooling load of its evolving server room.

The Energy and Environmental Sustainability team partnered with the BCCRC Facility Maintenance and Operation team to move toward a solution that considered both the operational requirements while minimizing the environmental impact. A detailed energy study was commissioned and a clear opportunity was proposed by the consultant.

The study identified that the cooling for the server room was mainly provided by the two existing less efficient large chillers CH-1 and CH-2, while the smaller heat recovery chiller CH-3 was not working as originally intended. Through extensive trend analysis additional opportunities to optimize the operation and chiller sequencing of the remaining chiller plant were uncovered. In this complex building with a variety of lab environment needs and heat generating equipment there is a year round cooling load; the heat from this process was being rejecting through the cooling towers.

The integration of new rear door cooling racks in the server room and a new two modules heat recovery chiller CH-4 into the central cooling plant was proposed in addition to several other energy optimizing measures. The project design moved forward and had a high level of project support and engagement from the BCCRC Facility Maintenance and Operation team and senior leadership; this collaborative approach assisted with early risk identification and improved overall project coordination.

Several different heat recovery chiller configurations were assessed and the installation of an 80 ton dedicated heat recovery chiller was prioritized to take advantage of the heat recovery to reduce steam consumption; this ensures the greatest operational savings and GHG mitigation.

Technology: Heat Recovery Chiller with server room rear door cooling racks and heating water heat exchangers.

Energy Savings: An estimated 14,889 GJ per annum of natural gas (due to reduced steam consumption)

GHG Reductions: An estimated 741 tCO₂e/year

Business Case: \$1,753 per tonne GHG reduction (excellent use of CNCP funding with comparable projects up to \$5,000/ tCO₂e)

Benefits/Co-Benefits: Additional cooling for the server room; reduced cooling tower maintenance and water consumption

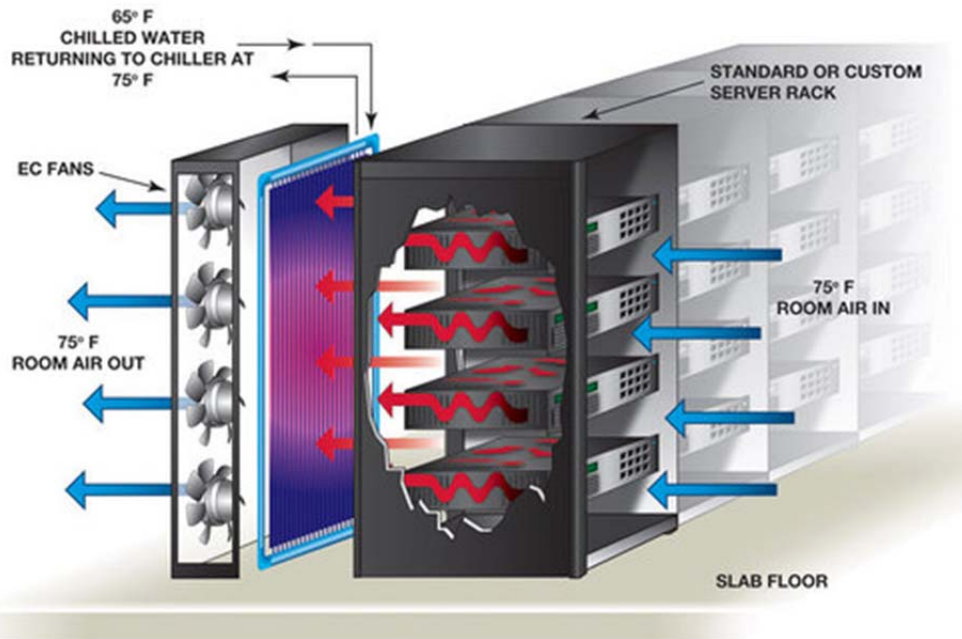
Total Project Cost: \$1.3 million

Operational Cost Savings: \$100,000 (estimated energy cost savings)

The other integral project measures were a repair of the existing heat recovery chiller CH-3 in order to have it operate as originally designed and the installation of new heat exchangers that utilize recovering the wasted heat from the server room and the repaired existing heat recovery chiller CH-3 and use it to assist with heating the domestic hot water and the heating water loop.

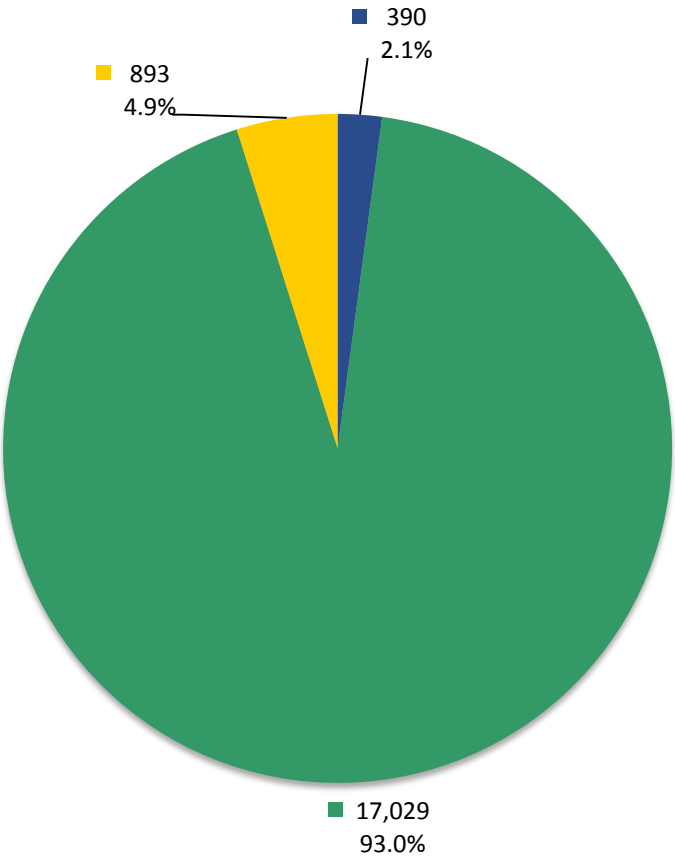
Considering the complexity of this cooling plant a commissioning and optimization plan was developed to ensure the plant operates as designed. The energy and emission savings will be monitored and verified after one full year of data is available.

The figure below shows how waste heat is extracted from the server via the chilled water return.



Source: <http://www.coolcentric.com/>

**Provincial Health Services Authority
Greenhouse Gas Emissions by Source
for the 2016 Calendar Year (tCO₂e*)**



Total Emissions: 18,312

- Mobile Fuel Combustion (Fleet and other mobile equipment)
- Stationary Fuel Combustion (Building Heating and Generators) and Electricity
- Supplies (Paper)

Offsets Applied to Become Carbon Neutral in 2016 (Generated May 16, 2017 9:34 AM)

Total offsets required: **18,297**. Total offset investment: **\$457,425**. Emissions which do not require offsets: **15** **

*Tonnes of carbon dioxide equivalent (tCO₂e) is a standard unit of measure in which all types of greenhouse gases are expressed based on their global warming potential relative to carbon dioxide.

** Under the *Carbon Neutral Government Regulation of the Greenhouse Gas Reduction Targets Act*, all emissions from the sources listed above must be reported. As outlined in the regulation, some emissions do not require offsets.

2016 Carbon Neutral Action Report Survey

Part One (external)

Contact Name(s):

Alex Hutton

Organization Name:

Provincial Health Services Authority

Please select your sector:

- Health Authority or Affiliate

1) Stationary Sources (Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions.

During 2016, did your organization take any of the following actions to support emissions reductions from buildings?

Select all that apply

- Conducted an energy audit/study of building(s) in the organization's portfolio
- Performed energy retrofits of the organization's buildings.: Retrofit projects were completed at 3 different buildings in 2016, and were in progress at one other building.
- Built, or are building new LEED Gold or other "Green" buildings.: The new Teck Acute Care Centre building at C&W campus was under construction during 2016 and is pursuing LEED Gold Certification.
- Other actions? Please describe briefly.: (1) Continued with Implementation phase of the BC Hydro Continuous Optimization (C.Op.) program at 4 buildings and started the Investigation phase at 3 new buildings. (2) Began to roll out Energy Engagement Strategy with FMO staff. (3) Promoted the use of our Energy and Environmental Sustainability (EES) Design Guidelines for New Construction and Major Renovation projects. (4) Continued to promote energy conservation and GHG emissions reduction through awareness and behaviour change programs.

Briefly describe your organization's plans to continue reducing emissions from its stationary sources in future years.

Provincial Health Services Authority has a Strategic Energy Management Plan (SEMP), last published in 2016, with details of our energy consumption and greenhouse gas emissions, reduction targets and planned actions to achieve these targets. This plan includes actions that can be summarized as follows:

1) Optimizing our Existing Buildings: Planning and implementing GHG / Energy reduction projects in our existing building portfolio by utilizing the Carbon Neutral Capital Program (CNCP) as our primary funding source.

2) Influencing New Construction: Implementing project-specific energy performance targets to ensure that our new buildings are as energy efficient as possible.

3) Systemic Change: Leveraging and promoting our Sustainability Policy, and implementing standards, guidelines, and processes to

embed energy management principles further into standard operations.

4) Behaviour Change: Engaging and educating our staff, via the existing Green + Leaders program, GreenCare Community and the BC Hydro Energy Wise Network and FortisBC's Communication, Engagement and Outreach program.

5) Innovation and Demonstration: Promoting innovative approaches and taking other small "seedling actions" to prepare for larger innovation as appropriate opportunities arise.

During 2016, did your organization participate in utility-sponsored energy demand management program(s) (e.g. BC Hydro's Energy Management (Manager))?

Yes

If yes, please describe briefly:

In 2016 PHSa continued to participate in the BC Hydro Energy Manager program and the Fortis BC Energy Specialist Program.

Participation in other utility-sponsored energy demand management programs over the years has also included:

- 1. BC Hydro and Fortis BC Continuous Optimization (C.Op.) program*
- 2. BC Hydro and Fortis BC New Construction (NC) program*
- 3. BC Hydro Business Energy Savings Incentive (BESI) program*
- 4. BC Hydro Energy Study & Audit program*
- 5. BC Hydro Energy Wise Network (EWN) program*
- 6. Fortis BC Communication, Engagement and Outreach (CEO) program*
- 7. Fortis BC Commercial Custom Design program*
- 8. Fortis BC Efficient Boiler program*
- 9. Fortis BC Efficient Commercial Water Heater program*

2) Mobile Sources (Vehicles, Off-road/Portable Equipment): Fuel Combustion.

During 2016, did your organization take any of the following actions to support emission reductions from its mobile sources?

Select all that apply

-
- Other actions? Please describe briefly.: In 2016, PHSa's Transportation Demand Management Coordinator worked to improve, promote and establish alternative transportation opportunities for PHSa staff. Specific actions include the following: • PHSa partners with Vancouver Coastal Health and Providence Health Care to provide a shuttle service between sites. In 2016, the shuttle provided transportation for 19,628 staff to and from PHSa facilities, reducing up to this number of single occupancy vehicle trips. • PHSa continues to operate a staff shuttle between C&W campus, staff off-site parking lot and King Edward Station that transported 117,172 passengers in 2016.
-

Briefly describe your organization's plans to continue reducing emissions from its mobile sources in future years.

1) As fleet vehicles require replacement, they will be replaced with more efficient vehicles.

2) The successful patient shuttle services will be continued for the foreseeable future.

3) Supplies (Paper):

During 2016, did your organization take any of the following actions to support emissions reductions from paper supplies?

Select all that apply

- Awareness campaign focused on reducing office paper use.
- Other actions? Please describe briefly.: 1) As part of the paper/waste reduction campaign within the Green+Leaders (G+L) behaviour change program, volunteers were supplied with Paperless Meeting Toolkits to encourage their colleagues to reduce paper use. (2) The online GreenCare Community (GCC) site provides tips and toolkits on using less paper, such as promoting paperless meetings.

Briefly describe your organization's plans to continue reducing emissions associated with its office paper use in future years.

BC Clinical and Support Services (BCCSS) will explore a proposal to convert the bulk of paper purchased to 30% recycled content. The current contract expires in November 2017. For context, in 2016 ~ 15% of the paper purchased had 30% recycled content.

4) Other Sustainability Actions:

Business Travel:

During 2016, did your organization take any of the following actions to support emissions reductions from business travel?

Select all that apply

-
- Encouraged alternative travel for business (e.g. bicycles, public transit, walking)
-
- Encouraged or allowed teleworking or working from home
-
- Other, please describe briefly: 1) PHSa have 6 Electric Vehicle charging stations installed. 2) The Energy & Environmental Sustainability (EES) team coordinated and delivered a Lower Mainland Clean Commuter Challenge (campaign to encourage staff to choose alternative healthier modes of commuting) and 182 staff participated in 2016. 3) PHSa have 739 bike parking stalls

Education Awareness:

During 2016, did your organization have any of the following programs or initiatives to support sustainability education and awareness?

Select all that apply

-
- Green, Sustainability or Climate Action Team
-
- Support for professional development on sustainability (e.g. workshops, conferences, training)
-
- Supported or provided education to staff about the science of climate change, conservation of water, energy and/or raw materials
-
- Other, please describe briefly: (1) Continued with the successful Green+Leaders (G+L) behaviour change program, with a focus on fostering sustainable behaviours in four key areas: Zero Waste, Energy Conservation and Climate Neutral, Active & Clean Transportation and Social Sustainability. (2) At the end of 2016, 1052 PHSa employees were registered on the Lower Mainland Facilities Management GreenCare Community (GCC) site. This website is used to communicate all EES projects and initiatives, as well as engage health care staff with the EES themes and offer a place for staff to collaborate. (3) Continued with the sponsored BC Hydro Workplace Conservation Awareness Program (WCA), which is being rebranded as the Energy Wise Network (EWN) program moving forward. This program supports the G+L program and also provides tools and resources for other awareness initiatives, such as our Facilities Maintenance and Operations (FMO) engagement strategy. (4) Educated 96 PHSa employees on Waste Management processes. (5) Trained 4 new Recycling Champions.

Other Sustainability Actions:

During 2016, did your organization have any of the following programs or initiatives to support sustainability?

Select all that apply

-
- An operations policy or program to facilitate the reduction and diversion of building occupant waste (e.g., composting, collection of plastics, batteries) from landfills or incineration facilities
-
- Lifecycle costing of new construction or renovations