

2017

# Carbon Neutral Action Report



North Island Hospital



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## Introductory Note

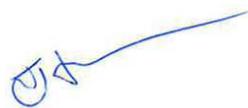
This is the seventh year that Island Health has reported its greenhouse gas emissions and become carbon neutral by purchasing offsets. This report discloses our emissions to offset for 2017, our emissions trends, and our strategies for reductions. Island Health remains committed to the provincial government's climate plans and legislation.

Since first becoming carbon neutral in 2010, Island Health has developed the internal capacity to not only track our in-scope greenhouse gas emissions but also deliver emission reduction projects that bring as much value to the organization as possible. 2017 was a year that highlighted the competing priorities for health care funds. At a time when significant resources were urgently needed to address the ongoing drug overdose crisis, it became more challenging for the health authority to direct substantial investments to emission reduction projects even though the benefits and returns were evident. There was no question that these projects could bring multiple benefits both in the short term and over the long run, but the uncertainty around funding remained.

Because of competing priorities and funding challenges, Island Health had to make the very difficult decision to forgo a once-in-fifty-year opportunity to significantly reduce emissions through the deployment of biomass boilers at the Nanaimo Regional General Hospital (the second largest heating plant in our facility portfolio). This decision will inevitably alter our path to achieving emission reduction targets, but our resourceful and dedicated team will continue to explore innovative solutions and partnerships in order to keep our commitment. Island Health will continue to work with the Ministry of Health, Climate Action Secretariat, and other public sector organizations to look for funding mechanisms for deep decarbonization.

The Carbon Neutral Capital Program, established in 2014, has provided critical and reliable yearly funding to Island Health for minor projects that reduce emissions. Island Health has been able to use this funding strategically to reduce emissions, avoid higher operational costs, and improve infrastructure. However, the Carbon Neutral Capital Program alone won't provide the funding required to achieve the ambitious reduction targets set out by the Province.

In 2017, BC also experienced the worst wildfire season in history. In the past year, Island Health has gained knowledge of the impacts of key climate vulnerabilities we face, including heat waves, poor air quality due to forest fire smoke, and heavy precipitation in the winter season. With the effects of extreme weather events that climate change could further intensify, Island Health is committed to preparing for and adapting to these changes to ensure that we continue to provide excellent health care to the communities we serve.



**James Hanson**  
Vice President  
Operations and Support Services  
Island Health

## Section 1: Overview

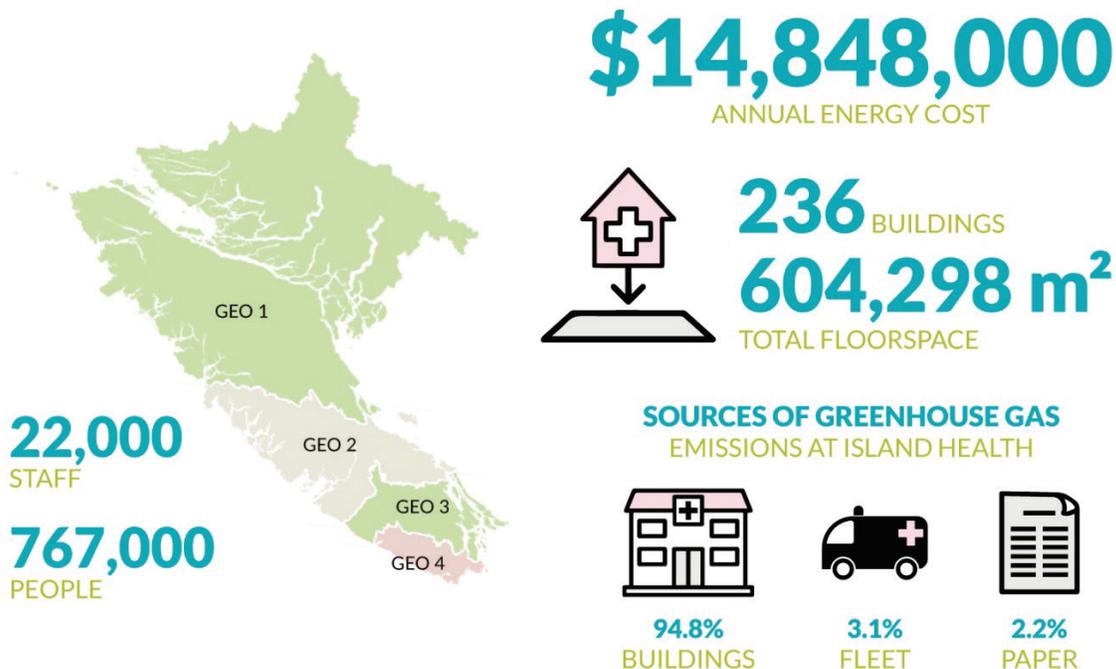
Island Health's 2017 Carbon Neutral Action Report for the period January 1, 2017 to December 31, 2017 summarizes our emissions profile, the total offsets required to reach net-zero emissions, the actions we have taken in 2017 to reduce our greenhouse gas (GHG) emissions, and our strategies to meet future emission-reduction targets.

By June 30, 2018, a copy of this report will be posted on the organization's new website [www.islandhealth.ca](http://www.islandhealth.ca).

### About Island Health

Approximately 22,000 health care professionals, technicians, and support staff at Island Health provide health care to more than 767,000 people on Vancouver Island, the islands in the Salish Sea and the Johnstone Strait, and the mainland communities north of Powell River and south of Rivers Inlet. Health care facilities are the largest source of greenhouse gas emissions for the health authority.

Compared to the 2016/2017 fiscal period, the annual energy cost for the 2017/2018 fiscal period has increased by 11%. The total floor space has also increased by almost 11% or nearly 60,000 square meters across the organization. The biggest contributor to this increase of floor space is the addition of two new North Island Hospital campuses (72,142 m<sup>2</sup>); with the decommissioning of the Campbell River Hospital (16,279 m<sup>2</sup>), the North Island campuses have contributed to a net increase of 55,863 m<sup>2</sup>. The higher energy cost is due, in part, to a service overlap period from May 2017, when Island Health gained ownership of the two new North Island campuses, until October 2017 when the old Campbell River hospital was closed. Other contributing factors include the temporary suspension of two significant pieces of energy efficiency equipment—the Royal Jubilee Hospital boiler economizer and the West Coast General Hospital heat recovery system—while repairs and upgrades were being carried out.



## Commitment

Island Health’s leadership team understands the value and importance of energy conservation and environmental sustainability; the organization’s *Environmental Sustainability Policy* states that Island Health will work to meet Greenhouse Gas (GHG) reduction targets mandated by the provincial government. B.C.’s 2007 *Greenhouse Gas Reduction Targets Act* set targets of 33% GHG-emissions reduction (below 2007 levels) by 2020 and 80% reduction by 2050.

On May 7, 2018, the *Greenhouse Gas Reduction Targets Act* was replaced by the *Climate Change Accountability Act*, which sets new legislated targets of 40% reduction in carbon emissions from 2007 levels by 2030 and 60% reduction by 2040. The current target of 80% reduction by 2050 remains unchanged.

The Province also requires all public sector organizations (PSOs) to achieve the Leadership in Energy and Environmental Design (LEED) Gold standard in all new provincially owned or leased facilities. Besides the three existing LEED Gold facilities—the Patient Care Centre in Victoria, Oceanside Health Centre in Parksville, and the new Emergency Department at Nanaimo Regional General Hospital (NRGH) — Island Health opened two new North Island campuses in Campbell River and Comox in 2017, both of which are designed to be LEED Gold certified.

The recent B.C. Auditor General’s audit report *Managing Climate Change Risks* highlighted the need for stronger action to prepare for and adapt to future climate change. The 2016 *BC Climate Leadership Plan* requires PSOs to develop a 10-year mitigation and adaptation plan. Island Health is committed to meeting this challenge and is the first health care organization to conduct a full climate vulnerability assessment at a hospital. A number of Island Health studies have provided valuable information on the organization’s climate vulnerabilities thereby laying the foundation for future projects that will address these vulnerabilities. More information about these projects can be found in **Section 4: Climate Adaptation** (page 11).

## 2017 Emissions and Offsets

Under BC’s *Greenhouse Gas Reduction Targets Act*, Island Health has been required since 2010 to report and offset its emissions to achieve carbon neutrality.

**Table 1: Island Health’s Total Emissions and Offsets for 2017**

GHG Emissions Created in Calendar Year 2017	
Total Emissions (tCO <sub>2</sub> e)	31,860
Exempt Emissions (tCO <sub>2</sub> e) <sup>1</sup>	864
Total Emissions for Offsetting (tCO <sub>2</sub> e)	30,996
Adjustments to GHG Emissions Reported in 2016	
Adjustments to 2016 Offsets	+36
Grand Total Offsets for the 2017 Reporting Year	
Grand Total Emissions for Offsetting (tCO <sub>2</sub> e)	31,032
Total Offsets Cost ( x \$25/tonne) x (5% GST)	\$814,590

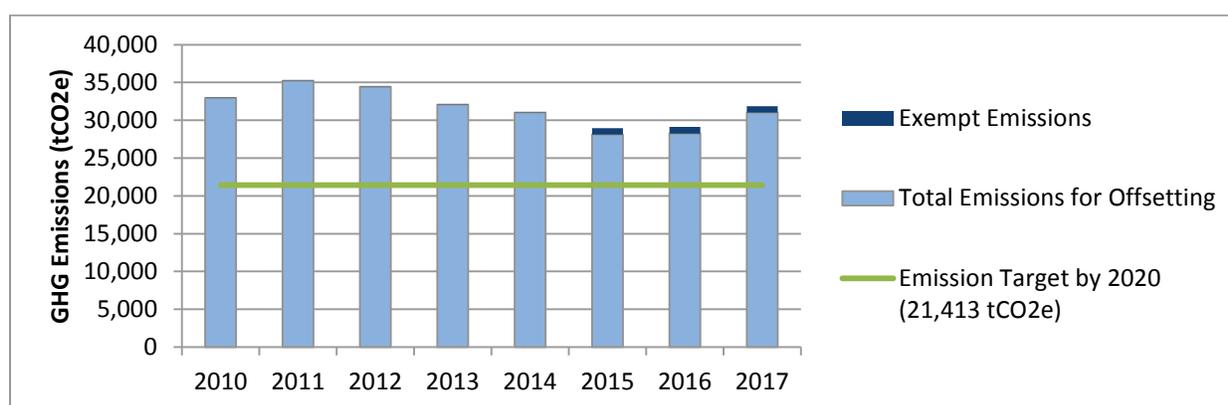
<sup>1</sup> “Biogenic” portion (BioCO<sub>2</sub>) of the emissions from biomass, renewable natural gas and biofuels are not required to be offset due to their renewable source.

To reduce its emissions to net-zero, Island Health invests in emission-reduction projects and purchases B.C.-based offsets. The offset payments provide incentives to B.C.-based projects that reduce emissions through GHG removal or avoidance according to provincial regulations. These projects support British Columbia’s green economy and provide social, environmental, and economic benefits to all British Columbians. Island Health pays the invoice issued by the Ministry of Environment in an amount equal to \$25 per tonne of CO<sub>2</sub>e offsets plus GST for each reporting year.

## Emission Trends

Since 2010, Island Health has been offsetting GHG emissions and reporting on emissions using the Province’s SMARTTool program. Figure 1 graphs the change in total emissions, exempt emissions, and emissions for offsets from 2010 to 2017 compared to the 2020 emission target (33% lower than the 2007 level). Table 2 provides additional detailed information for the same 2010-2017 period, including offset costs and emissions per Full Time Equivalent or FTE (the hours worked by an employee on a full-time basis).

**Figure 1: Change in Island Health Emissions and Offsets, 2010 to 2017**



**Table 2: Island Health Emission and Offset Figures, 2010 to 2017**

Year	Baseline 2007	2010	2011	2012	2013	2014	2015	2016	2017
Total Emissions	31,960	32,993	35,279	34,470	32,123	31,050	28,957	29,147	31,860
Exempt Emissions	n/a	61	59	52	54	56	866	870	864
Total Emissions for Offsetting	n/a	32,938	35,226	34,423	32,075	30,994	28,091	28,277	30,996
Offsets Cost plus GST	n/a	\$822,835	\$875,250	\$859,125	\$841,260	\$813,068	\$737,310	\$743,321	\$814,590
Emissions per FTE <sup>2</sup>	2.66	2.70	2.85	2.67	2.49	2.38	2.05	1.99	2.16

<sup>2</sup> The Full Time Equivalent (FTE) data, provided by the Ministry of Health to all BC health authorities, was used to ensure consistency in methodology for the healthcare sector’s Carbon Neutral Action Reports.

Island Health’s total emissions peaked in 2011 when the Patient Care Centre opened in Victoria. Emission levels steadily decreased between 2011 and 2015. The 2016 emission level was slightly higher (0.5%) than the 2015 level due to a cold winter season and a number of delayed emission-reduction projects. The 2017 emission level increased by 10% compared to the 2016 level.

Reasons for the 2017 emission increase include:

1. The addition of two new campuses of the North Island Hospital in Campbell River and Comox
2. The temporary service suspension of the economizer for the Royal Jubilee Hospital (RJH) boiler (the largest natural gas boiler within Island Health’s facility portfolio) during flue repairs
3. The temporary service suspension of the heat recovery chiller at West Coast General Hospital (WCGH) while it was offline for a system upgrade

By 2017, Island Health has managed to decrease emission levels by 13.6% from the peak level in 2011 despite a 15% increase in total floor space over the same six-year period. To achieve the Province’s emission target for 2020, the emission level needs to drop by 31% in the next two years. Although some PSOs are on track to achieving or even surpassing their 2020 targets, nearly all PSOs need additional support and resources to reach targets beyond 2020 (e.g. 80% reduction by 2050). None of B.C.’s health authorities are on track to achieving their reduction targets.

The increases in exempt emissions in 2015, 2016 and 2017 were due to the purchase of renewable natural gas from FortisBC, which reduced the total offsets that Island Health needed to purchase. Emissions per Full Time Equivalent or FTE (the hours worked by one employee on a full-time basis) had been steadily declining since 2011 until 2016 and stayed well below the peak value. Emissions from buildings make up close to 95% of total emissions. The rest comes from fleet and office paper (outlined in Table 3 below).

**Table 3: Island Health Emissions by Source, 2010 to 2017**

Emission Source [tCO <sub>2</sub> e]	2010	2011	2012	2013	2014	2015	2016	2017
Fleet	922	901	878	892	911	888	897	978
Office Paper	831	747	717	714	691	706	677	687
Buildings Owned & Leased	31,241	33,631	32,874	30,517	29,448	27,363	27,573	30,195
<b>Total Emissions<sup>3</sup></b>	<b>32,994</b>	<b>35,279</b>	<b>34,469</b>	<b>32,123</b>	<b>31,050</b>	<b>28,957</b>	<b>29,147</b>	<b>31,860</b>

## Carbon Neutral Capital Program

In 2014, the Province’s *Carbon Neutral Capital Program* (CNCP) was expanded to include funding for B.C.’s health authorities. Since then, Island Health has been able to access capital funding to implement GHG emissions reduction projects. The four-year average cost of reducing emissions through these projects is \$2,819 per tonne (Total Expenditure divided by Emission Reduction). This value is being used to project future emission reductions from CNCP funding only. The projection is presented in Figure 2.

<sup>3</sup> Total emissions include both exempt emissions and total emissions for offsetting.

The emission reduction for the 2017/18 fiscal period was noticeably lower than those in previous years. The NRGH Phase 3 Zoning project was originally a candidate for this year’s CNCP funding but later had to be postponed because the only bid received was cost prohibitive. The project is now expected to proceed as a CNCP project in the 2018/2019 fiscal period. The Cumberland Regional Laundry Dryer Heat Recovery project was also a promising candidate that was expected to produce significant GHG reduction following the example of the Victoria Regional Laundry Dryer Heat Recovery project completed in 2015. However, a preliminary study completed for the project revealed many technical challenges with the upgrade and ultimately led to the conclusion that the project was not viable.

With the withdrawal of these two projects from the CNCP funding application, two projects with less reduction potential were submitted instead. This situation illustrates the challenge of maximizing reduction benefits when projects are determined by their readiness to proceed at the time that funding is available and by their ability to be implemented within one year (a CNCP funding requirement). The annual CNCP cycle and the internal capital approval process often mean that the projects can only move forward with detailed engineering in April with the expectation that they will be completed by the following March. Table 4 provides a summary of Island Health projects funded by the CNCP from 2014-2018.

**Table 4: Summary of CNCP Projects**

Fiscal Year	Project Description	Total Expenditure (\$)	CNCP Funding (\$)	Total Annual Savings (\$)	Emission Reduction (tCO <sub>2</sub> e/yr)
F2014/15	Lighting upgrade Boiler optimization HVAC zoning	1,296,278	902,818	194,452	507.5
F2015/16	Laundry plant upgrade Boiler plant replacement Domestic hot water decouple Zone isolation and lighting	1,474,278	828,505	172,639	525.2
F2016/17	Heat recovery chiller Exhaust air heat recovery Zone control Domestic hot water decouple	1,354,402	817,953	104,640	654.7 <sup>4</sup>
F2017/18	Boiler & Heating Plant upgrade Heat recovery Heating ventilation & air conditioning (HVAC) upgrade	1,305,125	817,953	75,653	238.9
	<b>Average</b>	<b>1,357,520</b>	<b>841,807</b>	<b>547,384</b>	<b>481.6</b>

## **Section 2: Emission Reduction Projects in 2017**

In general, heat recovery and HVAC upgrade projects delivered the greatest emission reductions. The NRGH Electrical Vault Heat Recovery project and the Victoria General Hospital (VGH) Phase 1 Operating Room (OR) Zoning project are responsible for 83% of the emission reductions in 2017. More information about the latter project can be found in Appendix A.

<sup>4</sup> The number was updated from 630.6 tCO<sub>2</sub>e based on the latest calculations.

The following table is a summary of various types of projects completed in the 2017/18 fiscal year along with their associated costs, savings, and emission reductions; the Incremental Cost per Tonne of GHG Avoided and Payback on Incremental Cost are calculated based on this information.

**Table 5: Summary of Emission Reduction Projects in the 2017/18 Fiscal Year**

Project Type	Total Cost (\$)	Incremental Cost (\$)	Total Annual Cost Savings (\$)	GHGs Avoided (tCO <sub>2</sub> e/yr)	Incremental Cost per Tonne of GHG Avoided (\$)	Payback on Incremental Cost (yrs)
Boiler and Heating Plant Upgrade	540,000	160,800	13,741	33.11	\$4,857	11.7
Continuous Optimization	250,000	250,000	71,868	180.06	\$1,389	3.5
Lighting	308,842	308,842	43,653	6.15	\$50,218	7.1
HVAC Upgrade	317,500	317,500	30,263	94.57	\$3,357	10.5
Heat Recovery	482,625	482,625	67,217	254.80	\$1,894	7.2
<b>2017/2018 Total</b>	<b>1,918,967</b>	<b>1,519,767</b>	<b>226,742</b>	<b>568.68</b>	<b>n/a</b>	<b>n/a</b>

In Table 5, the Total Cost is the cost required to implement a project. When a piece of existing equipment is being replaced, the Incremental Cost is the extra cost required to achieve a higher efficiency from the equipment being replaced (e.g. mid-efficiency boilers being replaced with high efficiency boilers). When an energy efficiency project is a new addition to the existing infrastructure (e.g. adding a device to reduce existing motor use), the Incremental Cost equals the Total Cost of the project.

Incremental Cost per Tonne of GHG Avoided is the Incremental Cost divided by GHG Avoided. This measure gives a clear indication of the cost of emission reductions by project type. Heat recovery projects, HVAC upgrades, and continuous optimization are the most cost-effective in terms of reducing emissions. Although hydroelectricity in BC is mostly renewable, lighting upgrades are usually the least cost-effective projects because they have short payback periods. Natural gas boiler upgrades are cost-effective due to relatively low natural gas rates, but the upgrade from a less efficient to a more efficient boiler produces only marginal GHG reductions.

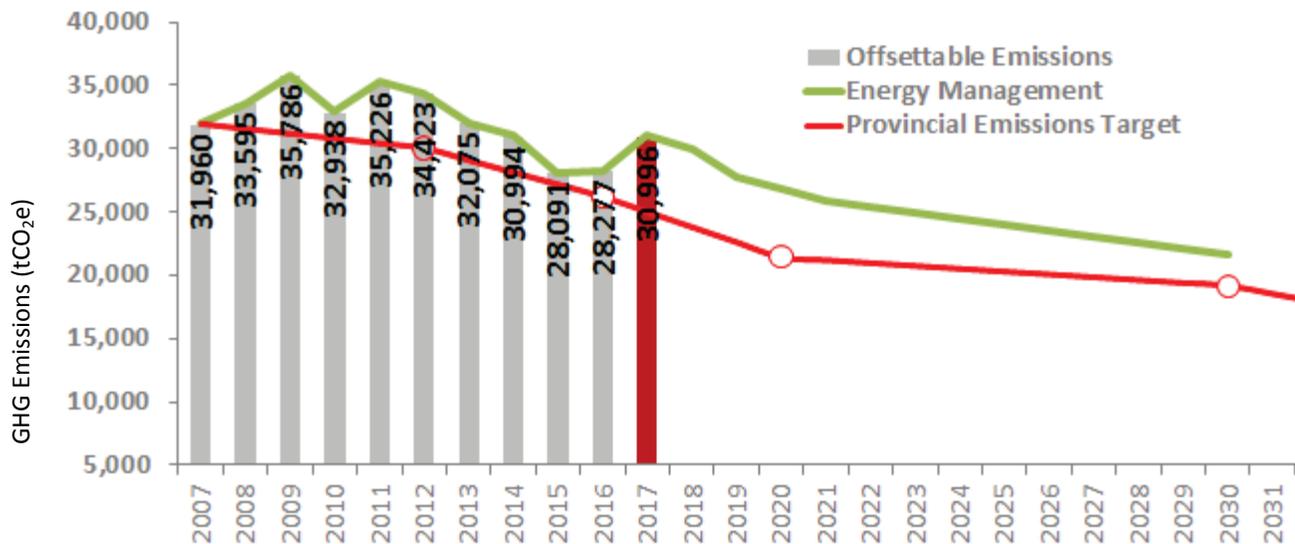
Payback on Incremental Cost is calculated by dividing Incremental Cost by Total Annual Cost Savings. On average, all of these project types have a payback of 12 years or less; however, the exact payback varies for each individual project. Most of these upgrades have a lifespan of 15 to 20 years and generate significant cost savings regardless of their emission-reduction potential.

### **Section 3: Strategies for Future Emissions Reduction**

The majority of Island Health’s building-related GHG emissions come from fossil fuel, primarily natural gas. In areas where natural gas is available, it is widely used for space and hot water heating, as well as for laundry and cooking. The future emissions reduction strategy for buildings will be centred on improving existing buildings, ensuring new buildings perform to high standards shortly after construction completion, and managing energy sources.

The green line in Figure 2 represents the expected emissions reduction resulting from a steady investment of Carbon Neutral Capital, the average cost of emissions reductions being \$2,819 per tonne of CO<sub>2</sub>e.

**Figure 2: Island Health Emissions, Targets and Projections**



### Existing Buildings

In existing buildings, efforts will continue to focus on minimizing waste and improving efficiency. This will require close collaboration between Energy Department staff and Facilities, Maintenance and Operations (FMO) staff. In addition to energy conservation capital projects such as HVAC improvements and lighting upgrades, more effort will be made to uncover opportunities that require relatively small upfront investment, such as building re-commissioning, continuous optimization, scheduling, optimized controls, and improved maintenance (e.g. coil cleaning, steam trap insulation, etc.).

### New Construction

Aggressive energy and emission targets were set at the early stages of the North Island Hospital project, which is promised to lower the emissions by 73% compared to the old Campbell River Hospital. Although the North Island Hospital buildings are performing better than buildings that merely meet B.C. building code requirements, there is still a performance gap that needs to be addressed. Going forward, the practice of setting targets for new construction projects will continue to avoid a net increase of GHG emissions. It is also important to reduce the amount of time it takes for the new buildings to reach or exceed performance targets. Future climate information will be incorporated into the planning and design of new construction projects to ensure these buildings will continue to have low emissions and be resilient in a changing climate.

### Energy Source Management

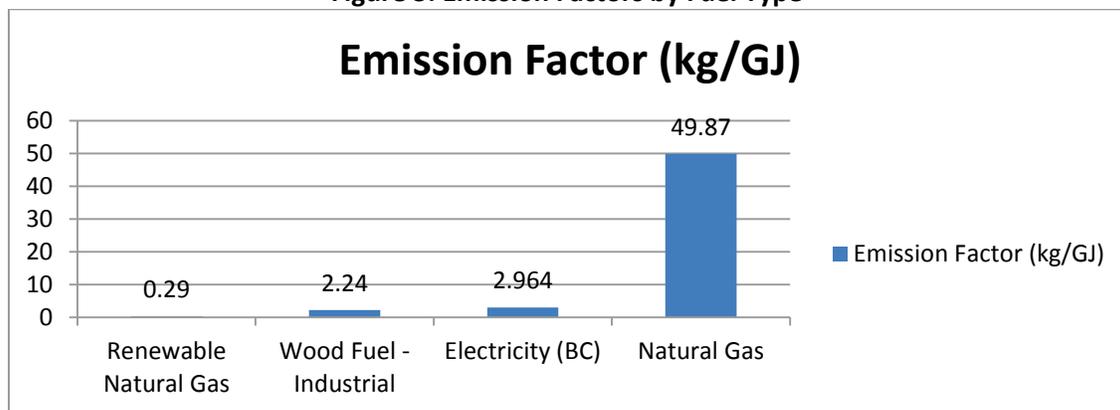
Another important strategy for reducing future GHG emissions is to increase the share of low-carbon energy sources. On this front, Island Health has taken steps to install renewable energy systems, purchase renewable natural gas, and explore the feasibility of a biomass energy plant at NRGH and at Cairnsmore Place Residential Care.

Following a decision in 2017 to not proceed with the construction of a biomass energy plant, two alternative energy source management options are now being explored:

1. Purchase renewable natural gas for an additional cost of \$830,000 per year, assuming FortisBC could provide the amount of renewable natural gas needed.
2. Electrify 30% of current natural gas load in the next two years by installing heat pumps (for space heating) and heat recovery chillers (for space cooling and hot water pre-heating). A high-level calculation suggests that the increased electrical charges as a result of this conversion will be more than offset by the reduced natural gas charges based on electricity and natural gas rate projections. This means that the reduction could be achieved without a significant increase of the operation’s utility budget. However, this level of conversion will require detailed engineering and a capital expenditure of several million dollars. Electrification will likely be a part of longer-term solution to meeting the emission reduction target beyond 2020.

Figure 3 illustrates the comparative emission factor (or emission levels) for four energy sources: natural gas, electricity, wood fuel and renewable natural gas. Natural gas produces the most emissions while renewable natural gas produces the least.

**Figure 3: Emission Factors by Fuel Type<sup>5</sup>**



## Fleet

Emissions from Island Health’s fleet represent 3.1% of the total emissions in 2017. The main strategy for managing fleet emissions is to improve the fuel efficiency of vehicles and to consider zero-emission vehicles (when new vehicles are purchased or leased) that are compatible with fleet vehicle uses.

In 2017, Island Health participated in the BC Government’s Fleet Champion Program and signed onto the West Coast Electric Fleets pledge. As part of the agreement, Island Health received consulting support to complete an Electric Vehicle (EV) Suitability Assessment, which analyzed fourteen fleet vehicles, and became eligible to receive an incentive for installing two Level 2 charging stations at an Island Health facility. This work has laid the foundation for proceeding with the procurement of electric fleet vehicles.

## Paper

Emissions from paper represent 2.2% of the total emissions in 2017. The biggest opportunity for paper emission reduction is to use less paper through digitalization and changing procedures and behaviours.

<sup>5</sup> Emission factors extracted from 2016 B.C. Best Practices Methodology for quantifying Greenhouse Gas Emissions.

Island Health is moving to switching all employees to a paperless ePay system where they can access pay information online. The use of alternative paper types such as wheat, eucalyptus, sugarcane, and bamboo could lower the reported emissions of paper as well. The annual Green Calendar produced internally has been used to test and prove the performance of wheat and sugarcane papers with the intention to promote their uses.

## **Section 4: Climate Adaptation**

Changing climate has been identified as a risk to both health care operations and the health of the general population. Island Health was successful in obtaining funding from Natural Resources Canada and the Pacific Institute of Climate Solutions to carry out a number of projects for assessing climate vulnerabilities and developing tools to address them.

The following climate change adaptation work was completed in 2017:

- Climate Vulnerability Assessment of Nanaimo Regional General Hospital<sup>6</sup>
- Climate Projection Mapping Project for Island Health owned facilities (including projection maps and climate variables)
- Customization of Climate Adaptation Assessment Toolkit for Island Health
- 2017 Heat Wave Impact Survey
- Incorporation of climate projection into new construction projects (e.g. energy modelling with projected weather information for the NRGH Intensive Care Unit)

Future tasks include:

- Follow up with the recommendations from NRGH's climate vulnerability assessment
- Raise awareness of climate change impact and build staff capacity to develop heat and smoke response strategies before summer 2018
- Test the Climate Adaptation Assessment Toolkit with at least one of the Island Health owned sites
- Participate in the study on infrastructure interdependency led by the Climate Action Secretariat
- Participate in the Mobilizing Building Adaptation and Resilience project led by BC Housing

## **Section 5: Sustainability Initiatives**

Many departments at Island Health are actively taking measures to achieve greater efficiency and reduce pollution and consumption of resources. Below are highlights of these activities in 2017.

### **Water Conservation**

A system was set up to monitor the water cost and consumption of all major Island Health owned sites on the same online platform that is used to monitor energy cost and consumption. The Energy Department began the practice of incorporating a water performance review into the quarterly meetings with the Facilities, Maintenance and Operations (FMO) department.

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<sup>6</sup> This is a Public Infrastructure Engineering Vulnerability Committee (PIEVC study). The PIEVC created a protocol to assess the vulnerabilities of infrastructure to extreme weather events and future changes in climate.

The initial analysis of the water use index (cubic meter of water consumption per square meter of floor space) immediately revealed a number of outliers, which resulted in the correction of a multi-year billing error at one facility and a focus on facilities with a high water use index for conservation opportunities. For example, Port Hardy Hospital had a water use index of 6.31 m<sup>3</sup>/m<sup>2</sup> while other facilities with similar functions had a water use index ranging from 1.01 to 2.87 m<sup>3</sup>/m<sup>2</sup>. Upon investigation, FMO staff members recognized that the issue was related to the failure of several automatic control valves and quickly replaced them. Since the correcting measure was taken in August 2017, the facility conserved 4,100 m<sup>3</sup> of water, which amounts to approximately \$3,000 cost savings over the same period.

An analysis of water and sewer rates of Island Health-owned facilities helped prioritize sites with higher consumption and water rates for further study and analysis. These studies would identify water conservation measures to implement over time.

### **Electric Vehicle Charging Infrastructure Development**

With the increased adoption and interest in electric vehicles (EVs), Island Health Parking Services collaborated with the Energy Department and took steps to assess the current and potential demand for EV charging stations at our own sites. Currently, four Level 2 Charging Stations are available in the public parking area at NRGH.

A survey was conducted to better understand the needs of EV drivers who travel to RJH. The survey results suggest that the number of EV drivers could triple in the next two years. Visitors prefer Level 2 charging stations because this option provides a faster charge during short visits. For staff and physicians, who work long shifts and may not be able to move their vehicles during shifts, Level 1 charging stations are likely more suitable. The survey provided useful information to help plan EV infrastructure in a way that could effectively encourage the adoption of clean energy vehicles and reduce-vehicle related GHG emissions.

### **Behaviour Change**

Island Health was accepted into the BC Hydro Energy Wise Network where funding and coaching were available to support behaviour change campaigns. One of the campaigns is detailed in Appendix B.

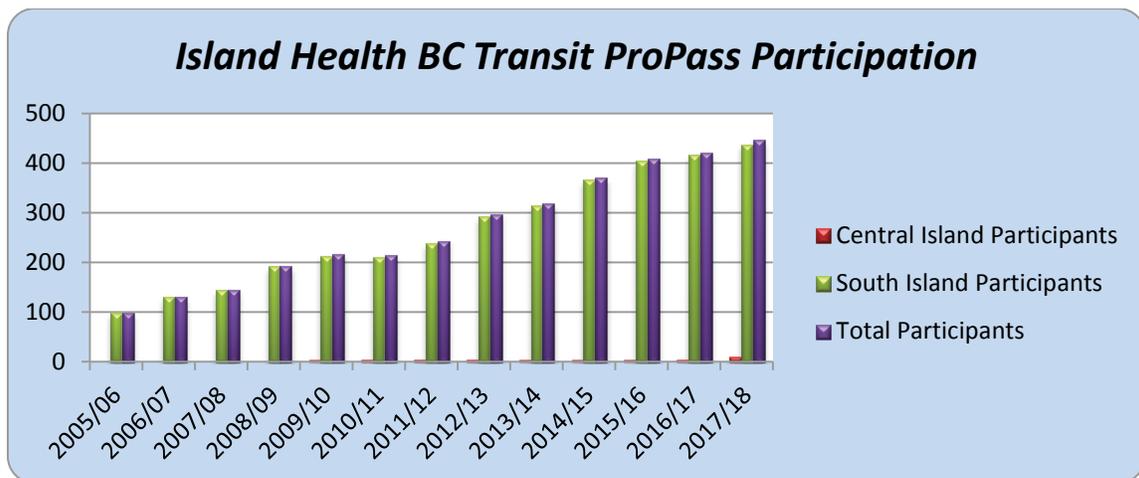
A total of 36 Green Champions from various departments across the organization were welcomed into the Island Health Green Champion program. They became leaders and role models for their colleagues and ran campaigns that aimed to encourage environmentally friendly behaviours such as turning off lights and monitors, identifying water leaks, and improving recycling practices.



**Green Champions at the training event at Victoria General Hospital**

## Transportation Demand Management

Parking Services promotes and supports Transportation Demand Management (TDM). This program is concerned with the ways in which our employees make optimal use of locally available transportation resources and Island Health supported initiatives, with a strong focus on getting people out of single-occupancy vehicles and into more efficient modes of commuting. Parking Services' primary focus is to reduce single-occupancy vehicle traffic and decrease the demand for parking at Island Health sites. Measures to support TDM include participation in the annual Bike to Work Week, offering employee enrollment in the BC Transit ProPASS program, providing an inter-site shuttle between RJH and VGH and increasing total bicycle storage capacity. In Fiscal 2017/2018, employees' ProPass enrollment was up by 6.16% and bike storage capacity increased by 4.29%.



## Appendix A: Success Story

### Zoning and Occupancy Control to Lower GHG Emissions

After reviewing successful zoning projects elsewhere, Island Health decided to study the opportunities for zoning at Victoria General Hospital (VGH).

Normally, rooms and areas are supplied ventilation through Variable Air Volume (VAV) boxes, and the ventilation rate can be reduced during unoccupied hours, normally during the night, if controls in specific areas allow for this. The ventilation rates for the operating rooms at VGH were set at their maximum levels for 24 hours a day.

#### Quick Facts:

- *Total project budget:* \$307,500
- *CNCP funding:* \$184,500
- *Cost savings:* \$25,200/year
- *Annual GHG reductions:* 89.3 tCO<sub>2</sub>e
- *Technology:*  
Individual room control of ventilation/temperature through modern equipment and controls

By installing modern digital controls to the VAV boxes and occupancy sensors to the rooms, we can better control the ventilation rate and the room temperature, and we have the ability to reduce them whenever the rooms are unoccupied during the day. If pressurization of the room is important, like in operating rooms, exhaust boxes are installed and controlled as well.

Where do the energy savings come from? When airflow is reduced to the rooms (by closing off the VAV boxes) this has the effect of raising the pressure in the duct. The fan control senses this and reduces its speed to maintain a certain air pressure. The reduction in fan power directly leads to electrical savings. Less airflow also translates into less hot/cold water needed for heating or cooling the air. That means less natural gas is required to heat the water and less electricity to cool the water.

A user interface, installed outside each operating room, displays up-to-date information on air quality parameters (see Figure 1).

Current trending on the building automation system is showing a 60% reduction in ventilation rates 50% of the time; therefore, a real 30% reduction has been achieved in airflow and related energy from the 24/7 profile recorded before the project started. The savings are anticipated to be higher than originally calculated.

Figure 1. Triatek 1655 Room Pressure



## Appendix B: Energy Wise Network Success Story

# Energy Wise Network Building Energy Challenge

Optimizing Variable Frequency Drive (VFD)



VFD Campaign Poster

### Background

The Island Health Facilities Maintenance and Operations (FMO) department plays an important role in finding energy conservation opportunities and joined the year-long Building Energy Challenge to support organization's goal of reducing energy consumption and Greenhouse Gas emissions.

The Optimizing VFD campaign was the second campaign during the Building Energy Challenge. It was launched in April 2017 with a kick-off conference call during which Island Health Energy Manager Albert Boulet provided guidance on where to look for potential VFD optimization in order to find energy savings.

### Campaign Overview

- The campaign raised awareness of VFD optimization among Island Health Facilities Maintenance and Operations (FMO) staff in seven sub-regions across Vancouver Island through conference calls, emails, posters and handouts.
- FMO staff members who interact with motors, fans and pumps were encouraged to use a checklist form to identify potential new VFD installations, opportunities to optimize existing VFDs and any issues related to current VFDs.
- FMO staff were given the opportunity to submit their VFD optimization ideas to two Island Health Energy Specialists.



# Energy Wise Network

Building Energy Challenge Campaign - Optimizing VFD



Victoria General Hospital FMO team earned a pizza lunch by being the team that submitted the most ideas during the Optimizing VFD campaign.

## Results / Lessons Learned / Acknowledgements

- Forty-six VFD Optimization Ideas were submitted to the Island Health Energy Team to optimize the performance of motors, exhaust fans and pumps. The Energy Team identified 12 of the most promising VFD applications and estimated the electrical savings would be approximately 63,500 kWh per year.
- The Optimizing VFD campaign struck a chord with the HVAC Technician Walter Nixon based out of Victoria General Hospital; in collaboration with his colleagues, he contributed 40 ideas and organized them neatly in a spreadsheet.
- The Nanaimo Regional General Hospital (the biggest site in the Central North Island region), has been installing VFDs systematically over the past decade and has valuable experience and knowledge to share with other sites.
- The campaign wrap-up conference call was a productive forum for sharing ideas and lessons learned from all Island Health FMO staff.

The Energy Wise Network was launched in 2016 to help organizations in their energy engagement programs.

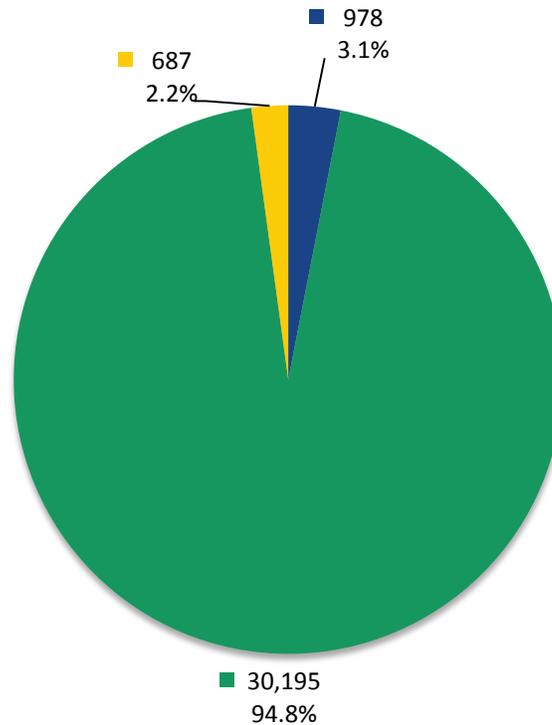
The network is made up of Advanced Education, Government, Schools (K-12), Hospitality, Municipalities, Property Management, and Retail sectors.

We're working together to help B.C. save energy.



## Appendix C: Emissions Source Report and 2017 Carbon Neutral Action Report Survey

### Vancouver Island Health Authority Greenhouse Gas Emissions by Source for the 2017 Calendar Year (tCO<sub>2</sub>e\*)



**Total Emissions: 31,860**

- 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 2017 (Generated May 01, 2018 11:08 AM)

Total offsets required: **30,996**. Total offset investment: **\$774,900**. Emissions which do not require offsets:

\*Tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) 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

# 2017 Carbon Neutral Action Report (CNAR) Survey

## Part 1: CNAR Survey

### 1. General Information

Name: Ting Pan  
Contact Email: Ting.Pan@viha.ca  
Organization Name: Island Health  
Sector: Health

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

**During 2017, did your organization take any of the following actions to support emissions reductions from buildings? (please select all that apply)**

- Conducted an energy audit/study of building(s) in the organization's portfolio.
- Performed energy retrofits of the organization's building(s)
- Built, or are building new LEED Gold or other "Green" buildings
- None of the above

**If you selected "*Performed energy retrofits of the organization's building(s)*":**

How many buildings were retrofitted?: 9

**If you selected "*Built, or are building new LEED Gold or other "Green" buildings*":**

How many new "Green" buildings?: 2

**Did your Organization perform any retrofits during 2017? Please describe briefly:**

The energy retrofits in 2017 include the following types of projects:

- Boiler and heating plant upgrades
- Continuous optimization
- Lighting upgrades
- HVAC conservation measures
- Heat recovery
- Building envelope upgrade

## 2a. Stationary Sources (eg. Buildings, Power Generators): Fuel Combustion, Electricity use, Fugitive Emissions

Please briefly describe your organization's plans to continue reducing emissions from its stationary sources:

### a) Over the next 1-5 years

1. Building re-commissioning, continuous optimization, and optimized controls
2. Minimizing waste through scheduling and demand based heating, cooling & ventilation
3. Heat recovery & heat pumps
4. Lighting upgrades
5. Improved maintenance (coil cleaning, steam traps, insulation, etc...)
6. More efficient equipment (boilers, chillers cooling towers, motors)

### b) Over the following 6-10 years

More of the same measures mentioned above, with the addition of some renewable energy projects.

## 3. Mobile Sources (Vehicles, Off-road/portable Equipment): Fuel Combustion:

During 2017, did your organization take any of the following actions to support emission reductions from its mobile sources? (please select all that apply)

- Replaced existing vehicles with more fuel efficient vehicles (gas/diesel)
- Replaced existing vehicles with hybrid or electric vehicles
- Took steps to drive less than previous years
- None of the above

If you selected "*Replaced existing vehicles with more fuel efficient vehicles (gas/diesel)*":

How many vehicles?: **3**

## 3a. Mobile Sources (Vehicles, Off-road/portable Equipment): Fuel Combustion:

Please briefly describe your organization's plans to continue reducing emissions from its mobile sources:

### a) Over the next 1-5 years

Introduce ZEVs into the VIHA vehicle fleet, and target annual fuel consumption for reductions. Aim to have fuel consumption reduce year on year (i.e. 2017 levels will be the high point, and we will be below that every year in future)

### b) Over the following 6-10 years

Aim to reduce overall vehicle fuel consumption by 25%.

## 4. Supplies (Paper): Indicate which actions your PSO took in 2017:

**During 2017, did your organization take any of the following actions to support emissions reductions from paper supplies? (please select all that apply)**

- Had an awareness campaign focused on reducing office paper use
- Had a policy requiring the purchase of recycled content paper
- Had a policy requiring the purchase of alternate source paper (bamboo, hemp, wheat, etc)
- None of the above

**If you selected "*Had a policy requiring the purchase of recycled content paper*":**

State the required recycled content here (30%, 50%, 100%):      30%

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

Work with paper-intensive units and identify behavior or procedure change opportunities to reduce paper use.

## 5. Other Sustainability Actions

### a) Business Travel

**During 2017, did your organization take any of the following actions to support emissions reductions from business travel? (please select all that apply)**

- Created a low-carbon travel policy or travel reduction goal (low-carbon = lowest emission of greenhouse gas per kilometre per passenger)
- Encouraged alternative travel for business (e.g. bicycles, public transit, walking)
- Encouraged or allowed teleworking or working from home
- None of the above

### b) Education/Awareness

**During 2017, did your organization have any of the following programs or initiatives to support sustainability education and awareness? (please select all that apply)**

- A 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
- None of the above

### c) Other Sustainability Actions

**During 2017, did your organization have any of the following programs or initiatives to support sustainability? (please select all that apply)**

- A water conservation strategy which may include a plan or policy for replacing water fixtures with efficient models
- 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
- Green procurement standards for goods (e.g., office furniture, etc.)
- Lifecycle costing of new construction or renovations
- None of the above

# Part 2: CNAR Survey

## 1. Emission Reduction Target

Does your organization have an emission reduction target? Yes

33% below 2007 emission level by 2020 and an 80% reduction by 2050.

## 2. Emission Reduction Plan

Does your organization have a strategic emission reduction plan to reduce the organization's emissions (e.g. a long term plan)? Yes

Island Health has a 5-year Strategic Energy Management Plan that is updated annually. The plan includes strategies to have Island Health achieve its 2020 and 2050 emissions reduction target. Work is underway to develop a 10-year plan.

## 3. Does your organization use building energy management tools? (please select all that apply)

ENERGY STAR: Yes

PUMA: Yes

FAME: No

Utility Manager: No

My organization doesn't use building management tools: No

## 4. What projects ("opportunities") does your organization see as being most effective in leading to substantive reductions of emissions, increased energy efficiency? Please describe briefly.

Electrification (i.e. heat pumps, heat recovery), and fuel switching to biomass/biofuel/Renewable Natural Gas.

## 5. Environmental Management Systems

Does your organization use an environmental management system (e.g., ISO 14001) to track and manage the organization's environmental impacts (e.g., beyond energy to include water, waste, contaminated sites, etc)? No

## 6. How many FTEs in your organization are tasked with energy management and sustainability operations (ie: focusing on reducing energy, water, waste, climate impacts from the operations)?

Number of FTEs tasked with energy management and sustainability operations: 7

## 7. Out of all the emission reduction projects your organization undertook in 2017, please briefly describe the one action taken

**that has resulted in, or is expected to result in, the greatest emission reductions, this may be considered your "success story":**

Heat pumps and heat recovery project

**8. When trying to develop an emissions reduction initiative in 2017, did you face any barriers to funding? (please select all that apply)**

Funding went to operational pressures: Yes

Funding went to competing capital priorities: Yes

Emission reductions are not prioritized in the funding approval process: Yes

Rules around spending or applying for the funds do not meet my organizational needs: No

I didn't face any barriers to funding: No

**9. What is the total amount of floor space in your organization including occupied and unoccupied space? (Please report in square meters)**

Total Floor Space in Square Meters: 604,298

**10. How many Full Time Equivalent employees (FTEs) do you have within your organization?**

**(excluding Health Authorities and their affiliates)**

I work for a Health Authority or a Health Authority affiliate:

Yes

**11. Please indicate the number of vehicles in the following vehicle classes that are in your fleet:**

Light duty vehicles (e.g. cars): 49

Light duty trucks (e.g. trucks, SUVs, MiniVans): 71

Heavy duty vehicles (e.g. transport trucks): 36

Off road vehicles (e.g. forklifts, front end loaders, snowmobiles): 8

## **Adaptation**

**12. Please select the top three priorities your organization is concerned about regarding impacts from climate change?**

- Warmer winter temperatures resulting in reduced snowpack
- Changes to temperatures and precipitation causing seasonal drought
- Heatwaves impacting population health
- Increased wildfire activity and reduced air quality
- Ecosystem shifts
- Increased precipitation and/or extreme weather events contributing to urban and overland flooding

- Increased precipitation and extreme weather events contributing to landslides
- Sea level rise and storms causing coastal flooding
- Sea level rise and storms causing coastal erosion
- Other

**13. Does your organization have a plan to improve the resilience of its infrastructure and services to the effects of climate change (e.g. facility and services climate risk assessment; prioritization of risks to prepare for/respond to)?** Yes

**If yes, has your organization integrated the effects of climate change into any of the following within the last five years? Please select all that apply**

- Climate Adaptation Strategy
- Asset Management
- Infrastructure Upgrades (e.g. storm-water management)
- Building Retrofits
- New Construction
- Emergency Response Plans
- Public education and awareness
- Other
- None of the above

**If you selected *Climate Adaptation Strategy* above, please describe the strategy briefly.**

Please include the URL if the strategy is posted publicly:

**14. Has your organization consulted any of the following resources on climate change adaptation? (please select all that apply)**

- X Plan2Adapt, a tool to explore the impacts of climate change on British Columbia ([www.plan2adapt.ca](http://www.plan2adapt.ca))
- Climate Change Indicators for British Columbia ([Read more about Climate Change Indicators](#))
- X Retooling for Climate Change ([www.ReTooling.ca](http://www.ReTooling.ca))
- X The Sea Level Rise Adaptation Primer ([Read the Sea Level Rise Adaptation Primer](#))
- X Canadian Coalition for Green Healthcare Climate Change Resilience Toolkit ([Go to the Health Care Facility Climate Change Resiliency Toolkit](#))
- X The Public Infrastructure and Engineering Vulnerability Committee's (PIEVC) protocol
- Other
- None of the above

## 15. Does your organization use any of the following types of adaptation resources?

- Webinars (e.g. Province of BC's BC Adapts Video Series; BC Regional Adaptation Collaborative Webinars)
- Websites (e.g. [www.ReTooling.ca](http://www.ReTooling.ca); [Go to the Adaptation Calenda](#))
- Infographics (e.g. [The Pacific Institute for Climate Solutions \(PICS\)](#))
- Training (e.g. BC Regional Adaptation Collaborative Workshops; Professional Associations; PSO Symposium)
- Tools (e.g. Plan2Adapt; Preparing for Climate Change: Implementation Guide; Sea Level Rise Primer)
- I am familiar with these resources, but am unable to use any of them. Please provide more information.

**Please rate the resources that you use according to their usefulness.**

**(1 = not very useful; 5 = very useful)**

Webinars (e.g. Province of BC's BC Adapts Video Series; BC Regional Adaptation Collaborative Webinars)	4
Websites (e.g. <a href="http://www.ReTooling.ca">www.ReTooling.ca</a> ; <a href="#">Go to the Adaptation Calenda</a> )	3
Infographics (e.g. <a href="#">The Pacific Institute for Climate Solutions (PICS)</a> )	Never used this tool
Training (e.g. BC Regional Adaptation Collaborative Workshops; Professional Associations; PSO Symposium)	4
Tools (e.g. Plan2Adapt; Preparing for Climate Change: Implementation Guide; Sea Level Rise Primer)	5

**Are there other types of resources that would help your organization prepare for, and adapt to, climate change?**

(e.g. [EGBC's Professional Guidelines: Developing Climate Change Resilient Designs for Highway Infrastructure in BC](#))

Health indicators/thresholds of heat waves and air quality that can be used as a reference by facility managers and building owners

**16. Has your organization partnered with any of the following on climate change adaptation? (please select all that apply)**

First Nation Governments	Interested
Indigenous Organizations	Interested
Municipal Governments	Yes
Regional Governments	Yes
Non-Governmental Organizations (eg. Columbia Basin Trust, Fraser Basin Council, SFU-ACT)	Yes
Private Sector	Interested
Other Public Sector Organizations	Yes

# Climate Change Adaptation Actions Taken in 2017

## 17. Please describe actions your organization has taken to prepare for, and adapt to a changing climate.

(e.g. risk and vulnerability assessments; assessing the impact of a changing climate on infrastructure, clients or employees; changes to decision making)

- Climate Vulnerability Assessment of Nanaimo Regional General Hospital
- Climate Projection Mapping Project for Island Health owned facilities
- Customization of Climate Adaptation Assessment Toolkit for Island Health
- 2017 Heat Wave Impact Survey
- Incorporation of climate projections into new construction projects (e.g. energy modeling with projected weather information)

## Climate Change Adaptation Actions Proposed for 2018

**Please briefly describe a climate change adaptation initiative that your organization has been involved with to address effects of climate change that another public sector organization may be interest in learning about.**

Develop a heat and smoke response strategy for facilities.

**If there is an opportunity to learn more about partnering on climate change adaptation, would you like to be contacted?**

Yes