Strategic Energy Management Plan

Vancouver Island Health Authority - 2019

BC Hydro
Power smart

island health

Joe Ciarniello

Executive Summary

Vancouver Island Health Authority (Island Health) is one of seven health authorities in British Columbia, Canada. Through a network of hospitals, clinics, centres, health units, and residential facilities, Island Health provides health care to more than 794,000 people on Vancouver Island, on the islands of the Georgia Strait, and in mainland communities north of Powell River, and south of Rivers Inlet. Our health care services include hospital, community and home care. Island Health also provides environmental and public health services, including education and prevention.

Key Facts

Description	***Figures***
Annual Operating Budget	$2.5 Billion
Client Population	>794,000 (6.8% of which is Indigenous)
Employees	>22,000
Medical Staff	>2,000
Volunteers & Auxiliary	~6,000
Facilities	>150
Acute Care & Rehabilitation Beds	1,728
Long-Term Care Beds & Assisted Living Units	6,593
Mental Health & Substance Use Beds	1,503

Island Health is governed by a board of directors, appointed by the provincial government. An executive team leads the delivery of health service within the Island Health region. We are publicly funded and accountable to the provincial government and the public for resources used in delivering health care and services. We are also focused on reducing greenhouse gas (GHG) emissions in an effort to meet the provincially legislated GHG reduction target of 40% below 2007 levels by 2030. In fact, the 2018/19 Annual Priorities Plan for Island Health explicitly states through Objective 4.6 of Goal 4 "Optimizing Health System Value" that we are ***to reduce Island Health's climate impact by implementing projects to reduce our carbon footprint***. Continued inclusion of this objective in the new Multi-Year Plan ensures and reaffirms our Strategic Energy Management Plan (SEMP) aligns with the organization's goals.

Island Health's SEMP for 2019 provides our updated road map for current and future years to ensure we meet our goals and targets for reduced energy consumption and GHG emissions. Since the last SEMP was issued in 2018, BC Hydro's energy conservation focus has altered course to include electrification and FortisBC's conservation program has expanded to double incentives available for gas reduction projects, in part as a result of changes in provincial and federal government policy. As our utility companies grapple with these changes, Island Health is working to capitalize on the new opportunities that arise while remaining focused on the goals of reducing energy use, utility costs, and GHG emissions.

Within Island Health challenges to energy management goals include organizational growth, increased use of energy intensive technology (i.e. medical imaging equipment), decreased incentives from BC Hydro, limited capital funds for projects, and escalating electricity and natural gas rates. In spite of these pressures, Island Health is committed to reducing energy use, meeting legislated GHG emission reduction targets, and reducing operating costs. Progress is demonstrated by an 11.3% reduction in weather normalized total energy use intensity ($kWh/m^2/year$) since the start of the energy management program in F2008. Over that same period, the cost of energy for electricity and fossil fuel combined has increased 39% and total size of the organization (floor area) increased 29%. The reduction in energy use intensity has mitigated the financial impact of these pressures.

One of the tools used to improve our energy management program is the BC Hydro funded Energy Management Assessment (EMA). The EMA is used to identify weaknesses in the program and guide us to specific action plans that will help us address those weaknesses over time. The EMA helps us ensure we are taking a fulsome approach to energy management. The five areas of focus identified in the most recent EMA are: vision and strategy, organizational integration, target-setting, performance tracking and reporting, and planning discipline. The specific action items in each of these areas are described later in this plan.

Our key energy targets for this year (short term) remain similar to last year. For electricity, our target is to implement projects that save at least 600,000 kWh/year of electrical energy. For natural gas, our target is to implement projects that save at least 13,900 GJ/year. **We are on track for exceeding both these targets.** The total approved capital budget this year for energy conservation projects that deliver these savings is approximately $2.85M.

Our long term organization-wide objective with respect to energy use is to achieve a 33.3% reduction in energy use intensity (EUI) from F2008 levels by F2024 (weather adjusted). As of F2019 we have achieved an 11.3% reduction so we are making progress toward this goal but have another 22% to go, or 4.4% per year. Individual EUI targets for each facility are still being determined based on site specific opportunities. To date, our long term targets have really been driven by and reflected in our GHG emissions reduction target which is to meet or exceed those set in provincial legislation. The 2018 Carbon Neutral Action Report provides an overview of how this is being achieved in facility operations, our automobile fleet and our paper consumption. Details on what we're doing in facilities is the focus of this report.

In terms of progress to date, Island Health's energy management program has implemented retrofit projects and other initiatives since F2007 that have reached a **cumulative impact of $3.5M in avoided annual costs** as of F2019, 63% of which is from electricity.

In addition to energy cost savings and mitigating the impact of an expanding organization and increasing energy prices, the energy program strives to achieve other benefits such as improved occupant comfort, reduced maintenance costs, and improved infrastructure reliability. Examples include improved light quality for occupants and reduced maintenance costs associated with new LED technology, and new heat recovery systems that harvest waste heat from building exhaust to offset natural gas while at the same time, providing improved air conditioning for occupants during those hotter than normal summer days.

This strategic plan shows what we are committed to delivering this year in terms of savings and what we hope to achieve in future years, depending on funding availability. We have already completed numerous energy audits and compiled a list of potential energy conservation project ideas to draw from. These are listed in our Master Project List, an Excel file which accompanies and forms part of this SEMP.

Inherent in this document is the value received from our partnerships with BC Hydro and FortisBC as they continue to support Island Health through funding for energy managers, specialists, studies, and most importantly incentives for project implementation. It's through these partnerships that we are able to maximize the benefits of our program. Since 2007 we have received cheques totaling more than $7.0M from BC Hydro and since 2010 we've received more than $4.0M from FortisBC to help cover program costs.

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1. Purpose

The Strategic Energy Management Plan (SEMP[1]) is our business plan for reducing energy consumption, utility costs and greenhouse gas (GHG) emissions. The SEMP sets our objectives and targets for this fiscal year and provides a realistic plan for achieving them. We can meet our objectives by implementing energy efficiency and conservation measures in existing and new buildings. The SEMP shows where we are today, where we want to be in the future, and how we intend to get there. Quarterly reviews of the SEMP reveal if we are meeting our targets. If not, the Energy Department will work with our stakeholders to adjust the plan.

By looking at actual consumption and cost in Table 4a we can see the net effect on Island Health's utility budget. Annual consumption varies depending on energy conservation projects completed in previous years, varying weather conditions, load creep and costs from changing energy rates and taxes. In F2019 Island Health consumed 107,441,344 kWh of electricity, a 3.0% increase from the previous year, and 538,113 GJ of natural gas, a 3.6% decrease from the previous year for an overall year over year reduction in total energy of 1.0%. In spite of the decrease, costs increased by 6.7%. This was primarily attributed to disruptions and restrictions in natural gas supply as a result of a gas pipeline rupture in Prince George in October of 2018. This caused significant spikes in the price of the portion of gas we buy at daily market rates, which is roughly 40% of our consumption at the largest 24 sites. A planned increase in electricity rates of 3% on April 1, 2018 also contributed to the higher cost.

Though water use has not been a focus of the SEMP in the past, it is now for a few reasons: first, reducing consumption improves our ability to function in the event of water shortages and second, we spend in excess of $2M annually on water and sewer bills. Consumption was 798,198 m^3 in F2019, a 3.5% decrease from the previous year, at a cost of $2,006,918 so it's a substantial piece of our operating budget that needs attention. Facility staff review water consumption trends at regular quarterly energy reviews and, as a result, have identified and addressed some anomalies in usage that led to measurable water savings.

Key Performance Indicators

Each year, Island Health's Energy Department meets with BC Hydro and FortisBC to establish energy reduction targets. Overarching these targets are the BC Government's legislated GHG reduction targets for the province, enacted through the *Climate Change Accountability Act* (formerly the *Greenhouse Gas Reduction Targets Act*). Savings in electricity and natural gas consumption ultimately reduce GHG emissions; therefore, the SEMP is a key planning tool used to meet our carbon reduction objectives.

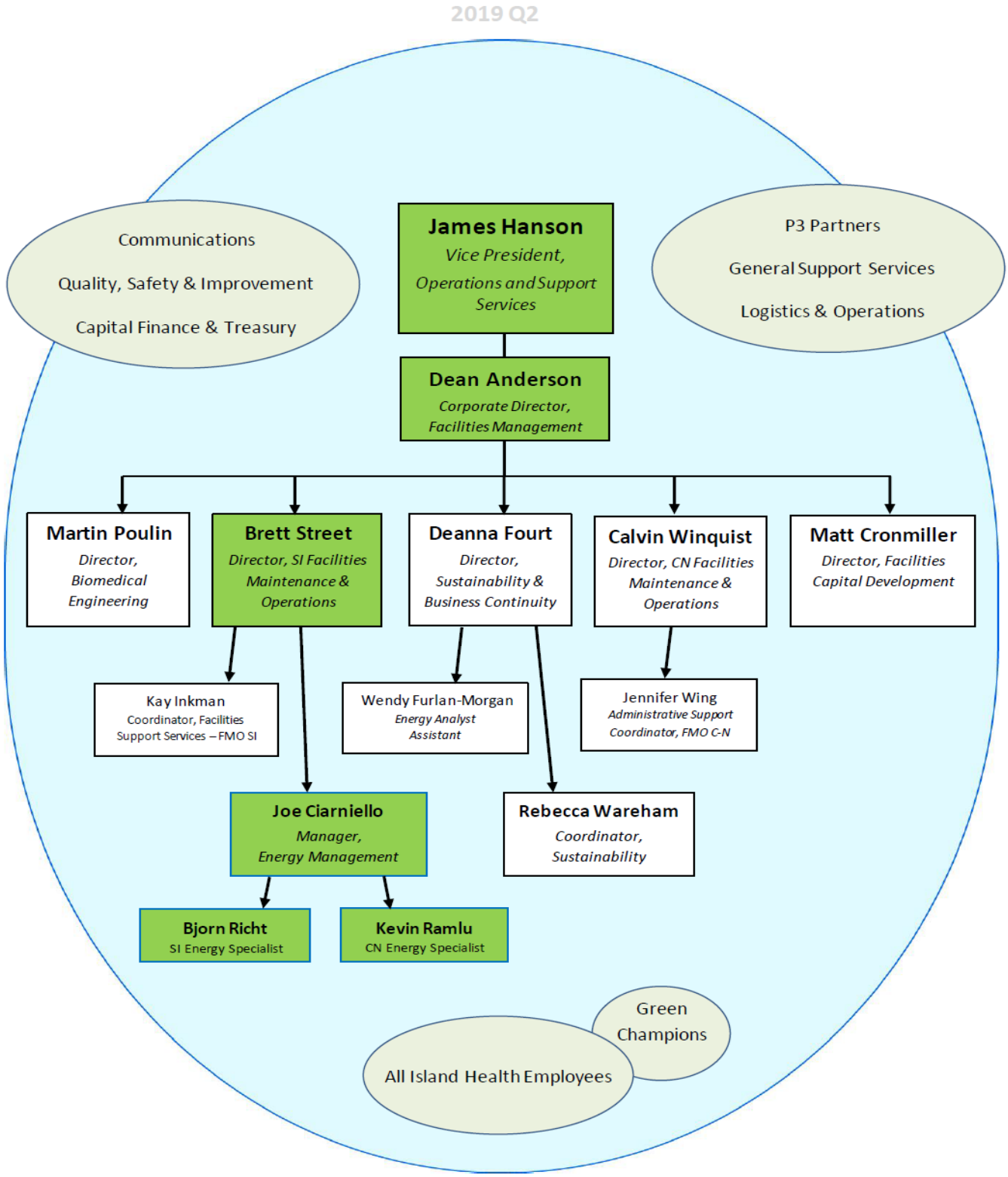
Our approach to reduced consumption starts with energy studies that identify and assess potential efficiency and conservation measures and provides the foundation of the business case for them. The return on investment for these projects is improved considerably when BC Hydro and FortisBC agree to provide incentives and has typically varied between 14% and 18% in recent years. Energy conservation projects are made up of one or more energy conservation measures (ECM). After implementation, the calculated ECM savings are "booked" by BC Hydro and FortisBC in order to measure progress towards meeting annual targets. Since we have no control over the impacts of weather, changes in how facilities are used, or increases in service levels, we also measure our success based on *avoided* energy use and costs – meaning the difference between actual consumption and cost and that which we would have experienced had the measures not been implemented.

[1] The SEMP includes the Energy Department's ***EEC Master Project List*** Excel file.

There are five key performance indicators (KPIs) we track in order to assess the success of our Strategic Energy Management Plan, as follows:

Electricity Savings Measured in kWh/year	These savings are recognized and booked by BC Hydro through one of their energy conservation programs.
Natural Gas Savings Measured in GJ/year	These are savings that are recognized by FortisBC through their energy conservation programs.
Offsettable GHG Emissions Measured in tCO_2e/year	GHG emissions are based on electricity and fossil fuel consumed at owned and operated facilities, converted into tonnes of carbon dioxide equivalents (tCO_2e). It also includes emissions from fleet vehicles and emissions associated with office paper consumption. Fleet and paper caused emissions are not addressed in this report.
Energy Use Index (EUI) Measured in kWh/m^2/year	EUI is the generally accepted measurement of building energy performance. EUI results are used to help focus efforts on the worst performing sites and to monitor progress over time.
Water Use Measured in m^3/year	Water consumption at our larger sites is tracked individually and as a total roll-up for Island Health. Water consumption is commonly measured in units of cubic meters and we are billed for consumption each quarter.

Organizational Chart



2. Multi-Year Plan

Each year, Island Health's energy team updates the Multi-Year Plan, an integral part of the SEMP, through focused strategic planning sessions. The Multi-Year Plan identifies electrical and fossil fuel energy savings and resultant carbon reductions from currently approved capital projects and projects proposed in future years (see Table 1). The Multi-Year Plan evolves as new and potentially better opportunities are uncovered through energy studies and advances in technology. The Multi-Year Plan is a component within the Master Project List (MPL), the Excel file at the heart of our program.

The MPL allows the energy team to keep track of the status of all active and potential projects, and in particular, the expected and actual return on investment. This enables the team to identify whether there are sufficient projects underway to meet the objectives and targets as discussed in this SEMP. If not, the team uses the MPL to revise the plan in order to ensure the stated objectives are met.

The MPL is used to capture any and all ideas. Only those that make sense to do at this time make it into the Multi-Year Plan. All ideas are retained on the MPL to be evaluated each year should the business case change. This ensures we do not lose sight of opportunities and that we have a healthy source of new ones to draw from as funding is made available.

Budgets shown in Table 1 for the current year have, of course, already been approved. Capital requests have been submitted for projects in future years but approval is uncertain at this time. Projects that are approved will be identified and funds released at the start of each fiscal year.

Projects highlighted in yellow fall into the "low carbon electrification" category and may qualify for current provincial incentives under the new EfficiencyBC program.

Next Page - **Table 1. Multi-Year Plan**

Fiscal Year	Program Type	Project Name	Electrical Savings [GWh/yr]	Natural Gas Savings [GJ/yr]	Greenhouse Gas Savings [tCO_2e/yr]	Project Costs [$]
2019/20	CON-OPS (BCH)	WCGH - Continuous Optimization - BCH$	0.090	243	13	$ 93,000
	CON-OPS (BCH+FBC)	CDH - Continuous Optimization - Round 2 - BCH$	0.032	447	23	$ 4,200
		EPLTC - Continuous Optimization - Round 2 - BCH$	0.038	64	4	$ 3,360
		TLLTC - Continuous Optimization - Round 2 - BCH$	0.052	0	1	$ 3,360
		CPRC - Continuous Optimization - Round 2 - BCH$	0.040	749	38	$ 3,360
	CUSTOM (FortisBC)	RJH - B3 Replacement - Feedwater Economizer	0.000	1,538	77	$ 86,250
		RJH - Royal/ West Block RB.A1 Targeted Ventilation Scheduling	0.033	1,037	52	$ 18,000
		RJH - Royal/ West Block WB.A1 Targeted Ventilation Scheduling	0.017	613	31	$ 5,000
	NEW CONSTRUCTION	The Summit @ Quadra Village - Model Savings vs Model Baseline	0.633	9,684	-490	$ 716,900
	BESI	GRH - Parking Lot Lighting	0.001	0	0	$ 295,000
	VIHA Funded & Efficiency BC	TLLTC - Electric Boiler Replacement	0.000	0	-247	$ 350,000
		RJH - D&T Heat Recovery Chiller - Phase 1	0.000	9,759	480	$1,221,000
		NRGH - HR on EF2 and OR exhausts	0.000	1,000	50	$ 50,000
	EWN	Energy Wise Network program for 2019/20	0.000	0	0	$ 1,200
		2019/20 Total	**0.936**	**25,134**	**30**	**$2,850,630**
2020/21	CON-OPS (BCH+FBC)	RJH - Phase III Continuous Optimization - Implementation	1.090	13,050	662	$ 400,000
	CUSTOM (BC Hydro)	RJH - PCC Stairwell Bi-level Lighting	0.045	0	0	$ 22,000
	CUSTOM (BCH+FBC)	RJH - PCC HVAC Conservation Measures	0.303	5,060	256	$ 32,310
	CUSTOM (FortisBC)	NRGH - New Thermal Energy Centre (TEC)	0.000	2,975	148	$12,455,000
		NRGH - New TEC Non-Condensing Economizer	0.000	2,177	107	$ 121,333
		NRGH - New TEC O2 Trim System with Combustion Fan VFD	0.101	502	26	$ 51,637
		PHH - Zoning for Ventilation & Temperature Setback	0.098	0	18	$ 150,000
		CPRC - Boiler & Domestic Hot Water Systems Upgrade - FBC$	0.000	874	44	$ 687,000
		YLRS - Heat Pump Installation - CNCP	0.000	3,720	183	$ 2,100,000
		OBL - Decant and shutdown building	0.000	0	823	
	VIHA Funded & EfficiencyBC	CICHC - Heat Pump DHW System (reduces propane) - CNCP	0.000	0	33	$ 300,000
		TLLTC - Pipe Insulation	0.035	0	0	$ 12,000
		TGH - Pipe Insulation (reduces propane)	0.000	0	2	$ 7,000
		NRGH - Pipe Insulation	0.000	1,430	71	$ 70,000
		WCGH - DHW Preheat System	0.000	500	25	$ 99,000
		CPRC - Pipe Insulation	0.000	128	6	$ 6,000
		RJH - D&T Heat Recovery Chiller - Phase 2	0.748	628	39	$ 1,370,533
		SPH - AHU Fan Motor Replacement and VFD Addition	0.173	0	2	$ 77,000
		NRGH - Rehab AHU Renewal Phase 1 & 2 of 6	0.000	83	62	$ 3,600,000
		2020/21 Total	**2.593**	**31,127**	**2,508**	**$21,560,813**
2021/22	CUSTOM (BC Hydro)	CHC - Lighting Upgrade - BCH$	0.127	0	1	$ 130,724
		PHH - Lighting Upgrade - BCH$	0.124	0	1	$ 99,000
	CUSTOM (FortisBC)	RJH - EMP Return Air Conversion - FBC$ - CNCP	0.000	3,276	163	$ 381,000
	VIHA Funded & EfficiencyBC	RJH - EMP AHU Replacement	0.046	2,630	132	$ 2,255,000
		NRGH - Lighting Upgrade in Rehab - BCH$	0.150	0	2	$ 99,000
		DPRC - Heat Recovery Chiller - CNCP	0.000	1,350	66	$ 490,000
		CHCC - Replace Main Heating Boilers - FBC$ - CNCP	0.000	563	28	$ 637,000
		CLRC - Replace RTUs with HRV and Heat Pumps - CNCP	0.000	1,410	70	$ 275,000
		RJH - Chiller Plant Eliminate Quasi-Tertiary Pumping	0.126	0	1	$ 175,000
		WCGH - Pipe Insulation	0.000	541	27	$ 35,000
		EPLTC - Pipe Insulation	0.000	78	4	$ 7,000
		RJH - D&T Heat Recovery Chiller - Phase 3	0.000	7,000	349	$ 1,413,030
		2021/22 Total	**0.573**	**16,848**	**845**	**$ 5,996,754**

3. How Are We Doing?

Electrical Energy Savings

Table 2 shows electrical savings booked with BC Hydro for the past 13 years as well as the projected savings in the next three years. Energy savings accumulated over time is more indicative of the energy management program performance, rather than savings achieved in any one year. A graphical representation of our performance against the target is shown in Figure 1 and demonstrates that Island Health continues to exceed BC Hydro target savings over the long term.

Table 2. Booked Electrical and Projected Savings Based on Actuals and Multi-Year Plan

Fiscal Year	BC Hydro Booked Savings [GWh]	Cumulative Booked Savings [GWh]	Savings Achieved/Projected [GWh]	Cumulative Savings Achieved/Projected [GWh]	BC Hydro Target Savings [GWh]	Cumulative Target Savings [GWh]
F2007	1.722	1.722	1.722	1.722	1.000	1.000
F2008	0.886	2.608	0.886	2.608	1.000	2.000
F2009	0.767	3.375	0.767	3.375	1.000	3.000
F2010	3.798	7.173	3.798	7.173	2.000	5.000
F2011	0.581	7.754	0.581	7.754	2.000	7.000
F2012	1.890	9.644	1.890	9.644	2.000	9.000
F2013	2.750	12.394	2.750	12.394	1.600	10.600
F2014	1.613	14.007	1.613	14.007	1.200	11.800
F2015	1.602	15.609	1.602	15.609	1.600	13.400
F2016	2.280	17.889	2.280	17.889	1.600	15.000
F2017	1.506	19.395	1.506	19.395	1.300	16.300
F2018	5.098	24.494	5.098	24.494	1.200	17.500
F2019	**1.393**	**25.886**	**1.393**	**25.886**	**1.200**	**18.700**
F2020			0.936	26.823	0.600	19.300
F2021			2.593	29.415	0.600	19.900
F2022			0.573	29.988	0.600	20.500

The cost of electricity in F2019 was $0.0851/kWh inclusive of all charges and tax which means the annual avoided cost of electrical energy for F2019 amounts to $2.2M ($0.0851/kWh x 25.866 GWh). This is as a result of projects implemented since F2007 and their cumulative impact in F2019 of 25.886 GWh.

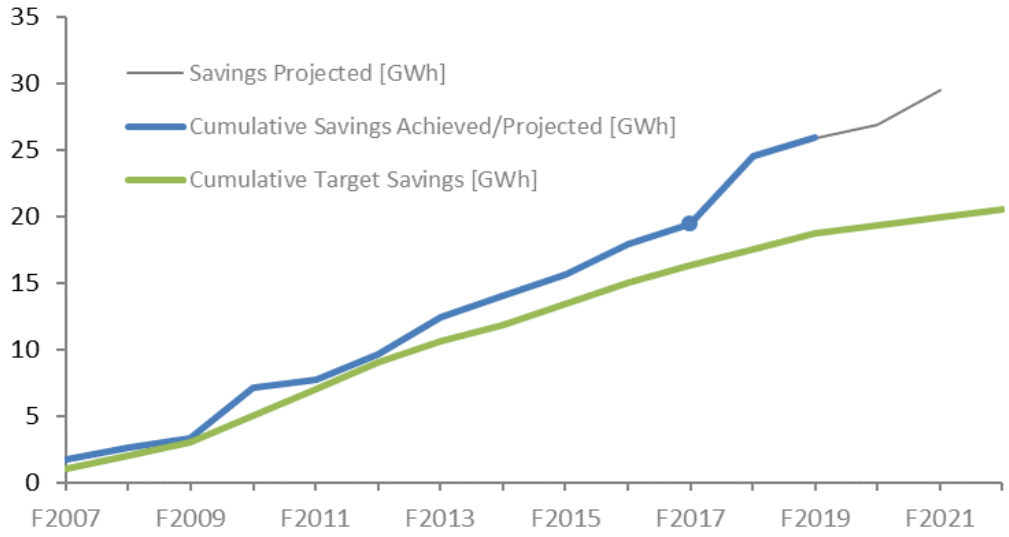


Figure 1. Electrical Savings vs Target F2007 – F2022 [GWh]

Natural Gas Energy Savings

Natural gas savings are accounted for by FortisBC through a variety of their conservation programs. Table 3 and Figure 2 below show savings since F2011 and illustrate performance remains above target.

Table 3. Natural Gas Savings Claimed and Projected Based on Actuals and Multi-Year Plan

Fiscal Year	FortisBC Gas Savings [GJ]	Cumulative Savings [GJ]	Total Savings Achieved/ Projected [GJ]	Cumulative Savings Achieved/Projected [GJ]	FortisBC Target [GJ]	Cumulative Target [GJ]
F2007						
F2008						
F2009						
F2010						
F2011	2,206	2,206	2,206	2,206		2,206
F2012	10,171	12,377	10,171	12,377		12,377
F2013	14,221	26,598	14,221	26,598		26,598
F2014	11,226	37,824	11,226	37,824		37,824
F2015	13,048	50,872	13,048	50,872	12,000	49,824
F2016	18,149	69,021	18,149	69,021	12,000	61,824
F2017	31,988	101,009	31,988	101,009	12,000	73,824
F2018	11,305	112,314	11,305	112,314	12,000	85,824
F2019	**11,777**	**124,091**	**11,777**	**124,091**	**13,800**	**99,624**
F2020			25,134	149,224	13,900	113,524
F2021			31,127	180,351	13,900	127,424
F2022			16,848	197,199	12,000	139,424

The cost of natural gas in F2019 was $10.35/GJ inclusive of all charges and tax so the annual avoided cost of natural gas energy for this year amounts to $1.3M as a result of the cumulative effect of projects implemented since F2011 which adds up to 124,091 GJ.

For F2019, the avoided cost of energy as a result of the cumulative effect of past energy efficiency projects is $3.5M.

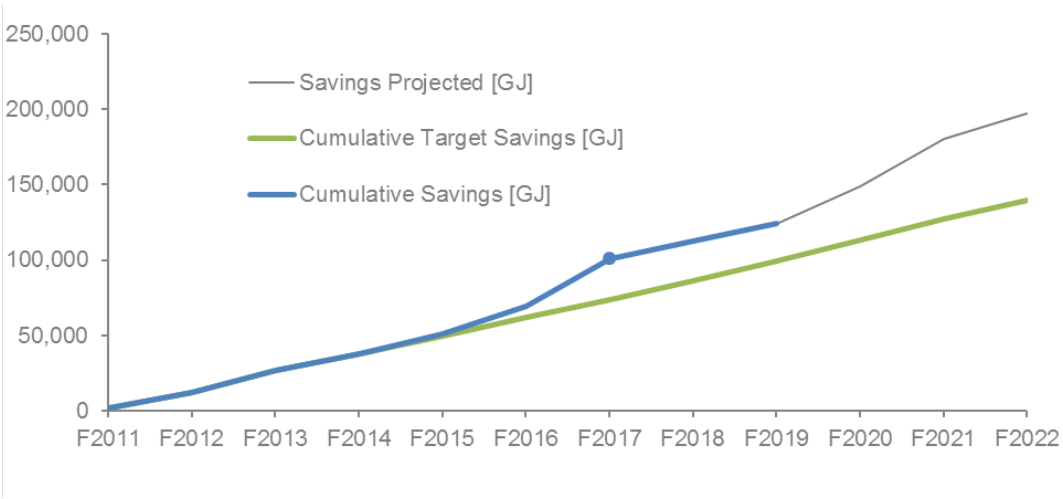
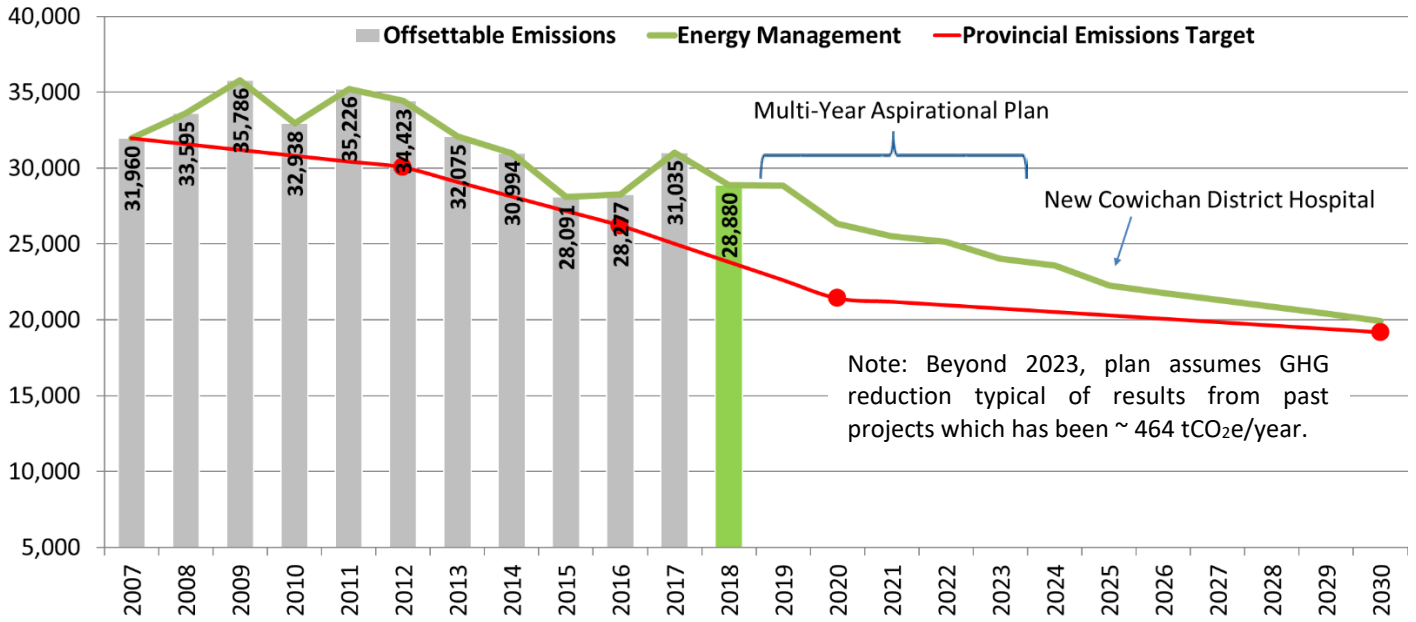


Figure 2. Natural Gas Savings vs Target F2011 – F2022 [GJ]

GHG Emissions Reduction

Since C2007, the majority of Island Health's GHG emissions reduction has been achieved from capital investment in energy conservation measures at our owned and operated sites. The heating plants in our buildings provide the heat to keep occupants warm, produce the hot water for hand washing, and steam for sterilization and humidification. While these are essential, our heating plants consume fossil fuels and produce the lion's share of our GHG emissions which contribute to climate change.

As shown below in Figure 3 *Island Health Offsettable Greenhouse-Gas Emissions*, our conservation efforts have had a positive impact as emissions have declined since peaking in 2009, even as the organization has grown. The red line indicates the provincial emissions reduction target and the green line predicts where we will be with our current aspirational investment level beyond C2019, as detailed in the Multi-Year-Plan. As we project into the future, we can see that it will be a challenge to meet target.



Of these emissions, 95% is associated with buildings, 3% with fleet vehicles, and 2% with paper.

Figure 3. Island Health Offsettable Greenhouse-Gas Emissions (tCO_2e)

Island Health Roll-Up

Tables 4a and 4b show electrical, fossil fuel, total energy consumption and index as well as cost for all owned and operated sites since F2008. Table 4b shows weather adjusted figures which are more indicative of the impact of energy management since weather effects have been removed. The tables include the organization-wide Total Energy Use Index (EUI) based on total energy consumed divided by the total building area of all sites. Since F2008 Island Health has experienced a drop in EUI from 532 kWh/m^2 to 472 kWh/m^2 for an 11.3% reduction when adjusted for weather. Our longer term goal is to reduce EUI by 33.3% from what is was in F2008, so we are making progress but more needs to be done.

Table 4a. Floor Area, Energy Consumption, Total Energy Use Index, and Total Energy Cost

Fiscal Year	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [GJ]	Total Energy [kWh]	Total Energy Use Index [kWh/m²]	Total Energy Cost $
F2008	424,479	76,800,572	548,963	229,290,177	540	10,584,120
F2009	427,525	76,676,733	560,928	232,490,038	544	11,597,039
F2010	430,014	75,124,016	518,986	219,286,918	510	11,547,887
F2011	440,562	77,030,702	561,189	232,916,540	529	12,022,992
F2012	470,811	80,160,999	608,650	249,230,323	529	13,209,753
F2013	470,333	83,969,434	592,632	248,589,559	529	13,933,815
F2014	474,414	84,997,725	581,966	246,654,995	520	14,732,811
F2015	474,679	84,604,701	517,862	228,455,175	481	13,105,125
F2016	474,928	84,706,087	512,552	227,081,757	478	12,117,532
F2017	475,047	83,909,232	545,197	235,352,889	495	12,287,528
F2018	541,259	104,349,120	558,241	259,416,127	479	13,790,753
F2019	546,268	107,441,344	538,113	256,917,172	470	14,715,680

Table 4b. Weather Adjusted Energy Consumption and Total Energy Use Index

Fiscal Year	Electricity [kWh]	Fossil Fuel [GJ]	Total Energy [kWh]	Total Energy Use Index [kWh/m²]
F2008	77,058,609	536,157	225,991,166	532
F2009	76,902,098	531,745	224,608,947	525
F2010	75,135,115	528,982	222,074,566	516
F2011	77,200,176	548,089	229,447,255	521
F2012	80,534,211	587,170	243,637,074	517
F2013	84,143,796	590,449	248,157,318	528
F2014	84,978,727	571,817	243,816,710	514
F2015	84,255,455	557,091	239,002,864	504
F2016	84,232,707	537,013	233,402,937	491
F2017	83,576,442	551,554	236,785,984	498
F2018	104,225,153	558,135	259,262,699	479
F2019	107,239,349	541,730	257,719,815	472

Figure 4 shows the trend of total energy cost compared to weather adjusted EUI. The reduced cost of natural gas yielded significant reductions starting in F2015 but this trend reversed in F2018 due to increasing gas prices and the addition of the two new North Island hospitals. EUI continues on a favourable downward trend.

As Island Health improves and expands service delivery and quality, its appetite for energy grows which highlights the need to maintain and improve the energy management program to keep costs in check.

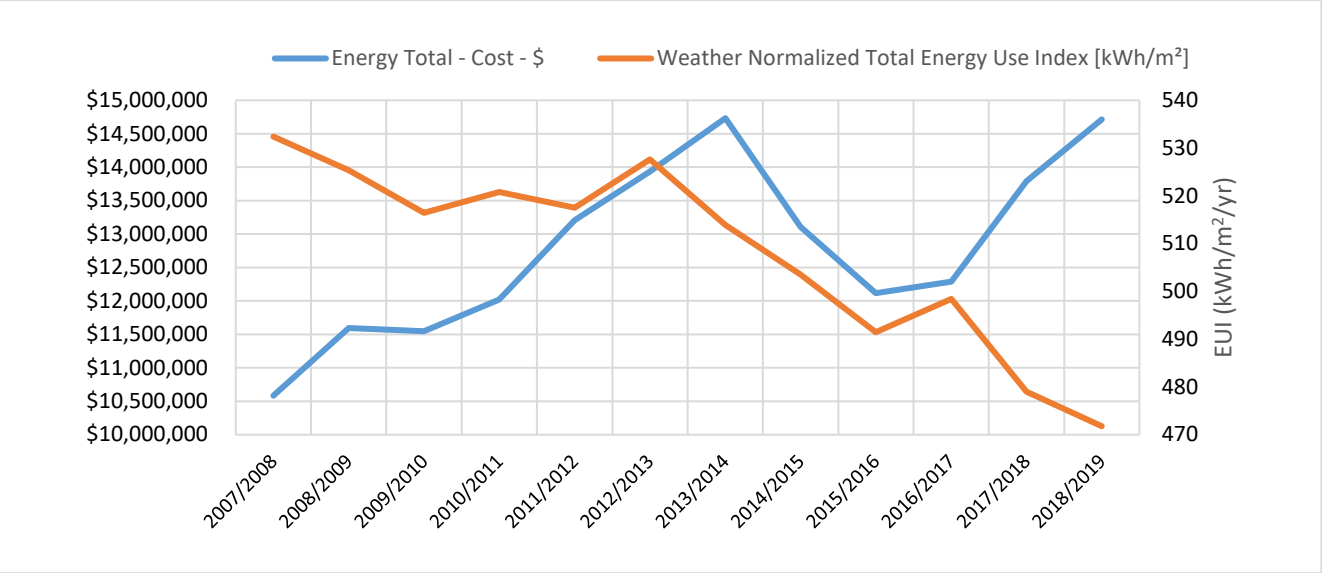


Figure 4. Trend of Total Energy Cost and Weather Normalized Total Energy Use Index

4. Facility Benchmarks

It is important to evaluate building energy performance over time, comparing how each facility performs currently against past performance and how it's performing relative to other similar facility types within the organization. This helps us understand where to focus our efforts. We have arranged our buildings by facility type, based on their health care purpose. For each facility type we can see how the EUI has either improved or worsened over the last few years and compare them to other similar facilities.

The total energy use represents electricity and fossil fuel consumed to meet building needs for heating, cooling, lighting, ventilation, domestic hot water, clinical functions and process loads. Clinical functions include medical imaging and laboratories. Process loads include elevators, space humidification, sterilization and food service kitchens. Backup boiler and generator fuels are not included here. These figures have been weather corrected except where noted.

See Appendix B for a complete list of Site Acronyms and Definitions

Large Acute Care

Large Acute Care have unique requirements and provide the most services. Our Large Acute Care facilities consume the most energy of all our buildings, accounting for 80% of all consumption by Facilities Management (FM) in F2019.

Table 5. Large Acute Care for F2019

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [kWh]	Total Energy Use Index [kWh/m²]	Total Cost Index [$/m²]	Emissions [tCO_2e]
CDH	16,498	3,164,068	5,226,679	509	$29	965
CRH-N*	32,762	11,694,900	6,108,255	549	$41	1,221
CVH*	39,826	13,444,650	5,533,291	477	$32	1,137
NRGH	54,441	13,564,771	19,142,288	601	$34	3,274
RJH	155,304	27,297,775	45,191,267	467	$24	7,825
SPH	14,302	3,457,278	3,903,131	515	$31	733
VGH	49,554	9,200,091	14,425,734	477	$26	2,670
WCGH	5,440	3,903,273	6,635,731	747	$42	1,209

*New Campbell River and Comox Valley hospitals. Data not weather corrected.

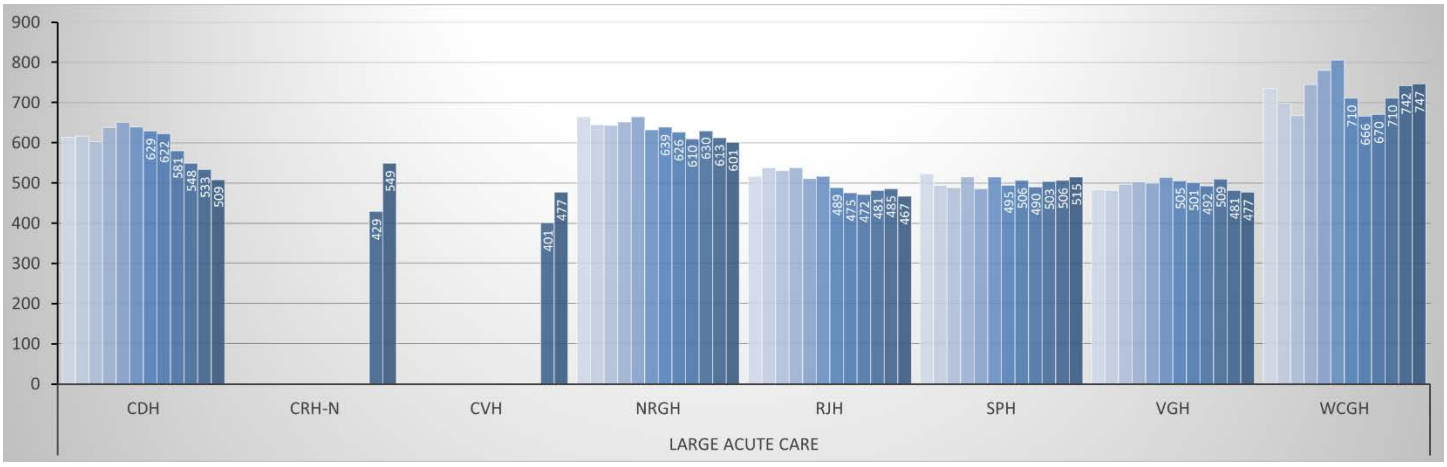


Figure 5. Large Acute Care F2008 to F2019 EUI Performance (kWh/m²)

Long Term Care

Long Term Care facilities are the second highest consumer of energy. These facilities are not as energy intense as hospitals, focusing instead on providing a home-like environment for residents. Long Term Care facilities consumed 13% of our FM energy in F2019.

Table 6. Long Term Care for F2019

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [kWh]	Total Energy Use Index [kWh/m²]	Total Cost Index [$/m²]	Emissions [tCO_2e]
ABH	9,726	1,144,583	1,303,579	252	$16	243
CHC	5,328	824,585	1,288,298	397	$24	236
CPRC	3,662	580,942	1,335,001	523	$31	243
DPRC	6,928	714,019	1,429,928	309	$17	258
EPLTC	4,000	531,893	1,295,380	457	$25	236
GLH	7,609	784,637	1,675,507	323	$18	306
GRH	17,517	995,377	3,489,191	256	$14	629
HSHC	1,600	269,394	288,656	349	$24	54
MTH	2,629	204,905	871,840	410	$22	159
OBL	14,381	1,268,928	3,871,039	357	$15	708
PRIO	7,149	831,741	1,893,898	381	$23	347
TLLTC	4,651	1,907,303	121,135	436	$25	42
YLRS	5,467	760,841	1,709,014	452	$25	308

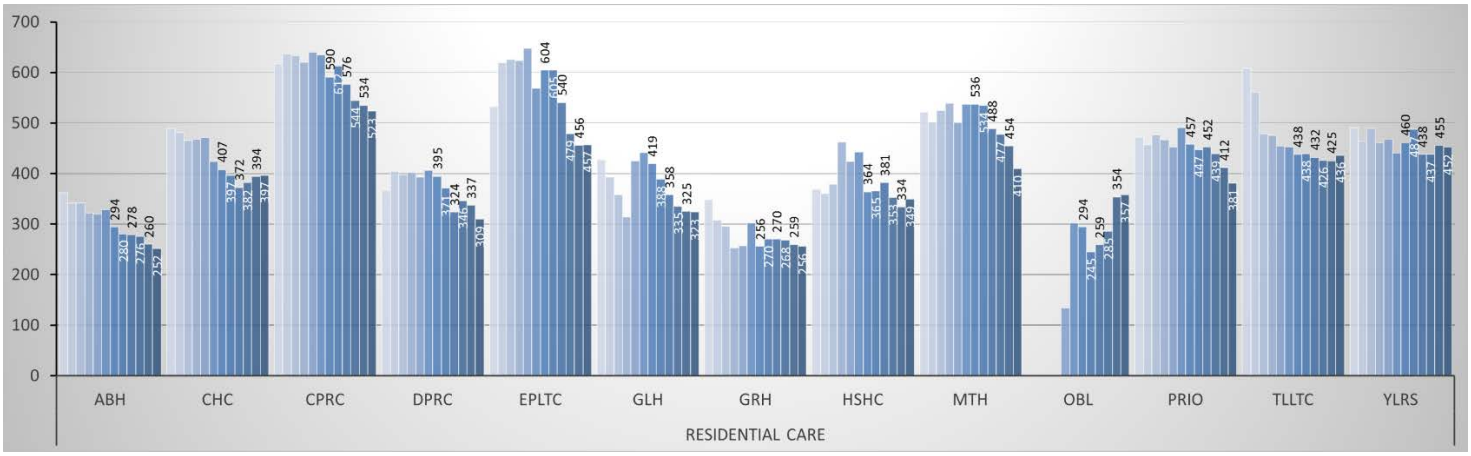


Figure 6. Long Term Care F2008 to F2019 EUI Performance (kWh/m²)

Small Acute Care

Small Acute facilities are mostly located in and serve rural communities. They consumed 2% of our FM energy in F2019.

Table 7. Small Acute Care for F2019

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [kWh]	Total Energy Use Index [kWh/m²]	Total Cost Index [$/m²]	Emissions [tCO₂e]
LMH	3,981	741,428	1,182,814	483	$58	274
PHH	4,463	1,623,311	80,155	382	$26	38
PMH	1,176	337,139	438,009	659	$91	104
TGH	1,700	285,983	444,774	430	$50	119
THC	381	89,608	0	235	$30	1

Figure 7. Small Acute F2008 to F2019 EUI Performance (kWh/m²)

Office/Outpatient Facilities

These facilities have been grouped together due to their similar usage profiles. Operating typically during weekday office hours only, these facilities consume the least amount of energy within our portfolio. Office/Outpatient facilities consumed 1% of our FM energy in F2019.

Table 8. Office/Outpatient F2019

Site	Floor Area [m^2]	Electricity [kWh]	Fossil Fuel [kWh]	Total Energy Use Index [kWh/m^2]	Total Cost Index [$/$m^2$]	Emissions [tCO_2e]
BAM	700	80,126	27,769	154	$21	7
BAM-Res	279	15,376	0	55	$7	0
GRHC	799	122,630	0	153	$19	1
NWWS	1,858	81,391	4,973	46	$6	2
PAH	468	71,774	0	153	$20	1
PHPCC	475	75,130	0	158	$21	1
QAC-Main	8,909	730,037	1,157,962	212	$14	212
QAC-Pearks	3,905	187,518	483,756	172	$11	88
VPAHC	1,181	145,997	73,417	186	$17	15

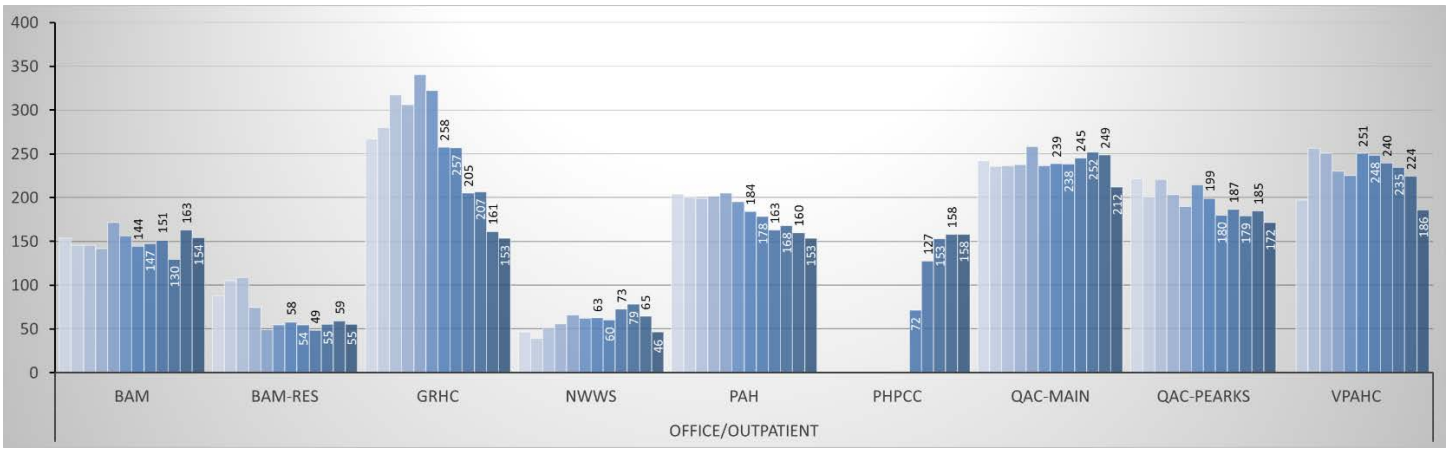


Figure 8. Office/Outpatient F2008 to F2019 EUI Performance (kWh/m^2)

Mental Health

These facilities serve a variety of patients who require mental health and substance use services. These facilities consumed 2% of our FM energy in F2019.

Table 9. Mental Health F2019

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [kWh]	Total Energy Use Index [kWh/m²]	Total Cost Index [$/m²]	Emissions [tCO_2e]
CLRC	5,440	580,942	1,335,001	352	$21	243
DARS	1,733	160,945	413,192	331	$19	75
QAC-Ledger	2,772	208,496	358,893	205	$12	67
SOMH	3,497	357,181	574,226	266	$17	106

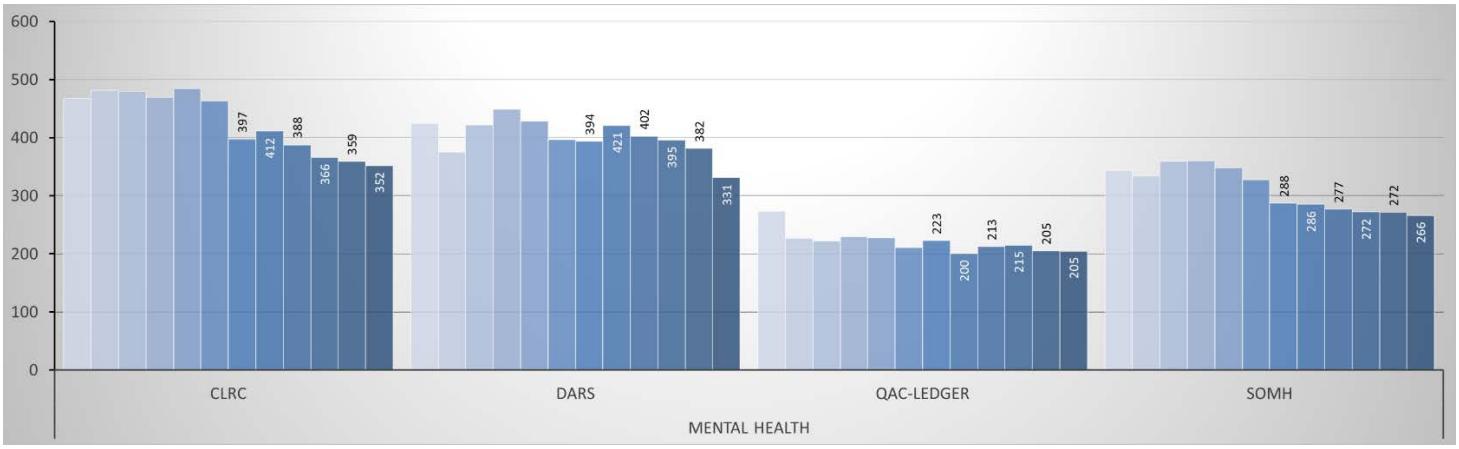


Figure 9. Mental Health F2008 to F2019 EUI Performance (kWh/m²)

Health Centres

These facilities serve patients on a short term, primary care or urgent care basis. Health Centres used 2% of our FM energy consumption in F2019.

Table 10. Health Centre F2019

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [kWh]	Total Energy Use Index [kWh/m²]	Total Cost Index [$/m²]	Emissions [tCO_2e]
CHCC	5,116	853,208	1,856,901	530	$30	340
CICHC	2,129	422,230	676,509	516	$66	157
LCHC	3,348	433,811	638,547	320	$23	118
OHC	3,638	588,891	263,117	234	$17	54

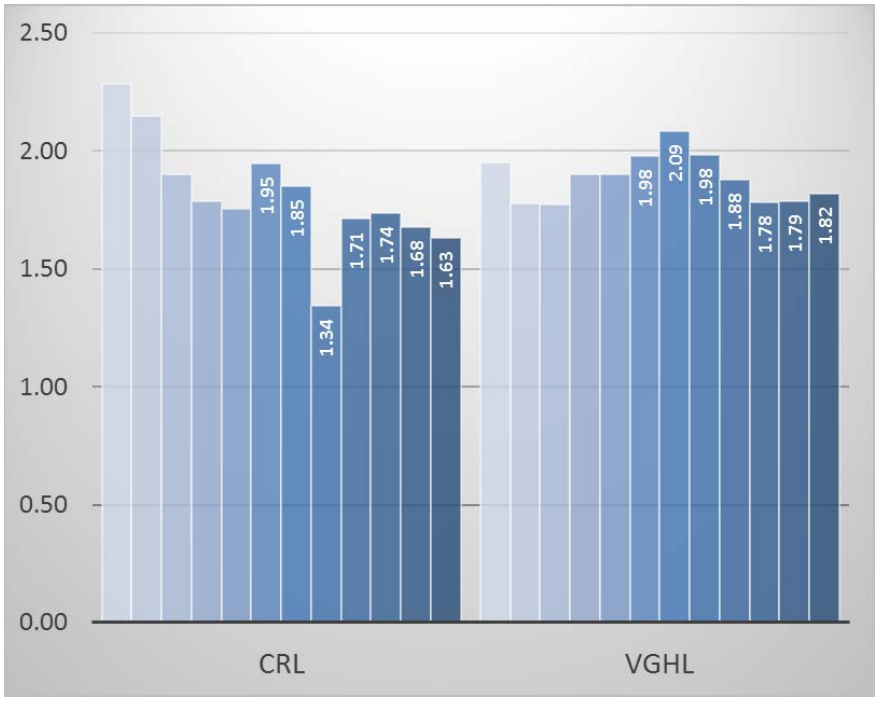
Figure 10. Health Centre F2008 to F2019 EUI Performance (kWh/m²)

Laundry Facilities

Laundry facilities are unique because their energy use is primarily driven by the amount of laundry processed. There is a small amount of energy used to maintain space comfort and make hot water for domestic use. In total, the two laundry facilities, Cumberland Regional Laundry and Victoria General Hospital Laundry, used more than 6% of what all the FM sites reported in this SEMP used in total.

Table 11. Laundry Facilities F2019

Site	Laundry [kg]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Use Index [kWh/kg]	Total Cost Index [$/kg]	Emissions [tCO_2e]
CRL	3,279,491	594,586	4,760,899	1.63	$0.07	861
VGHL	5,984,969	1,875,559	9,002,933	1.82	$0.08	1,636



(This data is not weather adjusted.)

Figure 11. Laundry Facilities F2008 to F2019 EUI Performance (kWh/kg of laundry)

Future Island Health Facilities

A major new building will be completed and put into service in early C2020. The Summit @ Quadra Village is a new 320-bed Long Term Care facility being paid for and owned by the Capital Region Hospital District. Though Island Health will not own the facility, we will operate and maintain it and pay all utility bills. Having The Summit enrolled in BC Hydro's New Construction Whole Building Design Program has enabled Island Health to justify and pay for features that will achieve a higher performance building, predicted to use 29% less energy than it otherwise would have if built to code.

A new hospital is also being planned for the Cowichan Valley to replace the existing Cowichan District Hospital. The project is currently in the business development stage. It is expected that later in F2020, a detailed business plan will be submitted to the provincial government. Once the plan is accepted, the project will move to the procurement stage for detailed design in F2021 with construction anticipated to start in F2022 and occupancy expected in F2024 or F2025. The new hospital will be located on a greenfield site, will be designed to achieve LEED Gold certification, and will target additional levels of energy efficiency and GHG emissions beyond what LEED Gold achieves. Specific design features to reduce energy consumption and GHG emissions have yet to be finalized and approved.

Sites We are Focusing On

Our efforts are focused on our large acute care centres which, in F2019, accounted for 80% of Island Health's total energy consumption. Figure 12 shows what share of the total energy is consumed by each different facility type. (Note: this chart does not include energy consumed by laudry facilities or leased sites.)

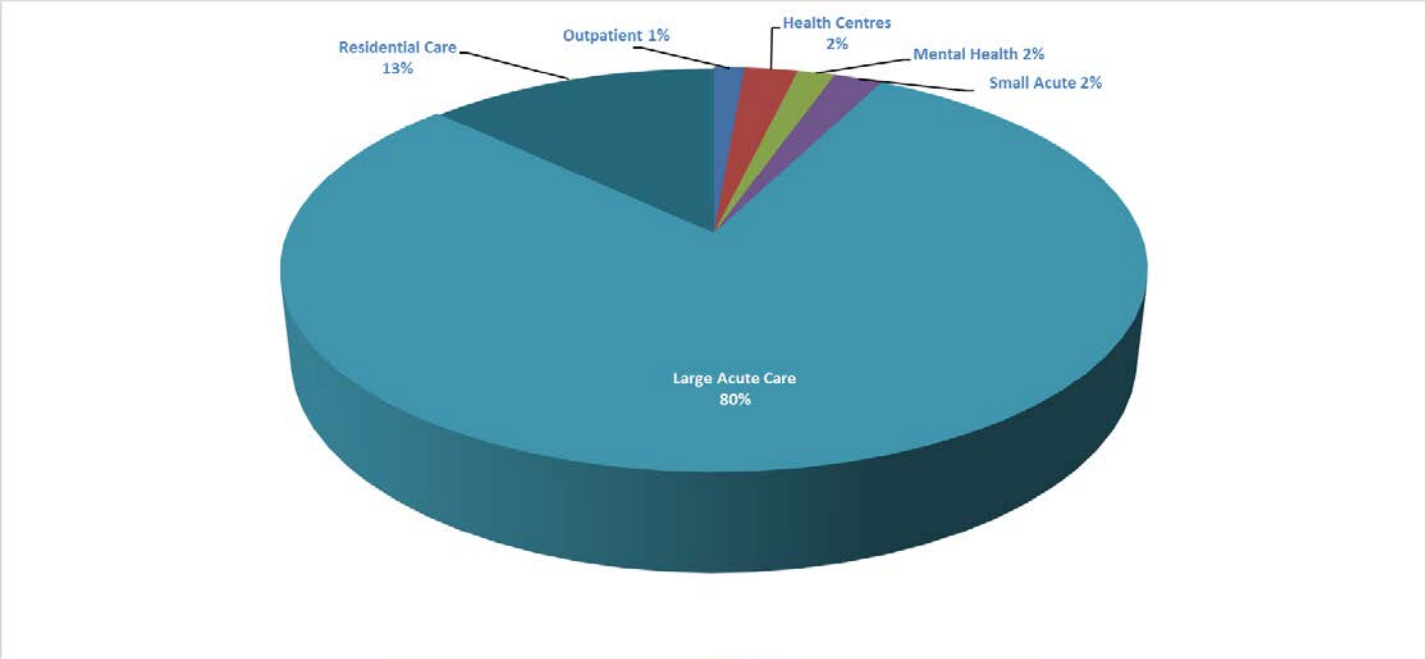


Figure 12 Percentage of Total Energy Use by Building Type

5. Energy Studies

Table 12a lists energy studies Island Health completed in F2019. Table 12b shows studies under way or in planning stages in F2020. Many studies hone in on specific opportunities or more specialized initiatives. Other criteria for completing an energy study includes sites which have not had an energy study in the last three to four years and have a high EUI or high total energy use.

On average Island Health invests roughly $200,000 each year on energy studies, preliminary design and costing. Historically BC Hydro covered 100% of energy study costs. They recently reduced study funding to a maximum of 50% and limited scope to lighting and HVAC controls type projects. Their criteria may change in the next year depending on the direction taken with electrification programs. FortisBC currently funds 50% of a study that meets specific natural gas reduction criteria. The remaining 50% is paid out once sufficient measures are implemented. Completion of energy studies is the life blood of an energy management program and the basis for sound decision making on projects and energy reduction strategies. Energy studies also provide required information for the Carbon Neutral Capital Program funding applications to the Ministry of Health as well as other funding programs.

Table 12a Studies Completed in F2019

Completed in F2019	**Cost**
RJH C-Op Investigation Phase (year 2)	$ 34,594
RJH C-Op Investigation Phase (carry-over from Year 1)	$ 15,699
NRGH ICU Climate Change Impact Study	$ 1,887
VGH DHW System Renewal (research phase)	$ 11,750
VGH AHU System Renewal (research phase)	$ 10,250
Cumberland Laundry Comprehensive Study	$ 18,556
C-Op Round 2: WCGH (Standard Recommissioning)	$ 15,100
C-Op Round 2: EPLTC, TLLTC, CDH, CPRC (Refresh)	$ 14,401
NRGH Thermal Energy Plant	$ 23,058
NRGH Thermal Energy Plant - ECM Engineering Design Allowance	$ 10,085
NRGH Rehab - AHU Renewal & Heat Recovery Chiller Preliminary Engineering & Costing	$ 37,950
NRGH Rehab - AHU Renewal Energy Study Report	$ 19,960
RJH D&T HRC Updated Energy Calculations for Phase 1 and 2	$ 2,940
PCC Comprehensive Study	$ 32,227
Pulse Energy Contract Renewal - 1 Year (Required for EWN)	$ 29,568
Walker DDC Replacement - Central-South Sites (Preliminary Engineering & Costing)	$ 10,080
Tie-in Gas and Electricity to DDC at OHC (For EWN)	$ 2,957
TOTAL	**$ 291,062**

(Note: EWN = Energy Wise Network. This is the BC Hydro behavioral change program.)

Table 12b Studies Underway or Planned in F2020

Underway or Planned in F2020	Cost	
Cumberland Laundry Comprehensive Study (last invoice)	$	4,639
RJH C-Op Hand-Off Phase (F2020 portion)	$	8,100
VGH DHW Phase 2A & 3A (base system only preliminary engineering & costing)	$	10,650
VGH DHW & AHU 2B & 3B (includes energy study details, prelim. engineering & costing)	$	53,250
SPH Lighting Audit	$	4,728
NRGH Heat Recovery Coil Additions in OR Exhaust & EF2 (savings calcs & engineering)	$	8,855
WCGH DHW Pre-Heat (energy savings calculations & engineering)	$	6,900
C-Op Round II: WCGH Implementation Phase (design & engineering services)	$	24,500
Pulse Energy Contract Renewal (Required for EWN)	$	26,624
PCC ECM Design & Specifications	$	10,000
FMO Training Webinars & Workshop	$	10,185
C-Op Round 2: WCGH (Standard Recomissioning) Completion Phase	$	4,100
TOTAL	**$**	**172,531**

6. Awareness and Behaviour Change

Island Health recognizes the impact employees have on reducing energy consumption and GHG emissions. The Energy Department operates its multi-faceted employee engagement program and partners with BC Hydro through the Energy Wise Network program and FortisBC through their Conservation and Outreach Program for support and resources.

Our engagement program is made up of three main components: webinars, workshops, and quarterly energy review meetings for operators lead by energy department staff. In recent years, we have chosen to focus specifically on Facilities Maintenance and Operations (FMO) staff since they have the most direct impact on and ability to reduce energy. Going forward we are adding the capacity for regular energy monitoring and reporting on a daily basis by operators themselves. Some are already doing this.

FMO Energy Webinars

For the last two years, the Energy Department has been planning and coordinating the delivery of webinar based energy education for our FMO staff in an effort to enhance the skills needed to identify and correct energy waste, as well as identify potential capital project opportunities. This annual webinar series is made up of three two-hour sessions, available to all staff through screen sharing and conference calling tools. We typically have participants from all sites across the Island so the level of engagement has been quite high.

Past webinar series have had a broad focus delving into a variety of different building systems to explain how to optimize energy performance and uncover maintenance type issues. The F2019 series was much more focused on building automation and control, and examined common strategies to reduce energy consumption using programming. As a result of the positive feedback these webinar series have received from staff (see Figure 13 for survey results), plans are in place to deliver more in F2020.

FortisBC has covered much of the consulting fees associated with these webinars providing a total of $18,000 to date.

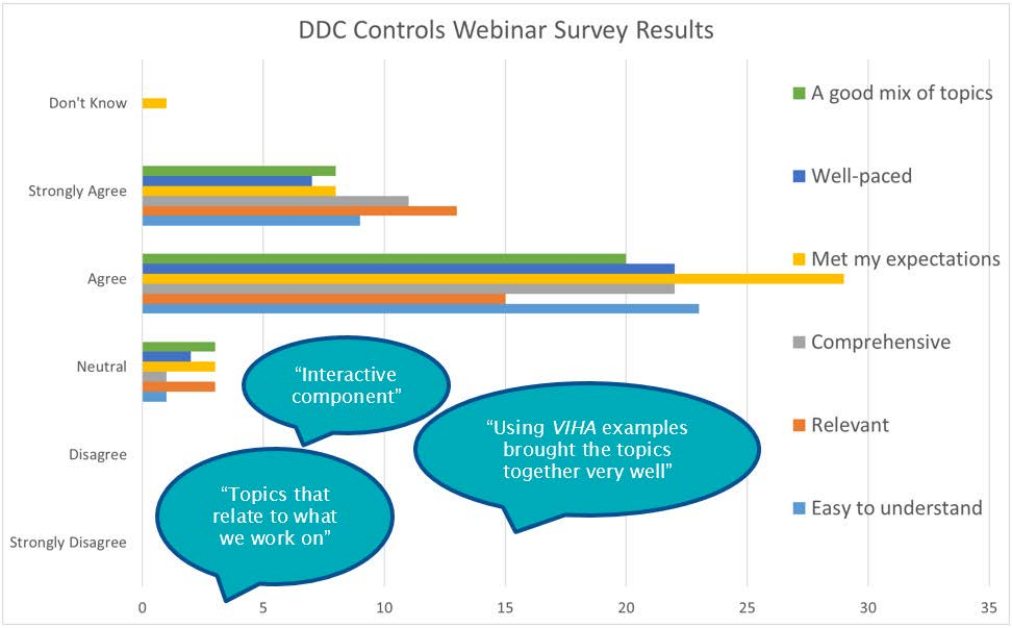


Figure 13. Quantitative and Qualitative Webinar Survey Results

FMO Workshops

Historically, we have been relying on third party experts from a variety of fields to train and educate our staff and this has proven to be useful and effective based on their feedback. However, we have also learned that our staff want to hear from their peers to learn what they are doing, what their challenges are, and how they have addressed operational issues. Recognizing we have our own in-house pockets of excellence, the Energy Department planned and facilitated the first ever "FMO Best Practices and Lessons Learned Workshop" in February of 2019.

The workshop was based on the fact our staff have tremendous knowledge of, and experience with, our building systems, equipment, and how it's all supposed to work. Leveraging this so all FMO staff can benefit was the goal. Six enthusiastic staff volunteered to prepare and deliver presentations on their own Best Practice and Lessons Learned so other staff could hear and learn from them. This knowledge and expertise would otherwise not have been available and would remain in hidden pockets throughout the organization. The workshop had participants from across the Island from Port Hardy to Victoria.

Feedback on the workshop was so positive that we are planning a second one later in F2020. It's hoped that this will become an annual event. Figure 14 shows what the first workshop looked like while Figure 15 summarizes the results of the feedback survey.

Figure 14. FMO Directors, Managers and Staff at FMO Best Practices and Lessons Learned Workshop

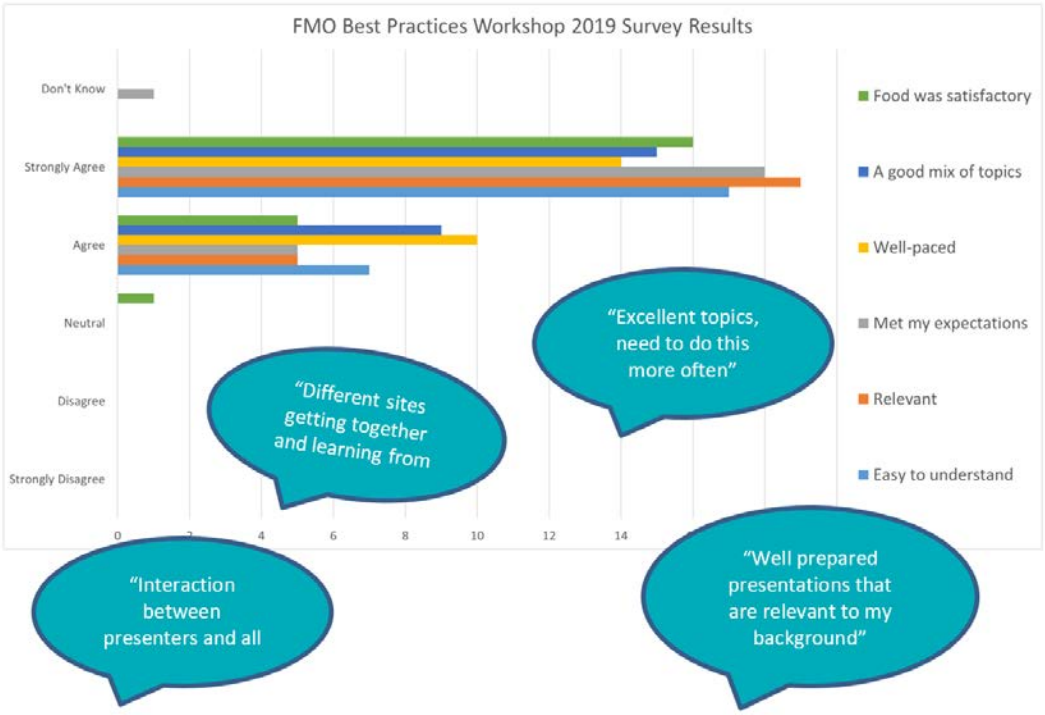


Figure 15. Quantitative and Qualitative Webinar Survey Results

Energy Wise Network Program

This awareness and behavior change program is made available and funded by BC Hydro's Energy Wise Network (EWN) program. The EWN program provides funding for prizes and food, support from an engagement consultant, and educational opportunities through webinars and workshops. Island Health has been benefiting from BC Hydro's engagement programs since 2010.

This past year, with support from our FMO staff, we tailored a campaign focusing on identifying issues within our building direct digital control (DDC) systems and created the DDC Controls Checklist Campaign. An additional objective of this campaign was to put into practice what we had learned in the FMO Energy Webinars. By conducting hands-on exercises with staff we demonstrated they have the capacity to carry out much of the optimization we had traditionally outsourced to third party consultants. An excerpt from one of the checklists is shown in Figure 16.

Heat Recovery					
12. Have you confirmed existing heat recovery heat exchangers are operating when it should be? See Slide 39			✓		No heat recovery
Pumps					
13. Is the heating pump enabled only when heating coil valve open? See Slide 24		✓			-Pumps are controlled by Lockouts -This can be done through pg in house

Figure 16 Sample Section of Completed DDC Controls Checklist

The EWN program focus for this year is to enable more staff to use our real-time energy management information system (Pulse Energy) for daily monitoring and reporting. The system shows electricity and natural gas consumption in real-time. It will allow operators to identify and follow-up on anomalies in energy use they could not otherwise see from monthly 3utility bills. This will help identify day-to-day operational issues causing energy waste. We are starting this process using these five steps:

1. Updating all energy baselines to establish what is normal consumption for each site.
2. Automatically distributing six week and six month reports showing actual vs normal consumption.
3. Revising our existing Pulse Energy training material.
4. Conducting in-person training sessions with operators.
5. Establishing a procedure where operators review Pulse Energy trends daily and report anomalies to their supervisor to plan investigative steps when warranted. This will help operators identify if their equipment is running as expected and should lead to improved overall building performance.

7. Energy Management Assessment (EMA)

The last EMA workshop held in February of 2018 uncovered the following five areas of focus to improve our energy management practices. Shown in quotations below are the actual descriptions of these areas of focus as stated in the consultant's report. Specific action items we've implemented, or are in the process of implementing, are as noted.

Vision & Strategy

"Align energy management program efforts with the most current organizational strategy. Clarify the organizational risk profile and business driver weightings to be utilized in resolving competing priorities. Reposition the energy conservation program as a broader operational improvement initiative that delivers total strategic value, far beyond just lower operating costs."

Action Taken:

a. GHG reduction has been included in the **Island Health 2018/19 Annual Priorities Plan** within Objective 4.6 *Reduce Island Health's Climate Impact* using Strategy 4.6.1 *Advance Island Health as close as possible to the provincial emissions reduction target* using the 18/19 Tactic: *Implement projects to reduce Island Health's carbon footprint.*

b. GHG reduction remains a strategy in the draft **Island Health 2019/20-21/22 Multi-Year Plan** and includes tactics such as electrification (i.e. heat recovery chillers), continuous optimization, and alterative fuels.

c. Five new key performance indicators (KPIs) have been added to the Operations and Support Services performance tracking system as follows: booked electricity savings (kWh/year), booked natural gas savings (GJ/year), GHG emissions (tCO_2e/year), energy use index (kWh/m^2/year), and total water consumption (m^3).

Organizational Integration

"Increase broader participation in the energy conservation initiative by leveraging the existing site or area coordinators in key operating departments. Establish more specific details in operating regulations that directly reinforce the current energy conservation mandate."

Action Taken:

d. Opportunities for Improvement (OFI) lists have been compiled for many of our largest sites: Royal Jubilee Hospital (RJH), Nanaimo Regional General Hospital (NRGH), WestCoast General Hospital (WCGH), and the new Campbell River (CRG) and Comox Valley (CVH) Hospitals. These are being used to facilitate and manage our in-house continuous optimization/improvement initiative. These lists are reviewed regularly with facilities staff and new OFIs are added as identified and existing ones removed once they're addressed.

e. Regular training sessions for our facilities operators are being held approximately three times each year. These take the form of either webinars delivered by energy management consultants or in-person

workshops with both employees and consultants providing content. To date, training has focused mainly on identifying and addressing common deficiencies using the building's automation system.

f. An additional initiative that has been discussed but not yet formally put in place is the creation of a project specific "commissioning team" whose job it will be to verify and ensure new systems operate as intended under all possible operating conditions and seasons. Exactly what this will look like is yet to be finalized, in part because this function is already supposed to be in place on all projects. What is currently in place is not working adequately because some projects are still declared complete while deficiencies remain.

Targets / Reporting

"Set comprehensive reduction targets that account for both capital projects and non-capital activities, preferably based on energy intensity."

Action Taken:

g. KPIs have been identified and targets set for GHG emissions, energy use index (EUI), and BC Hydro and FortisBC annual energy savings, as noted above in Vision & Strategy. Specific targets for each of these KPIs are reported elsewhere in this SEMP. Targets have not been set yet for water use though consumption is being monitored, tracked and reported and that alone has lead to reduced usage two years in a row.

Performance Tracking & Reporting

"Proactively deliver regular energy intensity reports to operating personnel for use in raising general awareness and examining variances from established targets. Report program performance results to the executive sponsor and senior management as a means to securing support for forward-looking objectives and resource requirements."

Action Taken:

h. FMO Quarterly Energy Reviews: Energy department representatives meet with facilities staff on a quarterly basis to review energy consumption trends and cumulative sum of savings (CUSUM) reports for each site to discuss anomalies and potential remedies when/if needed. Updates on existing projects are provided and new projects and opportunities are solicited and discussed. These meetings represent monitoring, tracking and reporting of energy and water use at the operator level and have resulted in measurable savings as well as heightened awareness of the importance of energy and water use.

i. The plan in F2020 is to train operators on how to use the Pulse Energy real-time monitoring tool to check energy use in real-time on a daily basis and investigate any anomalies found. The service contract for the Pulse Energy monitoring system has been renewed for one more year based on feedback from some operators who rely on it to assess the energy impact of changes made to their facility. The intent this year is to ensure operators at all sites add energy monitoring to their daily routines.

j. The Pulse Energy real-time monitoring system is being used to send automated CUSUM reports in an email to all facility managers and their key operators. These consist of both six week and six month CUSUM reports of electricy and natural gas which allow staff to see at a glance if energy savings continue or not, and then respond accordingly. It's an easy way for staff to assess the energy performance of their facilities.

k. On a quarterly basis, a detailed Energy Management Accountability Report is prepared, presented, and distributed to various stakeholders and leaders. The document reports on key highlights and lowlights in the quarter, presents charts showing how actual energy use is tracking against baseline and targets for each facility as well as the organization as a whole, includes financial charts so department managers can see if they have a positive or negative variance on utility budgets, and provides updates on all energy related projects and initiatives. This report is also recognized as, and was previously named, The BC Hydro Quaterly Report.

l. Several energy related key performance indicators have now been incorporated into the Operations and Support Services (OSS) dashboard and Year End Report, namely: booked electricity savings (kWh/year), booked natural gas savings (GJ/year), GHG emissions (tCO_2e/year), energy use index (kWh/m^2/year), and total water consumption (m^3).

m. The KPI of GHG emissions with targets has been added to the Island Health Performance Dashboard which is where the Executive and Board monitor how we're doing as an organization in all aspects of our business.

Planning Discipline

"Engage financial decision-makers to better understand requirements of current project valuation approaches and improve the economic evaluation of conservation opportunities by addressing strategic business drivers more specifically."

Action Taken:

n. More rigor has been incorporated into the capital project planning process with the development and adoption of an electronic capital request system known as eCASE (Electronic Capital Asset Submission and Evaluation). The system incorporates risk assessment and prioritization tools as well as the ability to attach documents for additional detail, for example a financial business case or an energy savings project. The system is owned and managed by the Capital Planning department and has been structured to ensure transparency for key decision-makers.

o. The Energy department has also moved to a more reliable process of developing projects to ensure more certainty and accuracy on costs and benefits. We no longer rely soley on energy studies for the business case and go directly to capital project implementation because, in most cases, the energy study does not provide accurate costs. An intermediate step of schematic design, preliminary engineering and quantity surveyor quality costing is now carried out before a final go/no-go decision is made to proceed with implementation. This update to our process has helped minimize risk of cost over-runs and stopped projects that simply don't have a strong business case, but might have appeared to in the energy study.

8. Risks

There are several risks that need to be considered in planning and executing our SEMP, including:

1. Persistence of energy savings, particularly with respect to initiatives such as building re-commissioning and behavioral programs. Taking steps to ensure energy savings are maintained will be very important to the overall success of the Energy Management Program.

2. Limits to energy efficiency and conservation – despite the progress made to date upgrading and optimizing existing facilities, in order to achieve the longer term GHG reduction targets, Island Health will need to implement alternative low/no GHG emissions strategies like fuel switching to biomass, renewable natural gas, and electricity.

3. Capital funding is becoming more difficult to secure. Island Health has explored various options to address this including partnering with third parties on construction of low carbon energy plants. This does not appear to be a viable option without Island Health incurring capital debt which is generally not permitted.

4. Reduction in program funding from BC Hydro - Energy Managers are currently only funded for 50% of their salary. Energy studies are only funded to a limit of 50% and C-Op program funding has been reduced to approximately 15% of what it was. To make matters more challenging, incentive agreements now have an expiry date of under one year. This adds constraints to project planning and further limits the type of projects that can be considered.

9. Opportunities

Recommissioning and Continuous Optimization (C-Op)

We enrolled a total of 23 facilities in the original Round 1 version of BC Hydro's C-Op program since its inception in F2010. In this version BC Hydro covered 100% of all consulting fees associated with investigations, verifications and coaching sessions associated with the first twenty sites (Phase I and Phase II) which have long since been completed. Of the remaining three sites BC Hydro is covering 50% of consulting fees (Phase III: NRGH, VGH, RJH) and only VGH has recently been completed. NRGH has completed the implementation phase and the controls based energy conservation measures are now in place and operational; all that is left are quarterly check-ins and reviews to ensure measures continue to operate and/or make adjustments if required. NRGH staff continue to implement controls measures beyond those identified in the BC Hydro project using internal resources. To date, approximately 100 measures have been implemented since 2015. RJH is currently in its implementation phase and is expecting to complete by the end of F2021 so will be the last site to cross the finish line.

Five sites have been enrolled in BC Hydro's new Round 2 C-Op program – a simplified version of the original but where BC Hydro covers only about 15% of consulting fees. WCGH has completed its investigation phase and there have been a number of new measures identified that will help increase the efficiency and output of the new heat recovery chiller. The investigation also confirms the continued operation of measures implemented in Round 1. The final step of implementation of the new measures is currently underway. Cowichan District Hospital (CDH), Cairnsmore Place, Eagle Park Long Term Care, and Trillium Lodge Long Term Care have all completed the investigation work and, for all sites but one, all measures implemented in Round 1 are still in operation as intended. One measure at CDH was found to be disabled but has since been re-installed and is now working again. These four projects are now complete.

Recommissioning and continuous optimization are the highest priority strategies because benefits are achieved without incurring major capital expense. Our studies have repeatedly shown there are significant opportunities to save energy simply by optimizing existing building systems. We have plenty of low hanging fruit left to pick but it takes skilled staff, diligence, and a continuous improvement approach to achieve and sustain results.

New Construction Programs

All new Island Health facility designs strive for the highest levels of patient care at the lowest possible energy use and GHG emissions. It is our intent that all new construction and major renovation projects participate in the BC Hydro New Construction Whole Building Design Program as well as the newly launched FortisBC New Construction Program.

Benefits of using a collaborative, integrated design process, like the one fostered by the new construction program, can be seen in the design of the new North Island Hospitals in Comox and Campbell River as well as The Summit building. Island Health, along with all public sector organizations, has been mandated by the government to take steps in new construction to reduce greenhouse gas emissions; this is indicated in the government's 2008 Climate Action Plan and the 2016 Climate Leadership Plan. Island Health is required to design all major new construction to meet the LEED Gold standard. The Province's 2016 Climate Leadership Plan further mandates emissions reduction and climate change adaptation plans.

Heat Recovery

Heat recovery will continue to be a viable means of reducing energy and GHG emissions in both retrofit and new construction projects. By utilizing waste heat from building exhaust and other sources and harvesting it with heat pumps, we can substantially lower natural gas consumption and GHG emissions.

Renewable Energy

Solar thermal and solar electric panels have been installed at several Island Health sites. These systems do offset natural gas and purchased electricity but are costly to install. Solar thermal has an unacceptably long payback so is not a viable option at present. These were installed at a time when the provincial government was covering nearly 100% of the capital cost. Solar electric systems however are becoming attractive with reasonable paybacks, currently around 15 years, which continue to improve as system costs decline and BC Hydro rates increase.

Island Health has also spent several years designing and assessing the costs and benefits of installing biomass boilers at a number of sites. The most favorable economics seem to be at larger facilities due to the economies of scale and boilers that are more forgiving of variable quality fuel. In spite of a good business case, it has not been possible yet to secure funding for a biomass boiler in part due to overall financial constraints, as well as increased risk associated with fuel quality and supply. Renewable natural gas also provides another low carbon fuel for our boiler plants but the cost is $7/GJ more than regular natural gas and production is limited in BC. In most cases, supply isn't even available.

Lighting & Lighting Control

Many lighting retrofits have been completed throughout Island Health in recent years. Conversion to LED technology and implementing lighting controls and daylight harvesting continue to be a good opportunity for savings with quite favorable returns on investment. Lighting projects also result in much lower maintenance costs as well as better comfort for patients and staff.

High Efficiency Heating Plants

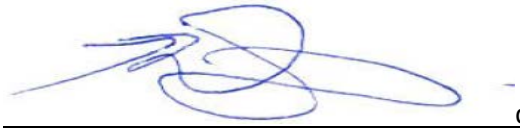
Island Health continues to invest in high efficiency heating plants for space heating and domestic hot water (DHW). High efficiency condensing boilers, coupled or de-coupled DHW systems, and thermal energy exchange systems (i.e. Thermenex) will continue to be investigated and evaluated on a site-by-site basis.

Scheduling & Zoning Upgrades

Island Health provides a wide array of services to patients. Typically, a facility will have some services available 24/7 while other services are offered only Monday to Friday during regular business hours. As a result, much of the space within our buildings is not occupied a lot of the time so this presents an opportunity to reduce or eliminate ventilation and save substantial amounts of energy. Our facilities can therefore benefit from zoning and scheduling retrofits that only ventilate spaces when occupied. Zoning breaks out the building into discrete areas with a specific operating schedule and supplies the right amount of conditioned air only when needed, thus reducing energy consumption. Some spaces, such as conference and meeting rooms, are ventilated only when occupancy sensors detect people. Zoning projects recently completed at NRGH resulted in significant energy savings from both electricity and natural gas, reduced GHG emissions and in some areas improved occupant comfort.

Senior Management Approval

By signing below, Island Health's senior management acknowledges receipt and approval of this Strategic Energy Management Plan.



_____ date: September 30, 2019

Brett Street, Director, Facilities Maintenance and Operations (South Island)

_____, date: September 30, 2019

Dean Anderson, Corporate Director, Facilities Management

_____, date: September 30, 2019

James Hanson, Vice President, Operations and Support Services

Acknowledgements

The Government of British Columbia

The Government of British Columbia is a leader in promoting a greener economy and one of the first jurisdictions in the world to establish carbon reduction targets. The Government's Carbon Neutral Capital Program (CNCP) has been providing funding to the BC Health Authorities since F2015 for GHG reduction projects. To date, Island Health has secured more than $4M from the program.

Island Health Executive

The Executive leadership is critical to Island Health being successful in energy management and meeting our organization's carbon reduction targets. We thank Island Health's Executive and Board for their support of the Energy Team, access to capital, and the priority given to energy conservation.

BC Hydro

We thank BC Hydro for their support in providing Island Health incentive funds for energy managers, studies, capital projects, the EWN program, and access to their technical experts. The funding provided by BC Hydro for our Energy Manager positions is critical to the success of our program. We also appreciate the ongoing training at Energy Manager meetings, workshops and monthly webinars, as well as recognition of our accomplishments by way of awards and newspaper ads showcasing the fruits of our team's efforts to the community and Province.

BC Hydro Key Account Manager

Thank you to Jeff Whitson for his guidance and leadership in the healthcare sector. Jeff's insights and support to FMO and the Energy Management team is invaluable.

FortisBC

We thank FortisBC for the funding they provide to support our energy specialist positions, energy studies, capital projects, equipment purchases, and training programs.

FortisBC Energy Solutions Manager

Our appreciation and gratitude also goes to Jennifer Coulthard for continued support and advocacy on behalf of Island Health at FortisBC.

Corporate Director Facilities Management

Thanks also to Dean Anderson who brings a new vision and focus to the Energy Management team. We look forward to his leadership and continued support in the years to come.

Facilities Maintenance and Operations (FMO)

As best practices in energy management become more embedded in building maintenance, operations and project management, we applaud FMO for their willingness to collaborate and share expertise. FMO provides the insight and resources to successfully implement energy projects while ensuring patients, residents and staff are comfortable and safe. Without their knowledge and support, the Energy Management Program could not exist.

Facilities Capital Development

The Facilities Capital Development Department focuses on design, construction and commissioning of major capital projects including new buildings and major renovations. They have a great deal of influence on the future energy performance of our sites. We thank them for their support and collaboration.

Capital Planning and Capital Finance

Thank you to Capital Planning and Capital Finance for the support of the Energy Management team. These departments are essential to securing and managing capital funds from the Ministry of Health and Regional Hospital Districts (RHDs).

Island Health Employees

Thank you to all Island Health employees for the actions you take - such as turning off lights and computer monitors and contributing to a culture of sustainability.

Appendix A – Policy, Vision, Purpose and Values Statement

8.0 Life, Safety and Environment

8.3 Energy Efficiency & Conservation

8.3.3 Environmental Sustainability

1.0 Purpose

Island Health recognizes the link between a healthy environment and a healthy population. Island Health's commitment to minimize environmental impact is part of our desire to create healthier, stronger communities. As such, individual and collective actions are needed to protect and enhance our ecological environment while being socially and fiscally responsible.

Island Health envisions a health care system where people interact in an environment that embraces safe and healthy building products, clean air and water, minimal use of toxins, safe working practices, energy efficiency, waste reduction and water conservation.

Through the adoption of this policy, Island Health establishes a commitment to environmental sustainability. This policy provides the framework within which supporting protocols and procedures can be developed.

2.0 Policy

2.1 Environmental Sustainability

1. Island Health will achieve **environmental sustainability** through conservation of energy, resources, water and materials. This will be achieved by following the principals of reducing energy or materials consumption, reusing resources where applicable, and finally recycling materials and products of business. Any new materials or products will take into consideration the environmental impact of the product from cradle to grave and must ensure safety of employees and patients.

2.2 Green House Gas Emissions Targets

1. Island Health will work to meet the government mandated targets for Green House Gas (GHG) reductions contained in relevant legislation (refer to reference).
2. Island Health will purchase carbon offsets for emissions as per relevant legislation (refer to references).

2.3 Environmental Leader

1. Island Health will set an example to community stakeholders and will work with our partners (private sector, other health authorities, public sector, utility providers and government) in a collaborative approach toward environmental sustainability and integrate environmental

considerations and sustainability values into our decision-making processes and actions at work.

2.4 Accountability

1. Island Health will measure and report on its environmental sustainability efforts and will participate in annual government reporting programs such as the Carbon Neutral Action Report and the Strategic Energy Management Report.

3.0 Definitions

3.1 Environment

1. For the purpose of this policy, environment means the natural and human surroundings. The environment extends from the local community to the global systems, and includes air, water, land, built form, infrastructure, flora, fauna, as well as human beings.

3.2 Environmental Sustainability

1. For the purpose of this policy, environmental sustainability refers to the actions necessary to minimize harm through conservation, preservation or enhancement of the natural environment.

3.3 Sustainable Operations

1. Sustainable operations affect all Island Health business processes. Departments will need to develop, adopt and review sustainable best practices and business processes. This includes products and services that we purchase; minimizing solid, organic and hazardous wastes that we generate; and minimizing non-renewable energy and water resources that we consume. In addition, fostering reductions in transportation requirements and reducing emissions resulting from transportation.

3.4 Sustainable Facilities

1. Facilities Management will work to develop and incorporate environmentally sound and energy conserving procedures and processes into decision making processes.
2. Island Health Facilities Management will consider one-time and ongoing financial and environmental costs associated with their responsibilities.
3. Island Health facilities will be designed and constructed to achieve long-term energy efficiencies and reduce environmental impact.
4. New buildings or additions will have a “Green Building” rating system (Canada Green Building Council LEED, LEED for Existing Buildings; Operations and Maintenance, Green Guide for Health Care, Passive House), to align with the Carbon Neutral Government Climate Leadership Plan. Eligible buildings will be enrolled in BCHydro and FortisBC Whole Building New Construction Program. The Energy Efficiency and Conservation Department will establish an energy and greenhouse gas emissions target for the new building or addition that will ensure Island Health’s energy and emissions reduction goals are met.

3.5 Sustainable Partnerships

1. Island Health will work with other health authorities, public sector organizations, crown corporations, provincial governments, municipal governments, non-governmental organizations, utilities, and private sector businesses to achieve common sustainability goals.

4.0 Procedure

4.1 Executive

1. Will lead and support the organization's overall commitment to environmental sustainability.
2. Incorporate environmental considerations and sustainability values in decision-making processes, while supporting sustainability through appropriate budget and needs-based planning.
3. Consider a sustainability target within decision-making processes.

4.2 Facilities Management

1. Will endeavor to reduce energy consumption and minimize environmental impact in the course of business.
2. Energy Efficiency and Conservation will lead sustainability initiatives within Island Health to primarily reduce greenhouse gas emissions and energy consumption as well as engaging staff by communicating, educating and facilitating sustainable best practices.
3. Evaluate the success of sustainability initiatives by developing and monitoring sustainability metrics and targets.

4.3 Island Health Employees, Physicians, Volunteers, Students, Contractors and all others who carry out business for the organization

1. Will incorporate sustainable best practices into their work and decision-making process.
2. Are encouraged to identify role model and promote new ways of implementing sustainable programs and practices in the workplace.

5.0 References

Island Health Related Policies

- 20.1.2 Strategic Procurement
- 5.8.1 Wellness & Safety: General Policy

Regulatory

- Clean Energy Act (2010) https://www.leg.bc.ca/content/legacy/Web/38th3rd/1st_read/gov30-1.htm
- Climate Change Policy, Legislation & Programs - Province of British Columbia
- Carbon Neutral Government - Province of British Columbia

Health Authority Related

- Health Authority Carbon Neutral Action Reports (CNAR) http://www.viha.ca/about_viha/news/reports/cnar.htm
- Health Authority Strategic Energy Management Plan (SEMP) Scroll down for link to SEMP

Vision, Purpose and Values for Energy Efficiency and Conservation:

It is proposed that the Energy Team develop a Vision, Purpose and Values statement at aligns with and follows the format and spirit of Island Health's. For reference purposes the following is Island Health's Vision, Purpose and Values Statement followed by the proposed Vision, Purpose and Values for the Energy Department.

Island Health's Vision

Excellent health and care for everyone, everywhere, every time.

Island Health's Purpose

To provide superior health care through innovation, teaching and research and a commitment to quality and safety – creating healthier, stronger communities and a better quality of life for those we touch.

Island Health's Values

C.A.R.E.

Courage: to do the right thing- to change, innovate and grow

Aspire: to the highest degree of quality and safety

Respect: to value each individual and bring trust to every relationship

Empathy: to give the kind of care we would want for our loved ones

Energy Department Vision

An organization that considers and incorporates energy conservation and GHG reduction objectives in all we do and one where we all work toward and achieve aggressive reduction targets.

Energy Department Purpose

To provide the leadership, direction, and expertise required to achieve the vision which will lead to energy efficient, environmentally and financially sustainable health care facilities on Vancouver Island that have a minimized impact on climate change. We do this by identifying and prioritizing opportunities, communicating plans, securing funding, managing projects and initiatives, monitoring and evaluating performance.

Energy Department Values

S.A.V.E.

Sustainable in all that we do

Action to address climate change

Vision to achieve a greener environment

Energy conservation to save resources for our future

Appendix B - Site Acronyms and Definitions

Site - Name	Site - Code
Aberdeen Hospital	ABH
Bamfield Outpost Hospital	BAM
Bamfield Outpost Hospital Nurse Residence	BAM-Res
Cairnsmore Place Residential Care	CPRC
Campbell River Hospital - New	CRH-N
Chemainus Health Care Centre	CHCC
Comox Valley Hospital	CVH
Cormorant Island Community Health Clinic	CICHC
Cowichan District Hospital	CDH
Cowichan Lodge	CLRC
Cumberland Health Centre	CHC
Cumberland Regional Laundry	CRL
Drug & Alcohol Rehab Society	DARS
Dufferin Place (Extended Care at NRGH)	DPRC
Eagle Park Lodge	EPLTC
Glengarry Hospital	GLH
Gold River Health Clinic	GRHC
Gorge Road Hospital	GRH
Hillside Seniors Health Centre	HSHC
Lady Minto Hospital	LMH
Ladysmith Community Health Centre	LCHC
Mount Tolmie Hospital	MTH
Nanaimo Regional General Hospital	NRGH
Nanaimo Wentworth Street	NWWS
Oceanside Health Centre	OHC
Oak Bay Lodge	OBL
Port Alice Health Centre	PAH
Port Hardy Hospital	PHH
Port Hardy Primary Care Centre	PHPCC
Port McNeill Hospital	PMH
Priory Hospital - Heritage Woods	PRIO-HW
Priory Hospital - Hiscock + Rosewood	PRIO-H&R
Queen Alexandra Centre - Ledger House	QAC-Ledger
Queen Alexandra Centre - Main/Fisher	QAC-Main
Queen Alexandra Centre - Pearkes	QAC-Pearkes
Royal Jubilee Hospital	RJH
Saanich Peninsula Hospital	SPH
Seven Oaks Tertiary Mental Health Facility	SOMH
Tahsis Health Centre	THC
Tofino General Hospital	TGH
Trillium Lodge	TLLTC
VGH - Victoria Regional Laundry	VGHL
Victoria General Hospital	VGH
Victoria Pandora Avenue Health Centre	VPAHC
West Coast General Hospital	WCGH
Yucalta Lodge	YLRS

Definitions

Electrical Energy (kWh): Electricity Consumption as reported by BC Hydro.

Electrical Energy Index (kWh/m^2): Building energy use index based on annual electricity consumed per m^2 of building area.

Electrical Emissions (tCO_2e): Greenhouse gas emissions from the generation of electricity used. Conversion factors are based on Carbon Neutral Government Guidance Document *2016/2017 Best Practices Methodology for Quantifying Greenhouse Gas Emissions.*

Floor Area (m^2): Overall floor area of the facility, including all levels, measured to the outside walls.

Fossil Fuel Energy (kWh): Consumption of fossil fuels primarily used for building heat and domestic hot water. Fossil fuel energy includes natural gas, propane and fuel oil. Fuels used for backup generators and/or heating is excluded.

Fossil Fuel Energy Index (kWh/m^2): Building energy use index based on annual fossil fuel energy consumed per m^2 of building area.

Fossil Fuel Emissions (tCO_2e): GHG emissions from the combustion of the fossil fuel. Conversion factors are based on Carbon Neutral Government Guidance Document *2016/2017 Best Practices Methodology for Quantifying Greenhouse Gas Emissions.*

Energy Use Index (kWh/m^2): Total energy consumed, annually, from electricity and fossil fuels per m^2 of building area.

Total Cost ($): Sum of electrical and fossil fuel energy costs not including PST/GST.

Offsettable Emissions (tCO_2e): Sum of GHG emissions from electricity and fossil fuel.

End of report.