Strategic Energy Management Plan

Vancouver Island Health Authority
2018

BC Hydro
Power smart

island health

Joe Ciarniello

Executive Summary

Island Health is one of six 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.

Facts & Figures:

Description	***Figures***
Annual Operating Budget	$2.5 Billion
Client Population	794,000 (5.1% of which are Indigenous)
Employees	21,233
Staff Unions	14
Physicians and Volunteers	1,900 and 6,000 respectively
Facilities	150+
Acute Care & Rehabilitation Beds	1,555
Residential Care Beds & Assisted Living Units	6,426
Mental Health & Substance Use Beds	1,110

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, this year's 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***. Inclusion of this objective ensures and reaffirms our Strategic Energy Management Plan (SEMP) aligns with the organization's goals.

Island Health's SEMP for 2018 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 2017, 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 greenhouse gas emissions.

Within Island Health challenges to energy management goals include organizational growth, increasing reliance on energy intensive technology, decreasing incentives from BC Hydro, shrinking capital funds for projects, and escalating electrical energy rates. In spite of these pressures, Island Health is committed to meeting legislated carbon emissions reduction targets and reducing operating costs. Progress since the start of the energy management program in F2008 is illustrated by a 23% reduction in overall energy use intensity (kWh/m^2/year). Natural gas rates have also dropped 28% over the same period. However, the organization's size grew by 27.5% and electricity rates increased 72%. The reduction in energy use intensity and gas prices have significantly tempered the impact these negative pressures are having on our business.

One of the tools used to enhance our energy management practices is BC Hydro's 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 process helps us ensure we are taking a fulsome approach to energy management. The five areas of focus identified in the 2018 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 of focus are currently being identified and reviewed with facilities management to ensure consensus, buy-in, and that they are ultimately achievable over the next two years.

Our key energy targets for this year (short term) remain the same as last year. For electricity, our target is to implement projects that save at least 1,200,000 kWh/year of electrical energy. For natural gas, our target is to implement projects that save at least 12,000 GJ/year. **We are on track for exceeding both these targets.** The total approved capital budget for the energy conservation projects that will deliver these savings is approximately $3.0MM.

We are currently working to establish realistic long term organization-wide energy use intensity (EUI) targets as well as site specific EUI targets. 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 Carbon Neutral Action Report* provides the overview of how this is being achieved.

In terms of progress to date, Island Health's energy management program has implemented retrofit projects and other initiatives since F2008 that have resulted in a cumulative impact of $2,639,128 in avoided annual costs[1], 62% of which comes from electrical energy.

In addition to the obvious benefits of avoided costs and mitigating the impact on our budgets of an expanding organization and increasing electricity rates, the energy management program strives to achieve additional benefits from its projects. These include improved occupant comfort, reduced maintenance costs, and improved infrastructure reliability. Examples include improved light quality and substantially reduced maintenance associated with new LED lights, and new heat recovery systems that harvest waste heat from building exhaust to offset natural gas, and provide improved cooling 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. Based on the measures identified in our studies, we have prepared more than 60 capital requests for funding.

Also 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 energy management program. This year, we received the largest ever capital project incentives from BC Hydro for two new hospitals; a total of $1.7MM. This money will be used to fund the next highest capital project priority.

1. $2,639,128 total = $1,004,087 for natural gas at $8.94/GJ (Table 5) and 112,314 GJ/year (Table 3), plus $1,635,312 for electricity at $0.0843/kWh (Table 4) and 19,395,500 kWh/year (Table 4).

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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 will reveal if we are meeting our targets or not. If not, the Energy Department will work with our stakeholders to adjust the plan.

By looking at actual consumption and cost in Table 6a 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 F2018 Island Health consumed 104,349,120 kWh of electricity, a 24% increase from the previous year, and 558,202 GJ of Natural Gas, a 2% increase from the previous year at a total cost increase of 12.2%. The increase in consumption is primarily attributed to the opening of the new hospitals in Campbell River and Comox.

Though water use has not been a focus of the SEMP, it will be going forward. Consumption was 691,606 m^3 in F2018, a 19.7% decrease from the previous year, at a cost of $1,675,652 (18.2% decrease) so it's a substantial piece of our operating budget and needs attention. Plans are evolving and will be reported on in next year's SEMP.

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 *Greenhouse Gas Reduction Targets Act* and the Carbon Neutral Government Regulation. 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 too.

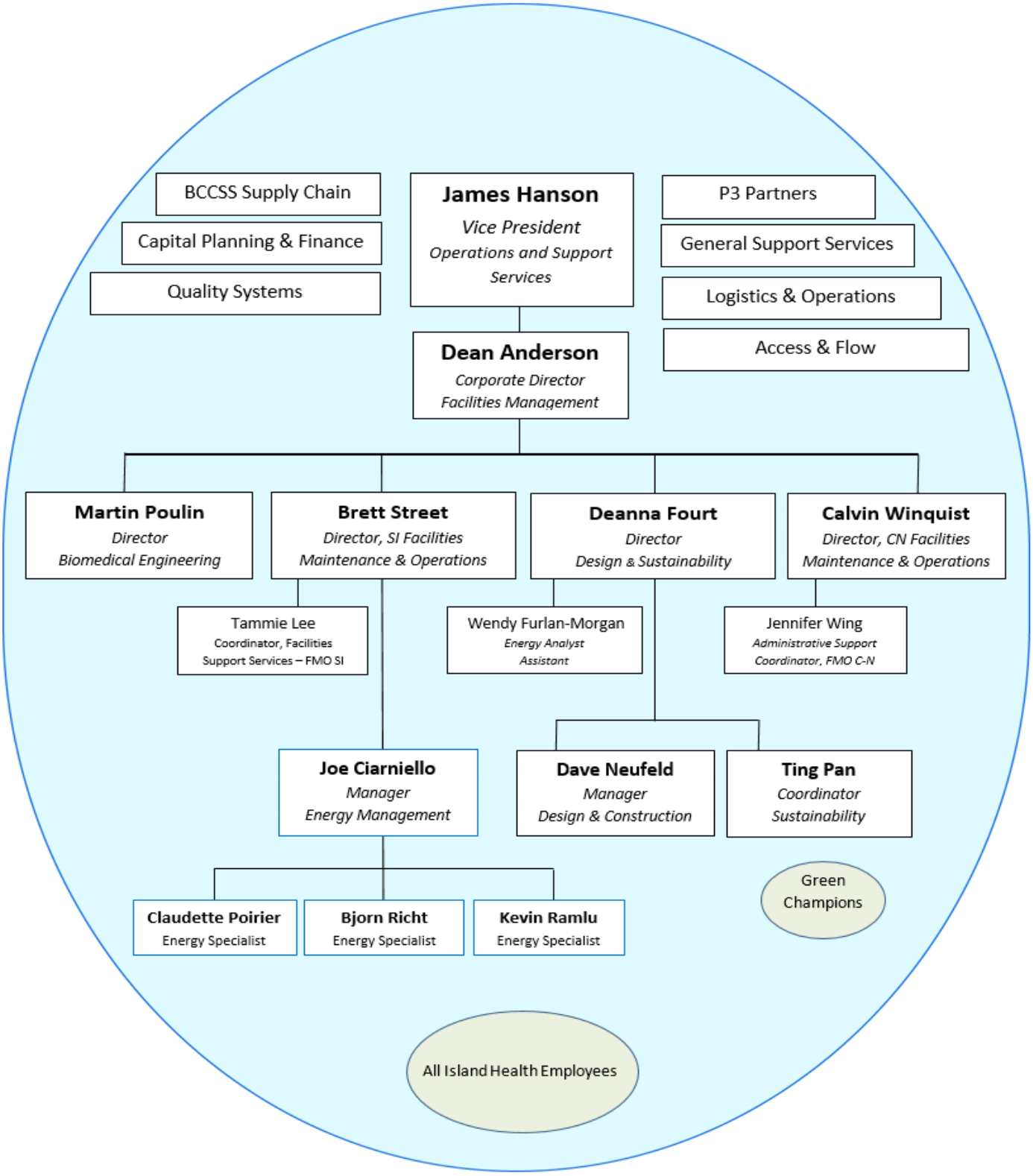
Our approach to reduced consumption starts with energy studies that identify potential efficiency and conservation measures and develops the business case for them. The return on investment for these projects is improved considerably when BC Hydro and FortisBC agree to provide incentives and has typically 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 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 the 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 four key performance indicators we track in order to develop and assess the success of our Strategic Energy Management Plan, as follows:

Electricity Savings Measured in kWh/yr	These savings are recognized and "booked" by BC Hydro through one of their energy conservation programs.
Natural Gas Savings Measured in GJ/yr	These are savings that are recognized by FortisBC through their Energy Specialist and conservation programs.
Offsettable GHG Emissions Measured in tCO_2e/yr	GHG emissions are based on electricity and fossil fuel consumed at owned & operated facilities, converted into tonnes of carbon dioxide equivalents (tCO_2e). Emissions from equipment such as back-up generators and other internal combustion engines for activities such as landscaping and fleet vehicles are not included in this SEMP but are included in the Carbon Neutral Action 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.

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.

i. 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.

ii. 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.

iii. 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.

iv. Projects highlighted in yellow fall into the "low carbon electrification" category and may qualify for current Provincial incentives.

Table 1 Multi-Year Plan

Fiscal Year	Program Type	Project Name	Booked Electrical Savings [GWh]	Booked Natural Gas Savings [GJ]	Greenhouse Gas Savings [tCO_2e]	Project Costs [$]
2018/19	BOILER	QAC Main - Upgrade to Near Condensing Boiler	0.000	298	15	$ 325,000
	CON-OPS (BCH+FBC)	NRGH - Phase III Continuous Optimization	0.492	4,267	218	$ 400,000
	CUSTOM (BC Hydro)	VGH - D&T Lighting - BCH$	0.231	0	2	$ 110,000
	CUSTOM (BCH+FBC)	VGH - Zoning -Phase 2 - LDR - CNCP (FBC$ & BCH$ application)	0.101	1,870	94	$ 307,500
	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	NIHP - Additional Electrical Savings "tag-on"	0.133	0	1	$ -
	PROGRAM ENABLED	RJH - EMP Cooling Tower Replacement + Pumps	0.014	0	0	$ 320,000
		VGH - OR Zoning -Phase 1 - CNCP - FBC$	0.084	1,299	66	$ 307,500
	PSPX	GRH - Parking Lot Lighting	0.001		0	$ 295,000
		QAC Parking Lot Lighting	0.001		0	$ 90,000
	VIHA FUNDED	NRGH - Phase 3 Zoning & Scheduling - CNCP	0.406	3,513	180	$ 499,000
		RJH - Steam Trap Repair	0.000	1,187	59	$ 9,210
		DPRC - Electronic Zone Control Upgrade - FBC$ - CNCP	0.047	790	40	$ 120,000
	2018/19 Total		**1.561**	**16,412**	**835**	**$ 2,892,460**
2019/20	CON-OPS (BCH)	CDH - Continuous Optimization - BCH$	0.068	454	23	$ 98,200
		EPLTC_TLLTC - Continuous Optimization - BCH$	0.090	109	6	$ 75,200
		WCGH - Continuous Optimization - BCH$	0.090	243	13	$ 93,000
		CPRC - Continuous Optimization - BCH$	0.040	110	6	$ 34,000
	CON-OPS (BCH+FBC)	RJH - Phase III Continuous Optimization - Implementation	0.423	4,000	204	$ 400,000
	CUSTOM (BC Hydro)	PRIO - Lighting Upgrade - BCH$	0.200		2	$ 170,000
		DPRC - Lighting Replacement - BCH$	0.129	0	1	$ 84,000
	CUSTOM (FortisBC)	RJH - EMP Return Air Conversion - FBC$ - CNCP	0.000	3,276	163	$ 381,000
		NRGH - Thermal plant upgrade	0.000	7,701	384	
	NEW CONSTRUCTION	The Summit @ Quadra Village - Model Savings vs Model Baseline	0.633	9,684	490	$ 716,900
	VIHA FUNDED	CPRC - Boiler & Domestic Hot Water Systems Upgrade - FBC$	0.000	874	44	$ 687,000
		TLLTC - Electric Boiler Replacement	1.210	0	-247	$ 350,000
		RJH - D&T Dedicated Heat Recovery Chiller - Option 2	0.000	44,477	2,178	$ 996,194
		RJH - Chiller Plant Eliminate Quasi-Teriary Pumping	0.126		1	$ 175,000
		CICHC - Heat Pump DHW System - CNCP	0.000	0	33	$ 300,000
		NRGH - Chiller Systems Optimization Phase 1	0.760	3,397	178	$ 2,284,156
		TLLTC - Pipe Insulation	0.035		0	$ 12,000
		TGH - Pipe Insulation	0.000	0	2	$ 7,000
		WCGH - Pipe Insulation	0.000	0	27	$ 35,000
		EPLTC - Pipe Insulation	0.000	78	4	$ 7,000
		NRGH - Pipe Insulation	0.000	1,430	71	$ 70,000
		WCGH - DHW Preheat System	0.000	0	25	$ 99,000
		CPRC - Pipe Insulation	0.000	128	6	$ 6,000
	2019/20 Total		**3.804**	**75,961**	**3,615**	**$ 7,080,650**

Fiscal Year	Program Type	Project Name	Booked Electrical Savings [GWh]	Booked Natural Gas Savings [GJ]	Greenhouse Gas Savings [tCO_2e]	Project Costs [$]
2020/21	BOILER	DARS ECM4.1.1Condensing Boiler Upgrade	0.000		18	$ 420,250
		ABH - Boiler Replacement - FBC$	0.000	380	19	$ 600,000
	CUSTOM (BC Hydro)	TLLTC - Lighting Upgrade - BCH$	0.114	0	1	$ 87,691
		GLH - Lighting Upgrade - BCH$	0.200	0	2	$ 150,000
	CUSTOM (BCH+FBC)	NRGH - Exhaust Air Heat Recovery in Ambulatory Care	0.003	263	13	$ 95,000
	GOAL	Continuous Optimization Round 2 - South Island	0.154	2,542	128	$ 100,000
	VIHA FUNDED	LMH - Control System Modifications	0.022	0	9	$ 99,000
		OHC - Control Systems Optimzation	0.050	80	5	$ 50,000
		NRGH - Replace Rehab Chiller with HR and HE Models - CNCP	0.000	14,319	709	$ 1,500,000
		RJH - EMP AHU Replacement	0.046	2,630	132	$ 2,255,000
		CLRC - Replace RTUs with HRV and Heat Pumps - CNCP	0.000	1,410	70	$ 275,000
		GLH - Heating Hot Water Upgrade	0.015	0	0	$ 101,475
		RJH - Chiller Plant Chilled Water Optimization Phase 2	0.081	0	1	$ 128,767
		WCGH - Heat Pumps for Backup Generator Heating	0.042	0	0	$ 35,000
		NRGH - Heat Pumps for Backup Generator Heating	0.105	0	1	$ 75,000
		2020/21 Total	**0.832**	**21,624**	**1,110**	**$ 5,972,183**
2021/22	CUSTOM (BC Hydro)	PHH - Lighting Upgrade - BCH$	0.124	0	1	$ 99,000
		ABH - Lighting Upgrade - BCH$	0.100	0	1	$ 70,000
	CUSTOM (FortisBC)	CPRC - Ventilation Upgrades - CNCP	0.003	697	35	$ 70,000
	VIHA FUNDED	YLRS - Perimeter Heating Controls Integration	0.000	0	3	$ 40,000
		DPRC - Energy Efficiency Upgrades	0.051	350	18	$ 99,000
		PHH - Energy Efficiency Upgrades	0.000	0	10	$ 99,000
		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
		DPRC - Boiler Room Upgrade - FBC$ - CNCP	0.000	1,340	67	$ 575,000
		RJH - Royal/ West RB.A1 & WB.A1 Replacement	0.000	0	0	$ 710,496
		RJH - D&T Cooling Towers Replacement	0.645		7	$ 1,916,185
		RJH - Chiller Plant Chilled Water Optimization Phase 3	0.264	0	3	$ 380,582
		RJH - Chiller Plant - AFD for 1000 Ton Chiller Add 24/7 Loads	0.247	0	3	$ 212,832
		NIAB – HVAC System Renewal	0.000	50	3	$ 78,000
		2021/22 Total	**1.584**	**4,350**	**245**	**$ 5,576,095**

3. How Are We Doing?

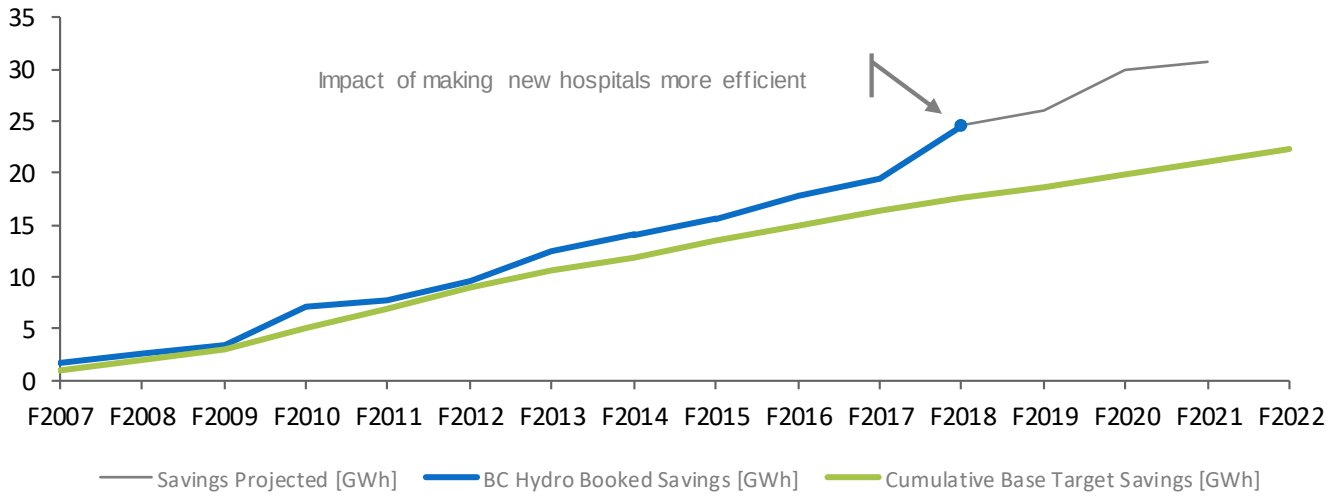
Electrical Energy Savings Booked

Table 2 shows electrical savings booked with BC Hydro for the past twelve years as well as the projected savings in the next four 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 (below) and demonstrates that Island Health continues to exceed targeted savings over the long term.

Table 2 Booked Electrical and Projected Savings Based on Mulit-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			1.561	26.055	1.200	18.700
F2020			3.804	29.858	1.200	19.900
F2021			0.832	30.690	1.200	21.100
F2022			1.584	32.274	1.200	22.300

Figure 1 Booked Electrical Savings vs Target F2007 – F2018 [GWh]



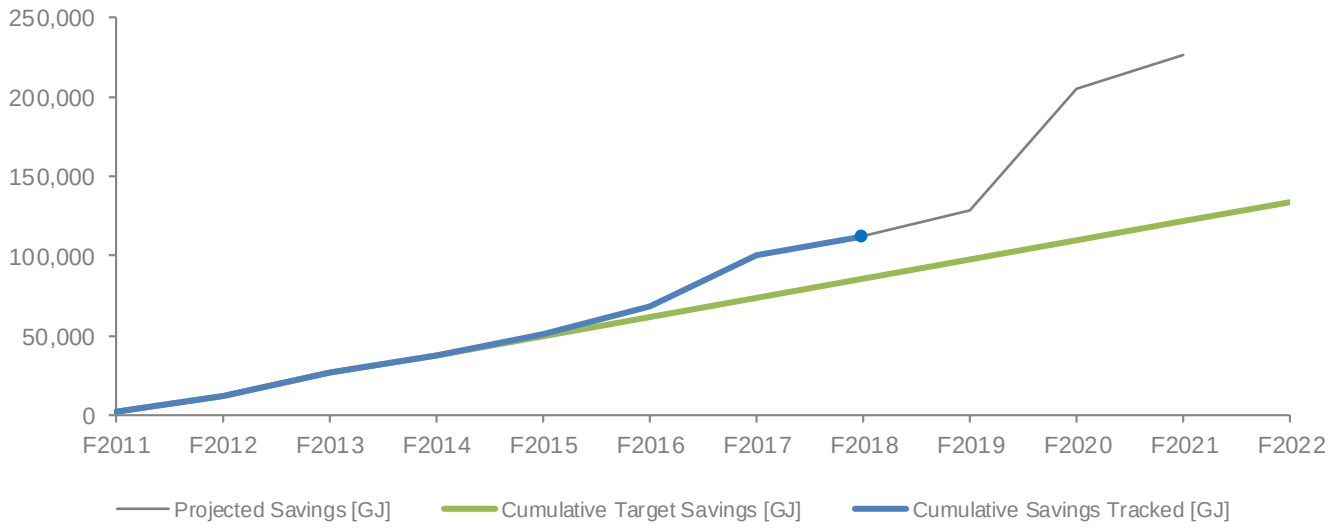
Natural Gas Energy Savings

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 Mulit-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			16,412	128,726	12,000	97,824
F2020			75,961	204,687	12,000	109,824
F2021			21,624	226,311	12,000	121,824
F2022			4,350	230,661	12,000	133,824

Figure 2 Tracked Natural Gas Savings F2011 – F2018 [GJ]

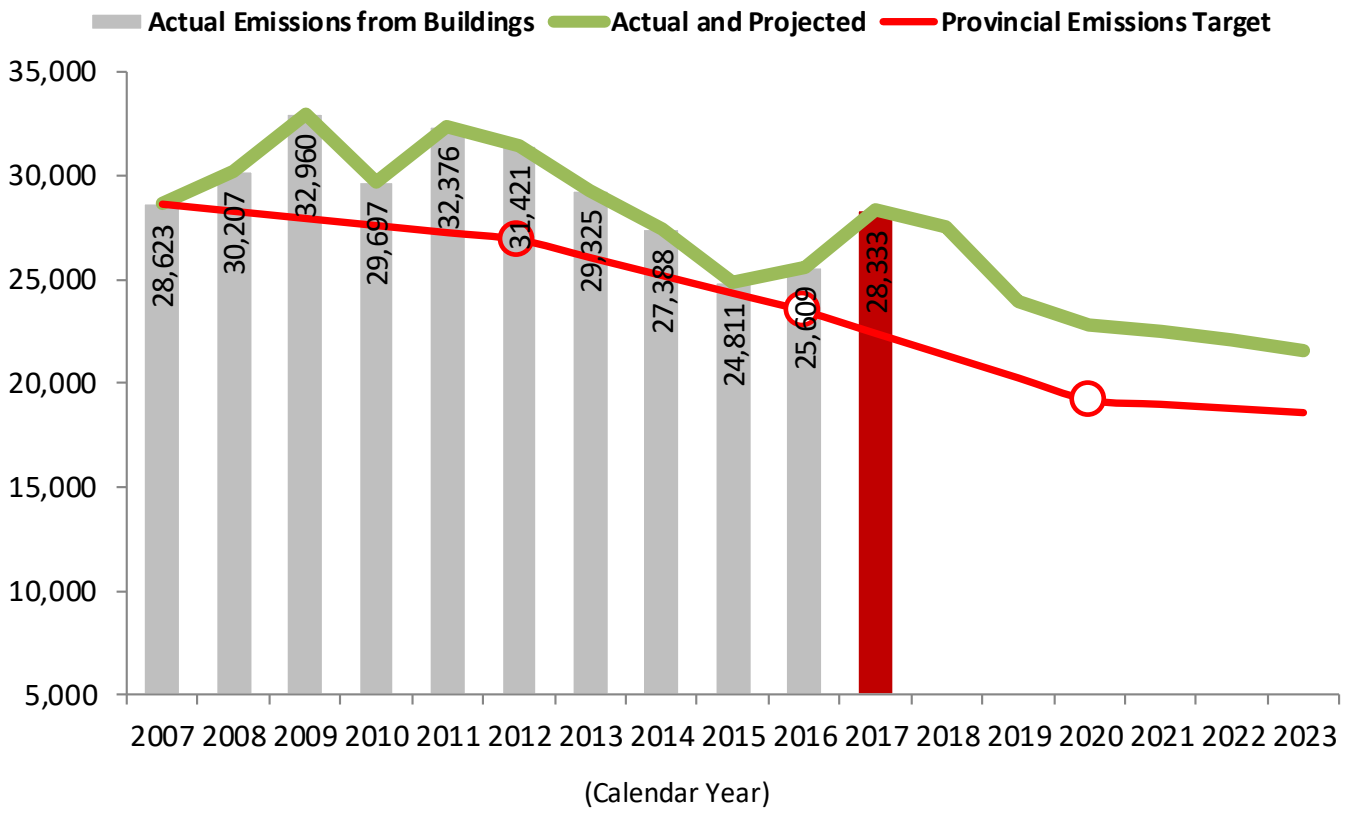


GHG Emissions and Reduction

Since 2007, the majority of Island Health's GHG emission 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 the graph of *Island Health Offsettable GHG Emissions*, our conservation efforts have had a positive impact as emissions have declined since 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 2017, detailed in the Multi-Year-Plan. As we project into the future, we can see that it will be a challenge to meet legislated reduction targets.

Figure 3 Island Health Offsettable GHG Emissions [tCO_2e]



Electrical Cost Savings

Electrical energy savings "booked" with BC Hydro each fiscal year since the current energy management program started is shown in Table 4 below. For the purpose of determining electrical cost savings, it is assumed that the impacts of energy projects are not realized until the following year and remain in effect in future years.

To show the value of the energy management program, the table adds the energy savings from all prior years, shown as Cumulative Savings in Effect. The unit cost of energy is shown in the Blended Cost column and is based on the total cost of electricity for that year divided by the total energy consumed, inclusive of all charges except tax. These rates are then used to determine the annual avoided costs in each year as shown in the last two columns.

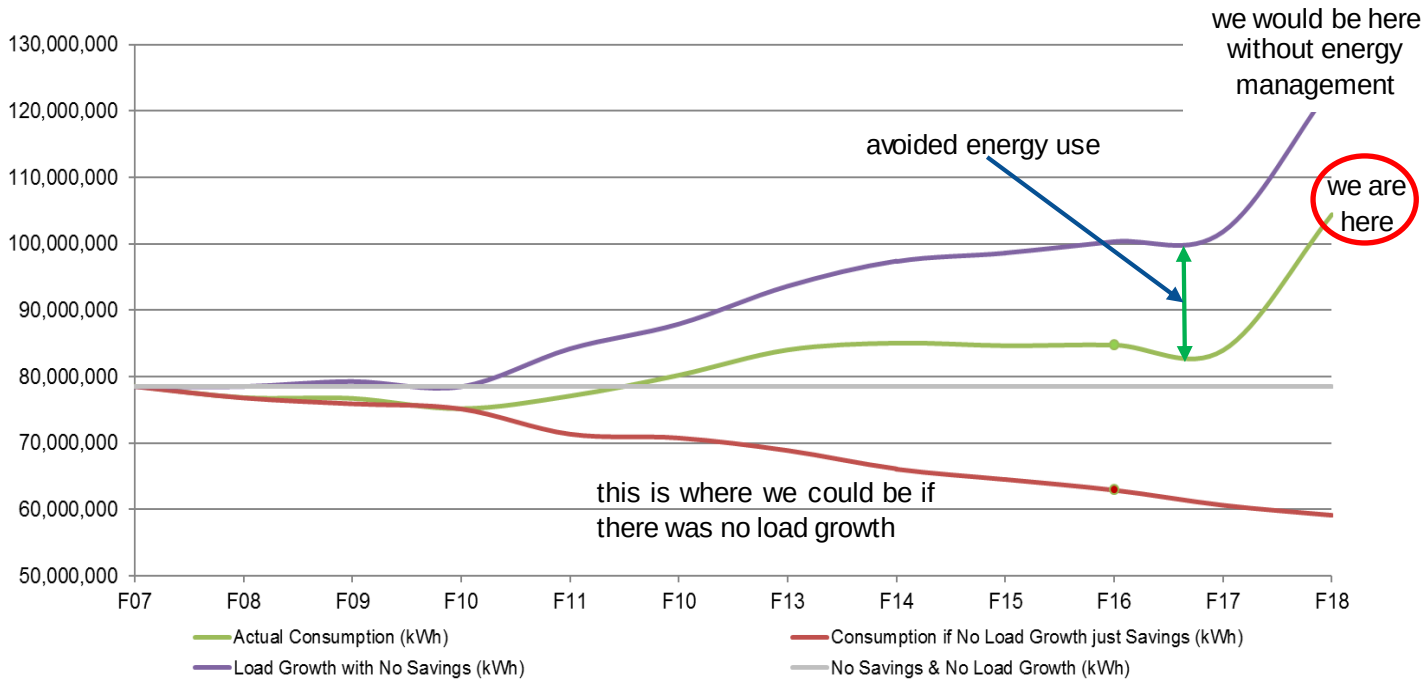
Table 4 Avoided Electrical Energy Costs from Capital Projects

Fiscal Year	Savings Booked (kWh)	Savings in Effect (kWh)	Cumulative Savings in Effect (kWh)	Blended Cost ($/kWh)	Annual Avoided Costs	Cumulative Avoided Costs
F2007	1,722,000					$0
F2008	886,000	1,722,000	1,722,000	0.0491	$84,613	$84,613
F2009	767,000	886,000	2,608,000	0.0524	$136,650	$221,264
F2010	3,798,000	767,000	3,375,000	0.0568	$191,779	$413,042
F2011	581,000	3,798,000	7,173,000	0.0574	$412,078	$825,121
F2012	1,890,000	581,000	7,754,000	0.0611	$473,831	$1,298,952
F2013	2,750,000	1,890,000	9,644,000	0.0679	$655,262	$1,954,215
F2014	1,613,000	2,750,000	12,394,000	0.0732	$907,368	$2,861,583
F2015	1,602,000	1,613,000	14,007,000	0.0763	$1,069,798	$3,931,380
F2016	2,280,500	1,602,000	15,609,000	0.0800	$1,250,108	$5,181,489
F2017	1,506,000	2,280,500	17,889,500	0.0833	$1,490,465	$6,671,953
F2018	5,098,195	1,506,000	19,395,500	0.0843	$1,635,312	$8,307,265

This table shows that the cost of electricity in F2018 would have been $1,635,312 higher if we had no energy management program in place. It also shows that the cumulative electrical savings of the program since F2008 has reached $8,307,265 in avoided cost. Also, note that the actual rate for electricity has risen from $0.0491/kWh in F2008 to $0.0843/kWh in F2018 for a substantial 72% increase.

Our electricity bills do not show a year over year reduction in costs reflective of the level of savings shown in Table 4, despite energy management, because of increased rates and total consumption across the organization from four main factors: increased floor area, increased level of clinical services, increased plug loads, and electrification (i.e. heat recovery systems). That said, Figure 4 below illustrates where we are today (green line) and where we would be if we had no energy management program (purple line). The figure also projects where we could be if we had no increasing demand (load growth) for electricity and still realized all the savings from energy management (red line).

Figure 4 Impact of Island Health's Energy Management Program



The difference between the purple line and green line shows the true impact of the energy management program and represents energy use avoided. The gap between the green and gray lines is the actual increase observed on our utility bills. The growth in our electrical load is represented by the gap between the purple line and grey line. The sudden rise in usage experienced in F2018 was due to two new large hospitals coming on-line while the old hospitals they replaced were required to remain in operation during the nearly year-long transition period.

Fossil Fuel Cost Savings

Fossil fuel cost savings can be attributed to two main actions: savings resulting from energy efficiency projects and lower natural gas prices. In general, there are two main factors that drive fossil fuel consumption: weather patterns and changing floor area. It has been observed that, compared to Environment Canada Climate Normals, the annual heating degree days (a measure of heat demand due to cold weather) over the past decade can vary by as much as 10% each year. We can remove the effect of heating degree days (HDD) on our fossil fuel consumption by normalizing with respect to HDD to determine the real savings on a year-over-year basis (see "Normalized" columns in Table 5). We can also remove the impact of floor area by dividing consumption and cost by the floor area (see Normalized GJ/m^2 and $/m^2).

Table 5 Actual and Normalized* Fossil Fuel Consumption and Cost

		Actual		Weather Normalized		Actual		Weather Normalized	
Fiscal Year	Floor Area m²	GJ	GJ/m²	GJ	GJ/m²	$	$/m²	$	$/m²
F2008	424,479	548,963	1.29	536,648	1.26	6,810,391	16.04	6,657,365	15.68
F2009	427,525	560,928	1.31	532,296	1.25	7,579,436	17.73	7,199,892	16.84
F2010	430,014	518,986	1.21	529,563	1.23	7,279,093	16.93	7,424,205	17.26
F2011	440,562	561,189	1.27	548,744	1.25	7,597,690	17.25	7,430,486	16.87
F2012	470,811	608,650	1.29	580,781	1.23	8,311,276	17.65	7,928,659	16.84
F2013	470,333	592,632	1.26	575,578	1.22	8,228,505	17.50	7,971,355	16.95
F2014	474,414	581,966	1.23	557,882	1.18	8,510,104	17.94	8,157,128	17.19
F2015	474,679	517,862	1.09	541,237	1.14	6,643,362	14.00	6,938,698	14.62
F2016	474,928	512,552	1.08	512,454	1.08	5,333,512	11.23	5,452,872	11.48
F2017	475,047	545,197	1.15	526,797	1.11	5,296,625	11.15	5,246,130	11.04
F2018	541,259	558,202	1.03	502,446	0.93	4,990,901	9.22	4,630,709	8.56
Overall %change	27.5↑	1.7↑	20.3↓	6.4↓	26.6↓	26.7↓	42.5↓	30.4↓	45.4↓

This table illustrates total fuel costs, normalized fuel costs, fuel costs per square meter, and weather normalized fuel costs per square meter trends over the last 11 years. The data illustrates that while Island Health has increased its floor area by 27.5%, we've experienced substantially reduced costs as a result of rates being cut nearly in half and by keeping overall consumption in check at 2008 levels.

*Normalized figures are adjusted for fluctuations in weather by using a 30 year average of weather data.

Island Health Roll-Up

Tables 6a and 6b show electrical, fossil fuel and total energy consumption and cost for all owned and operated sites since F2008. Table 6b shows weather adjusted figures which are more indicative of the impact of energy management since weather effects have been removed. The tables include the organizational-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 532kWh/m² to 409kWh/m² for a 23% reduction when adjusted for weather.

Table 6a Floor Area, Energy Consumption, Energy Use Index, Cost and Cost Index

Fiscal Year	Floor Area [m²]	Electricity [kWh]	Fossil Fuel [GJ]	Total Energy [kWh]	Total Energy Use Index [kWh/m²]	Total Energy Cost $	Cost Index [$/m²]
F2008	424,479	76,800,572	548,963	229,290,177	540	10,584,120	$24.93
F2009	427,525	76,676,733	560,928	232,490,038	544	11,597,039	$27.13
F2010	430,014	75,124,016	518,986	219,286,918	510	11,547,887	$26.85
F2011	440,562	77,030,702	561,189	232,916,540	529	12,022,992	$27.29
F2012	470,811	80,160,999	608,650	249,230,323	529	13,209,753	$28.06
F2013	470,333	83,969,434	592,632	248,589,559	529	13,933,815	$29.63
F2014	474,414	84,997,725	581,966	246,654,995	520	14,732,811	$31.05
F2015	474,679	84,604,701	517,862	228,455,175	481	13,105,125	$27.61
F2016	474,928	84,706,087	512,552	227,081,757	478	12,117,532	$25.51
F2017	475,047	83,909,232	545,197	235,352,889	495	12,287,528	$25.87
F2018	541,259	104,349,120	558,241	259,416,127	479	13,790,753	$25.48

Table 6b 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	76,923,726	536,616	225,984,794	532
F2009	76,720,424	532,263	224,572,500	525
F2010	74,955,008	529,527	222,047,028	516
F2011	77,039,459	548,705	229,458,868	521
F2012	80,360,415	580,756	241,682,718	513
F2013	83,994,219	575,548	243,870,017	519
F2014	84,814,260	557,851	239,774,040	505
F2015	84,043,894	541,206	234,380,064	494
F2016	84,000,214	512,424	226,341,364	477
F2017	83,250,335	526,765	229,575,207	483
F2018	81,749,516	502,468	221,324,998	409

Figure 5 graphically shows the trend of total energy cost compared to EUI (not adjusted for weather). Reduced natural gas costs yielded significant reductions in overall cost in recent years but the addition of the two new North Island hospitals in F2018 reversed that trend. Energy use intensity is back on a downward trend.

As Island Health continues to improve and expand service delivery and quality, it's appetite for energy grows which just highlights the need to maintain and enhance the energy management program in order to keep costs in check.

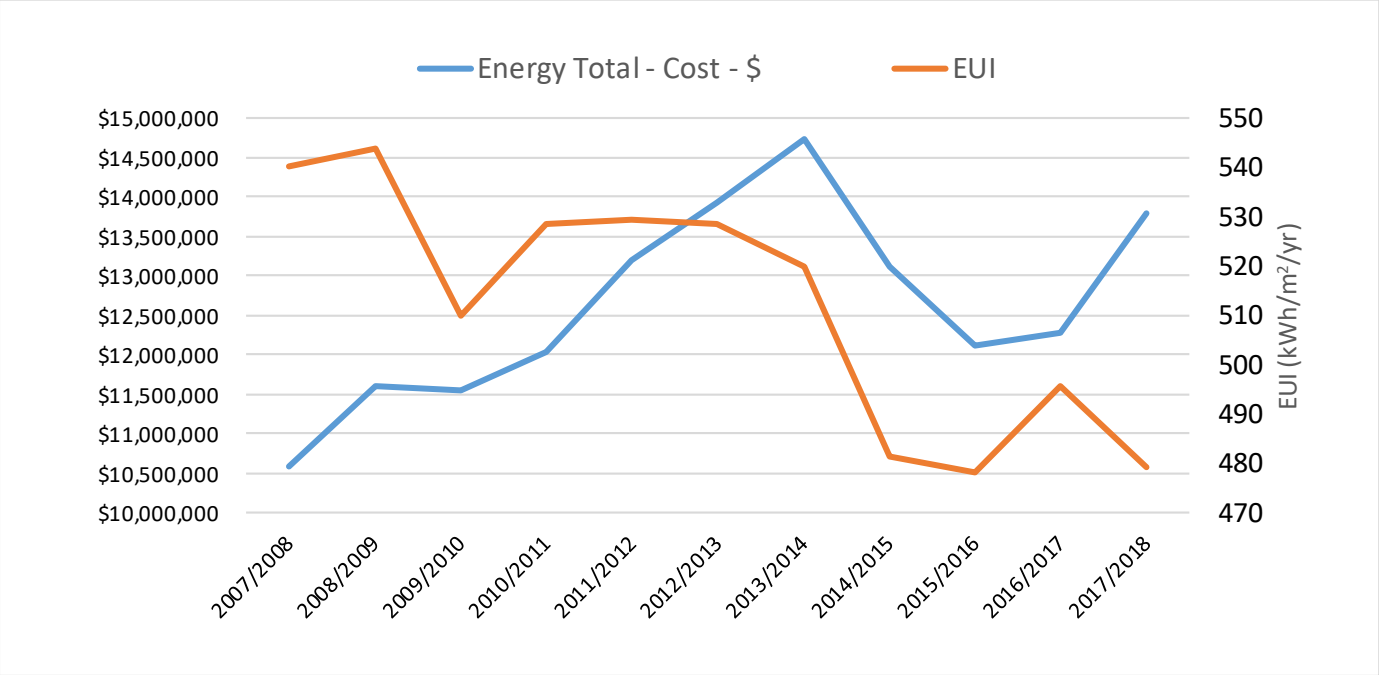


Figure 5 Trend of Total Energy Cost and Total Energy Use Index

4. Facility Benchmarks

It is important to evaluate building energy performance over time, comparing how each facility performs now with past performance and how it's performing relative to other similar facility types within the organization. At Island Health we prefer to focus on using these internal benchmarks. In other words, we compare ourselves to our own past performance and strive for year over year reductions at every site.

We have arranged our buildings by facility type, based on their health care purpose, and presented them in terms of EUI. For each facility type we can see how the EUI has either improved or worsened over the last five years and compared 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. (These figures have not been weather corrected.)

Large Acute Care

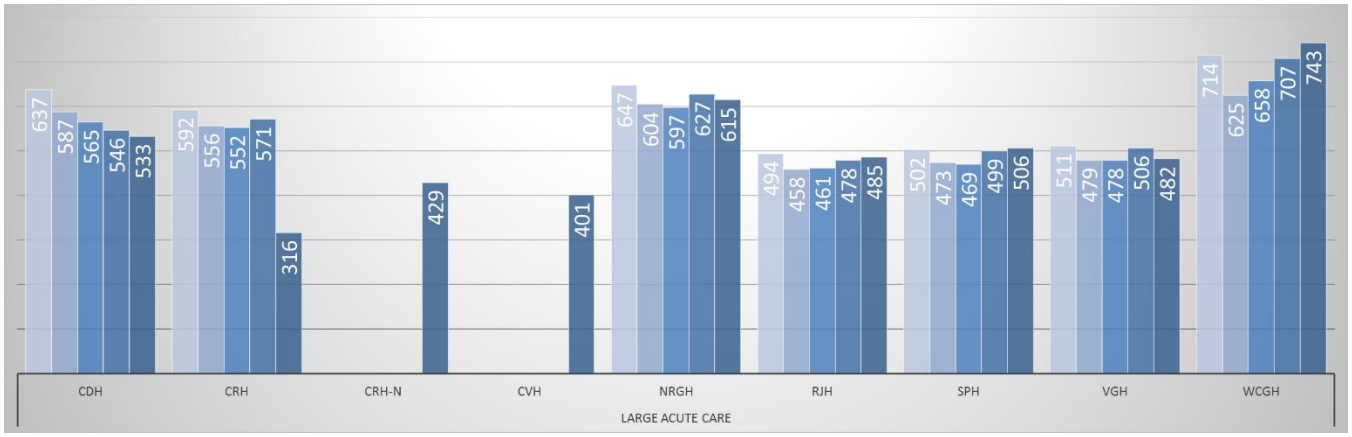
Large Acute Care have unique requirements and provide the most services. Our Large Acute Care facilities consume the most energy of all our buildings, accounting for 82% of all consumption, 80% of cost and 65% of all GHG emissions in F2018.

Table 7 Large Acute Care for F2018

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Use Index [kWh/m²]	EUI % Difference vs F2008	Total Cost Index [$/m²]	Emissions [tCO_2e]
CDH	16,498	3,168,461	5,621,913	533	-15.34%	$27	1,043
CRH	16,335	9,512,700	1,869,985	697	-48.15%	$17	354
CBR*	32,316	9,512,700	4,342,618	429	n/a	$28	881
CVH*	39,826	11,420,700	4,547,392	401	n/a	$27	938
NRGH	54,441	13,771,933	19,685,241	615	-9.79%	$32	3,410
RJH	155,304	26,852,359	48,544,580	485	-5.65%	$23	8,459
SPH	14,302	3,246,031	3,990,714	506	-5.82%	$28	751
VGH	49,554	9,164,376	14,729,340	482	-1.82%	$24	2,742
WCGH	14,117	3,721,455	6,761,860	743	-2.24%	$37	1,254

*New Campbell River and Comox Valley hospitals.

Figure 6 Large Acute Care F2014 to F2018 EUI Performance (kWh/m²)



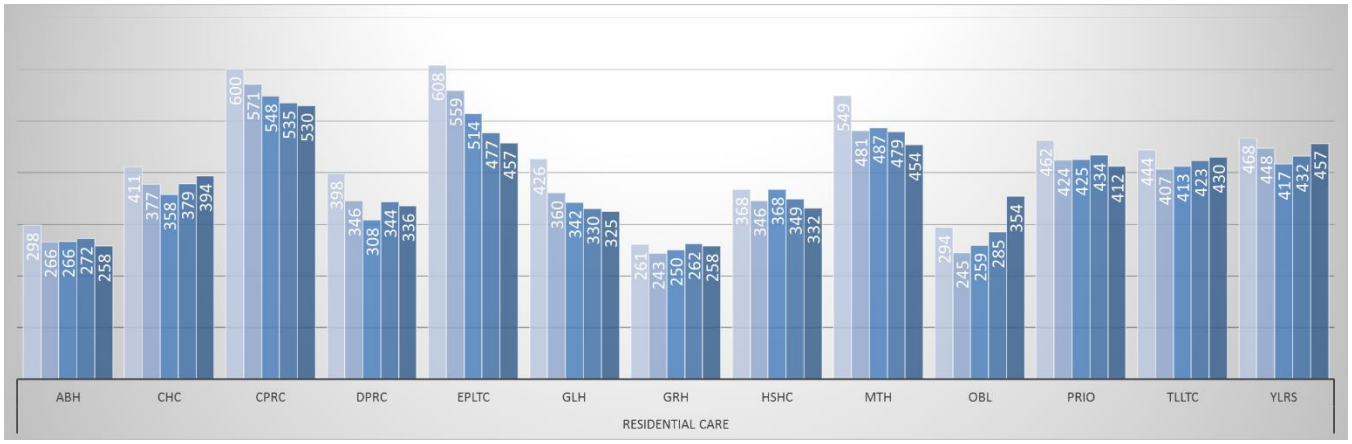
Residential Care

Residential 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. Residential Care facilities represent 12% of our energy consumption, 11% of cost and 13% of our GHG emissions in F2018.

Table 8 Residential Care for F2018

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Index [kWh/m²]	EUI % Difference vs F2008	Total Cost Index [$/m²]	Emissions [tCO₂e]
ABH	9,726	1,123,384	1,381,511	258	-30.74%	$15	260
CHC	5,328	814,030	1,283,788	394	-22.13%	$22	239
CPRC	3,662	592,979	1,346,455	530	-16.48%	$28	248
DPRC	6,928	740,659	1,584,263	336	-12.26%	$16	292
EPLTC	4,000	524,378	1,303,733	457	-16.99%	$22	240
GLH	7,609	795,442	1,674,125	325	-26.16%	$16	309
GRH	17,517	999,210	3,518,223	258	-28.51%	$12	642
HSHC	1,600	266,630	264,113	332	-11.50%	$24	50
MTH	2,629	209,255	983,813	454	-15.80%	$21	179
OBL	14,381	1,316,074	3,771,829	354		$15	691
PRIO	7,149	839,860	2,105,572	412	0.00%	$21	387
TLLTC	4,651	1,885,205	115,511	430	-15.63%	$25	41
YLRS	5,467	818,562	1,677,625	457	-31.33%	$23	310

Figure 7 Residential Care F2014 to F2018 EUI Performance (kWh/m²)



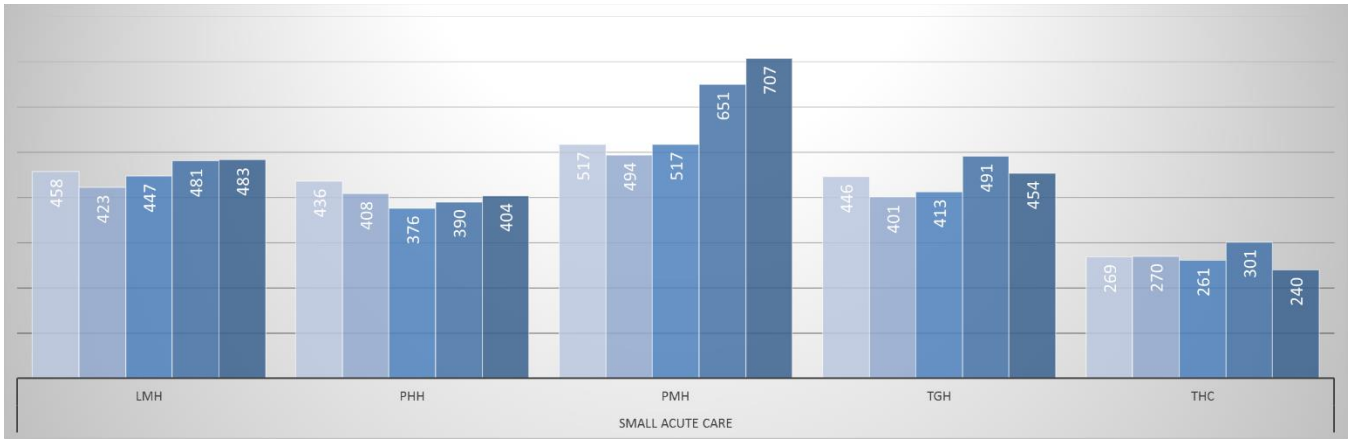
Small Acute Care

Small Acute facilities are mostly located in and serve rural communities. They represent 2% of our energy consumption, 4% of cost and 2% of our GHG emissions in F2018.

Table 9 Small Acute Care for F2018

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Index [kWh/m²]	EUI % Difference vs F2008	Total Cost Index [$/m²]	Emissions [tCO₂e]
LMH	3,981	734,403	1,189,912	483	-16.18%	$58	270
PHH	4,463	1,684,761	118,954	404	-27.03%	$27	47
PMH	1,176	361,568	470,272	707	20.82%	$92	107
TGH	1,700	285,597	485,651	454	-6.47%	$49	122

Figure 8 Small Acute F2014 to F2018 EUI Performance (kWh/m²)



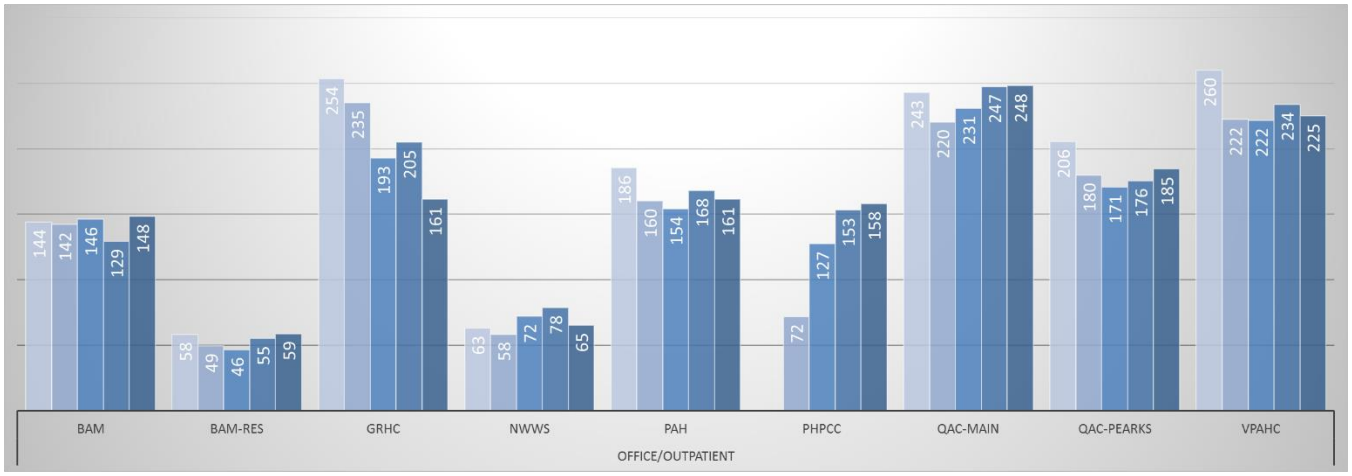
Office/Outpatient Facilities

These facilities have been grouped together due to their similar usage profiles. Operating typically during weekday office hours, these facilities consume the least amount of energy within our portfolio. Office/Outpatient facilities represent 2% of our energy consumption, 2% of cost and 1% of our emissions in F2018.

Table 10 Office/ Outpatient F2018

Site	Floor Area [m²]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Index [kWh/m²]	EUI % Difference vs F2008	Total Cost Index [$/m²]	Emissions [tCO_2e]
BAM	700	85,089	18,683	148	-6.52%	$20	5
BAM-Res	279	16,368	0	59	-37.38%	$7	0
GRHC	799	128,936	0	161	-44.17%	$20	1
NWWS	1,858	88,906	31,899	65	34.97%	$7	7
PAH	468	75,499	0	161	-22.78%	$21	1
PHPCC	475	75,083	0	158	0.00%	$21	1
QAC-Main	8,909	803,118	1,406,956	248	-1.21%	$14	261
QAC-Pearks	3,905	185,807	534,810	185	-20.18%	$10	98
VPAHC	1,181	148,011	117,768	225	0.00%	$18	23

Figure 9 Office/ Outpatient F2014 to F2018 EUI Performance (kWh/m²)



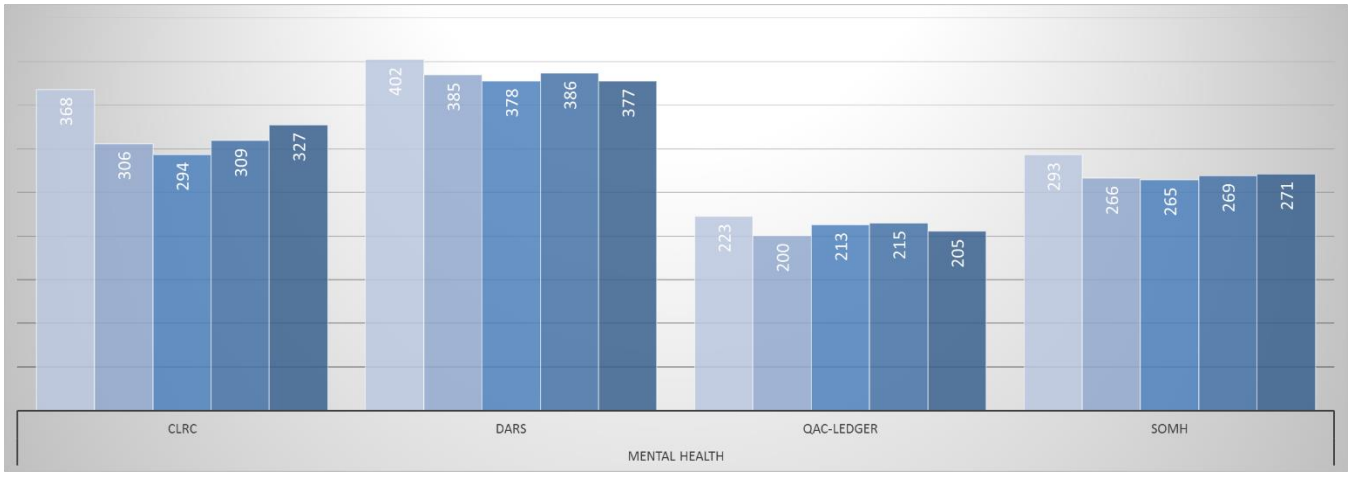
Mental Health

These facilities serve a variety of patients who require mental health and substance use services. These facilities represent 2% of our energy consumption, 2% of cost and 2% of our emissions in F2018.

Table 7 Mental Health F2018

Site	Floor Area [m^2]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Index [kWh/m^2]	EUI % Difference vs F2008	Total Cost Index [$/$m^2$]	Emissions [tCO_2e]
CLRC	5,440	622,420	1,157,787	327	-27.59%	$17	214
DARS	1,733	170,554	483,575	377	-14.67%	$21	89
QAC-Ledger	2,772	208,747	360,656	205	-24.86%	$13	67
SOMH	3,497	337,929	610,942	271	-22.21%	$17	113

Figure 10 Mental Health F2014 to F2018 EUI Performance (kWh/m^2)



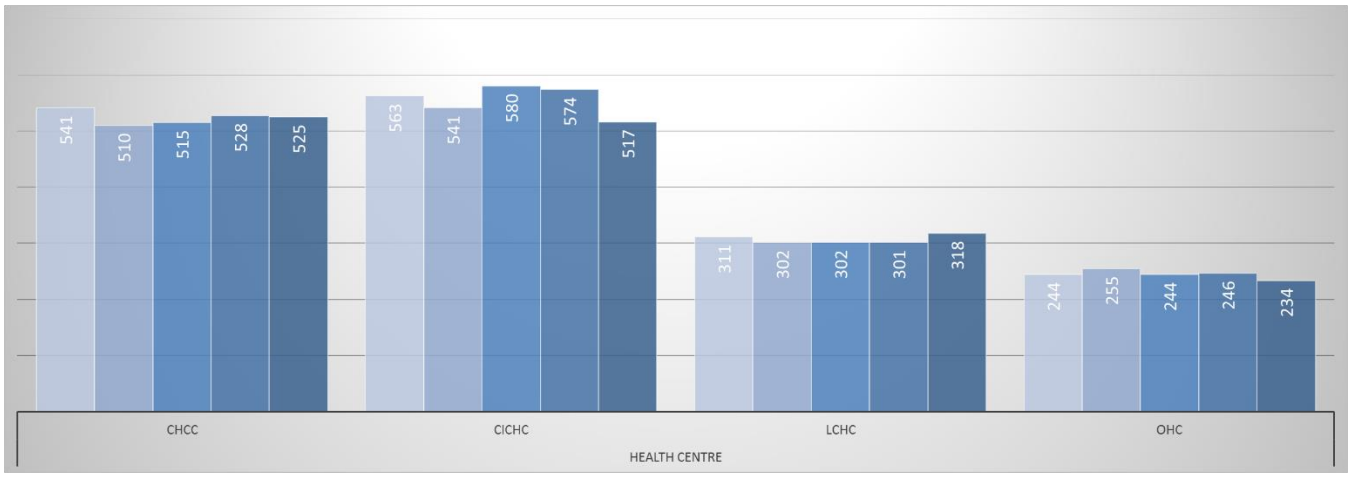
Health Centre

These facilities serve patients on a short term, primary care or urgent care basis. Health Centres represent 2% of our energy consumption, 3% of cost and 2% of our emissions in F2018.

Table 8 Health Centre F2018

Site	Floor Area [m^2]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Index [kWh/m^2]	EUI % Difference vs F2008	Total Cost Index [$/$m^2$]	Emissions [tCO_2e]
CHCC	5,116	864,224	1,824,209	525	-11.18%	$27	337
CICHC	2,129	473,987	625,947	517	1.72%	$65	143
LCHC	3,348	442,218	622,005	318	-43.19%	$21	116
OHC	3,638	597,228	252,466	234	0.00%	$17	52

Figure 11 Health Centre F2014 to F2018 EUI Performance (kWh/m^2)



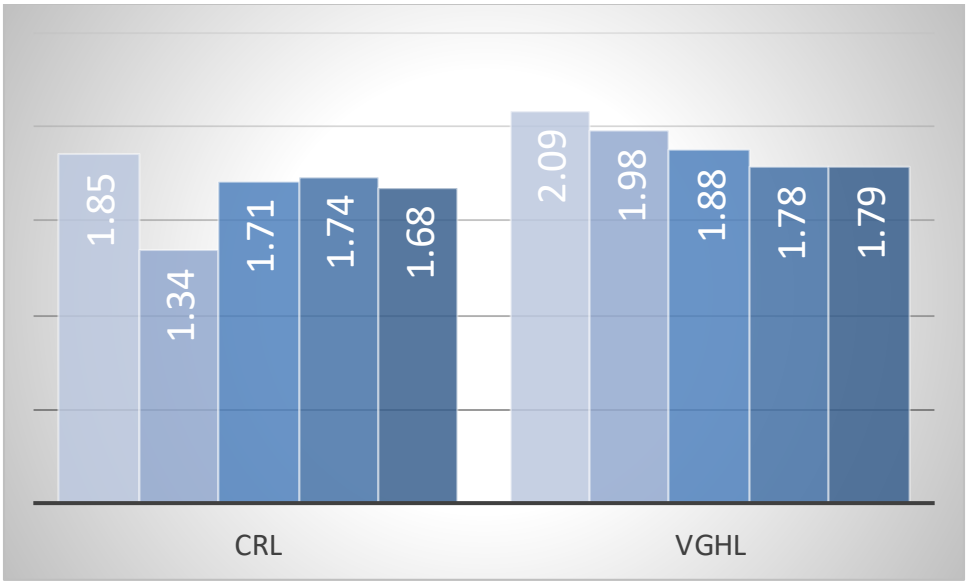
Laundry Facilities

Laundry facilities are unique because energy use is driven by the amount of laundry processed at these facilities. There is a small amount of energy used to maintain space comfort. They represent 7.4% of our energy consumption, 5.8% of cost and 7% of our emissions in F2018.

Table 9 Laundry Facilities F2018

Site	Laundry [kg]	Electricity [kWh]	Fossil Fuel Energy [kWh]	Total Energy Index [kWh/kg]	EUI % Difference vs F2008	Total Cost Index [$/kg]	Emissions [tCO_2e]
CRL	3,180,458	604,894	4,733,343	1.68	-26.54%	$0.06	856
VGHL	5,975,538	1,851,559	8,817,209	1.79	-8.53%	$0.07	1,603

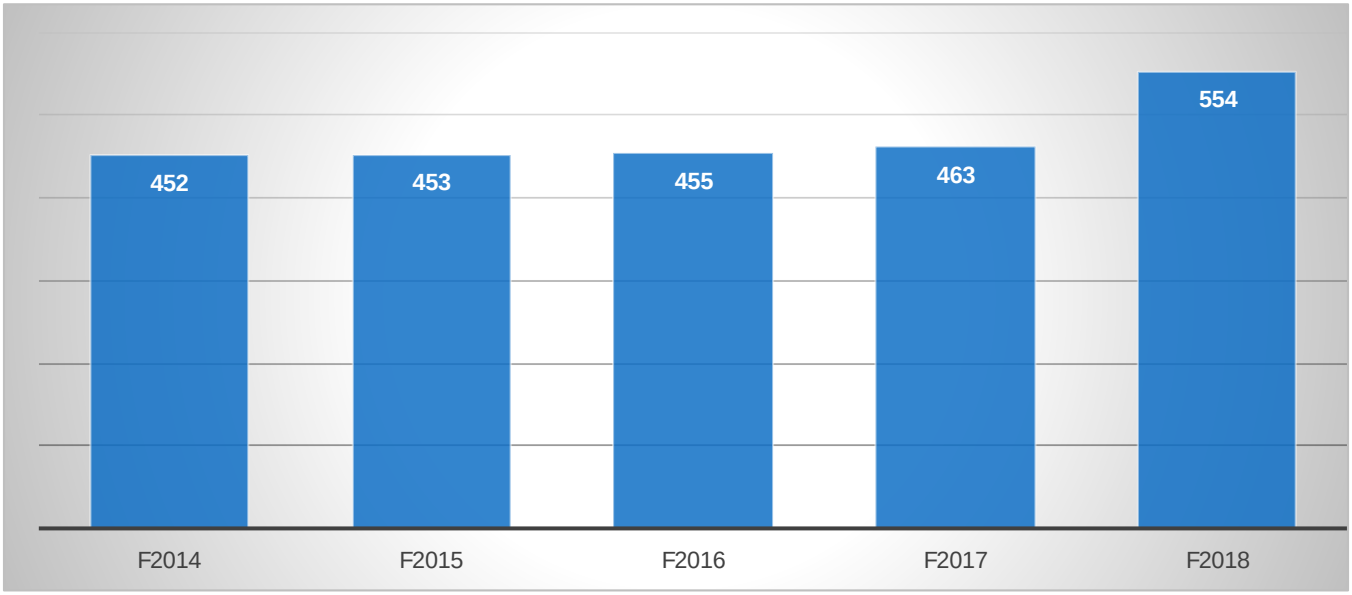
Figure 12 Laundry Facilities F2014 to F2018 EUI Performance (kWh/kg)



P3 Performance

The energy performance of the Patient Care Centre at the Royal Jubilee Hospital is monitored and reported monthly. The chart below shows that the EUI of the Patient Care Centre has continued to be steady over past several years. However, in F2018 there was an increase in the building's energy use due to more occupied floor area.

Figure 13 RJH Patient Care Centre EUI (kWh/m²)



Two new public-private-partnership (P3) hospitals were completed and commissioned in F2018 to replace aging existing hospitals, one in Campbell River and one in Comox, BC. Both facilities were enrolled in BC Hydro's New Construction Program and were designed to meet the LEED Gold standard. As a result, these facilities are expected to perform substantially better than facilities designed to meet the building code minimum. Actual performance results and more details of these new hospitals will be reported on in the 2019 SEMP.

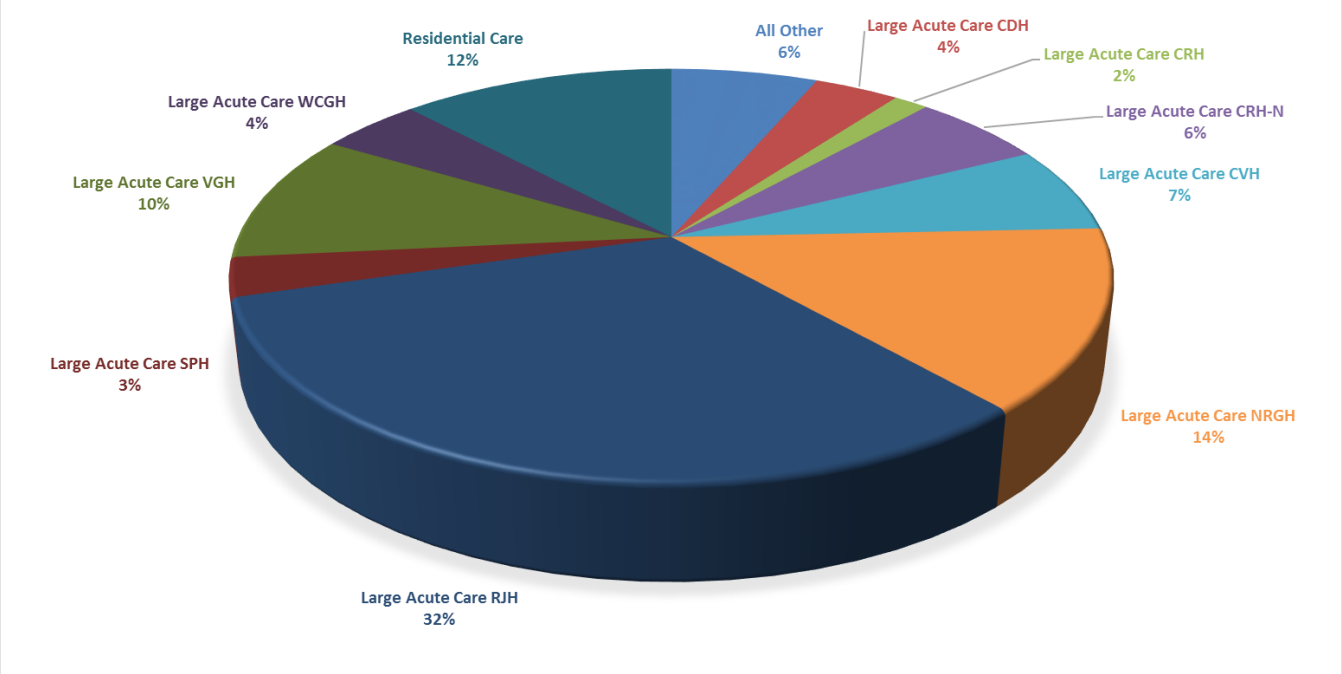
Future Island Health Facilities

A major new building will be completed in F2020. The Summit @ Quadra Village is a new 320-bed residential care facility being constructed by the Capital Region Hospital District. Though Island Health will not own the facility, we will operate and maintain it and pay all utility costs. Having The Summit enrolled in BC Hydro's New Construction Whole Building Design Program enabled the energy team to influence design in order to achieve a high performance building that will use substantially less energy that it otherwise would have.

Sites We are Focusing On

We mainly focus our efforts on our large acute care centres which, in F2018, accounted for 82% of Island Health's total energy bill.

Figure 14 Pie Chart of Total Energy Use by Building Type



5. Energy Studies

Table 14 lists energy studies Island Health has completed in F2018 and has underway or in planning stages for F2019 and F2020. Many of the studies are honing in on specific opportunities or more specialized initiatives. Other criteria for completing an energy study includes sites that have not had an energy study in the last three to four years and have a high EUI and/or high total energy use.

On average Island Health invests over $200,000 per year on studies. Historically BC Hydro covered 100% of the cost of studies that met a broad range of criteria. However, BC Hydro has reduced their funding and scope of interest down to just funding a maximum of 50% of the cost and limiting scope to lighting and HVAC controls. 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 should sufficient measures assessed in the study be implemented. Completion of energy studies is the life blood of an energy management program and the basis for sound decision making for projects and energy reduction strategies. Energy studies are also required to apply for Carbon Neutral Capital Program funding from the Ministry of Health.

Table 14 Studies Recently Completed and Planned

Site and Title	Cost
Completed in F2018	
CICHC DHW Heat Pump System Study	$13,500
TLLTC Eplus Boiler Replacement Options	$13,600
NRGH PIEVC Study	$80,000
NRGH Chiller Systems Study	$61,000
RJH Final Look at D&T Airside Heat Recovery	$25,500
DPRC HVAC controls	$3,000
DARS, SOMH, Pandora BC Hydro Energy Study	$28,700
VGH Water Study	$7,500
SPH Optimize DHW System	$6,000
Yucalta Heat Pumps Study	$17,000
RJH Royal West	$13,000
RJH C-Op	$104,000
NRGH ICU Climate Change Impact Study	$7,500
VGH Biomed Envelop Study	$14,500
EMP Return Air & Heat Recovery Penthouse	$12,500
Total	**$407,300**

Proposed or Underway in F2019 and F2020	
NRGH Thermal Plant ECM Assessment	$35,000
NRGH Rehab AHU Renewal and ECM Assessment	$60,000
C-Op Round II: EPLTC, TLLTC, CDH, CPRC	$15,000
C-Op Round II: WCGH	$20,000
VGH AHU Renewal & Optimization	$20,000
Cumberland Laundry Comprehensive Study	$25,000
RJH C-Op (balance of project)	$50,000
VGH DHW System Renewal & Optimization	$25,000
SPH BC Hydro Custom Study	$15,000
VGH Zoning Phase 3	$25,000
RJH Water Study	$20,000
RJH PCC Comprehensive Study	$45,000
Total	**$355,000**

6. Awareness and Behaviour Change

Island Health recognizes the role and impact employees have on reducing energy consumption and GHG emissions. The Energy Department leads the Energy Wise Network Program (EWN) which supports facilities maintenance and operations staff (FMO) at all owned sites.

Energy Wise Network Program

Building on the success of last year's EWN campaigns, the year-long Building Energy Challenge Campaign focuses on FMO staff and includes a series of activities targeting different continuous optimization opportunities. The intent is to encourage new habits of looking for energy saving opportunities as part of daily rounds.

As a result of the 2017 "fans and pumps" campaign for example, the Victoria General Hospital FMO team identified substantial energy savings associated with a pair of old heating hot water pumps. New pumps were installed along with variable speed drives resulting in measureable energy savings along with increased system reliability.

Figure 15 - Victoria General Hospital's new heating hot water pumps.

This year's training focuses on direct digital controls (DDC) opportunities and promotes best practices and provides low cost/no cost paths to energy savings. Examples include schedules to turn off equipment when not needed, reduced heating or increased cooling temperature setpoints after-hours, improved sequences of operations, and enhanced maintenance procedures.

In an effort to make it easier for FMO staff to implement the concepts promoted in the webinars, checklists have been developed to help crews identify energy savings opportunities.

FortisBC provided funding in the amount of $10,375 in F2018 to cover the cost of developing and hosting three webinars. These training webinars encouraged dialogue amoung FMO staff from various locations and were so well received that the energy team is hosting similar webinars in F2019 with support from both FortisBC and BC

Hydro.

Figure 16 Island Health F2018 Building Energy Challenge – Webinar slide

IMPROVING BUILDING PERFORMANCE USING DDC

Common COp Measures

Item	Measure	
1	Reduce Equipment Runtime	Schedules
2	Optimize Economizer Operation	Sequences
3	Eliminate Simultaneous Heating and Cooling	Sequences
4	Optimize Supply Air Temperature	Sequences
5	Optimize Zone Temperature Setpoints	Setpoints
6	Eliminate Unnecessary Lighting Hours	Schedules
7	Optimize Ventilation Rates	Setpoints
8	Volume Control for Pumps and Fans	Setpoints
9	Add / Improve Chilled Water Temperature Reset	Sequences
10	Eliminate Passing (leaky) Valves	O&M

7. Risks

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

- Persistence – 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.

- 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.

- 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 an option without Island Health incurring capital debt so alternatives are being explored.

- 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 Continuous Optimization program funding has been reduced to about 15% of what it was. To make matters even 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.

Risks are being addressed in part by setting aggressive energy and greenhouse gas emission targets for all new construction projects. Setting targets for existing sites is also being used to mitigate the risks, in particular at sites that have had extensive energy retrofits. The key going forward will be to ensure that infrastructure renewal, renovations, and additions to facilities include energy reduction features as part of design.

Behavior change and training of staff will help ensure energy becomes a priority for everyone in Island Health. Training is helping facility operators monitor energy use performance as well as ensure we only purchase the most energy efficient products and equipment and capitalize on all available incentive programs.

8. Opportunities

Fortunately, there are opportunities for saving energy and reducing GHG emissions. Below, we provide an overview of those we've been actively employing or are considering.

Operations

Recommissioning and Continuous Optimization (C-Op)

Island Health has enrolled 23 facilities in BC Hydro's Continuous Optimization program (C-Op). Phase I and Phase II sites have completed implementation and post-implementation verification sessions. For the Phase III sites, VGH has completed implementation and is now in the coaching phase. NRGH has completed the investigation phase and is currently implementing measures. RJH is in the investigating phase and will be moving to implementation in the latter part of F2019. Five sites have been identified and enrolled in the Round 2 program. CDH, CPRC, EPLTC, and TLLTC will be undergoing a Refresh (i.e. check-in) investigation while WCGH will go through a full recomissioning.

Recommissioning and continuous optimization are the best strategies to arm operators with because benefits are achieved without incurring major capital expense. These strategies help ensure we get the most out of our existing assets and that should always be our first step. It takes diligence, patience, and consistent support to achieve success. However, once a site has gone through the program, savings often exceed expectations.

Table 15 C-Ops Sites within Island Health

Phase I	Queen Alexandra Centre for Children Saanich Peninsula Hospital Aberdeen Hospital Priory Hospital Ladysmith Community Health Centre Trillium Lodge[1] Eagle Park[1] Cowichan District Hospital[1] Chemainus Health Care Centre Cairnsmore Place[1] West Coast General Hospital[2]
Phase II	Cowichan Lodge Lady Minto Gorge Road Hospital Glengarry Hospital Yucalta Lodge Dufferin Place Cumberland Health Centre Port Hardy Hospital Campbell River Hospital
Phase III	Victoria General Hospital Nanaimo Regional General Hospital Royal Jubilee Hospital

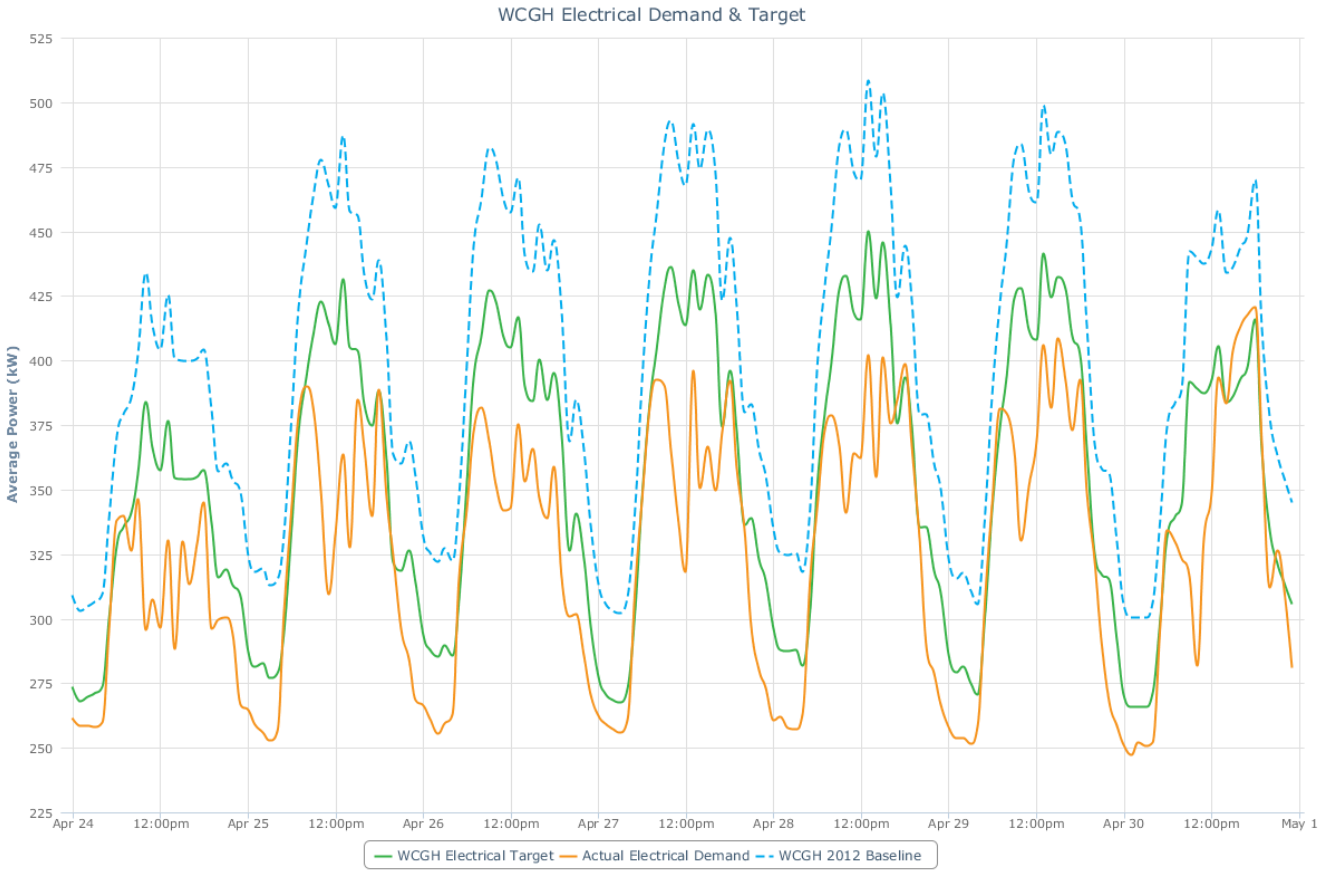
Energy Management Information System (EMIS)

Island Health and BC Hydro have invested in the implementation of an EMIS. To date we have 23 sites where remote monitoring of the main electrical and natural gas utilities is in place.

We have provided training to facilities staff so they can use the tool for regular monitoring and troubleshooting of energy use anomalies and have developed routine reports and e-mail alerts so facility operators can extract more useful and timely information from the system. This system is also being used for the implementation of site specific targets as shown below for WCGH, for example. All sites that have the EMIS system installed have site specific targets in place.

Unfortunately, BC Hydro has abruptly terminated it's funding of this EMIS program effective July 1st, 2018. Island Health is now considering its options.

Figure 17 Sample Trend from WCGH Showing Baseline, Actual, and Target Elecrtrical Demand



Optimizing Purchasing Decisions

Significant opportunity lies within the purchase of equipment and supplies for Island Health. Deployment of a policy for smarter purchasing of building equipment that is, for example ENERGY STAR rated, or for furniture and materials that are healthier will improve indoor air quality and reduce energy use.

Capital Projects

New Buildings

All new Island Health facilities strive for the highest levels of patient care and lowest energy use. It is our intent that all new construction and major renovations participate in the BC Hydro New Construction Whole Building Design Program to model and evaluate building performance before it is built.

Evidence 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 action on 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 build all new construction to the LEED Gold standard. The Province's 2016 Climate Leadership Plan further mandates a 10 year emissions reduction plan and a 10 year climate change adaptation plan. To meet those requirements the new facilities will have to have very low greenhouse gas emissions (i.e. Net Zero) and be adapted for future climate.

Heat Recovery

Heat recovery will continue to be a valuable opportunity in retrofit and new construction projects. By utilizing heat from building exhaust and other sources and harvesting it with heat pumps for example, we can substantially lower natural gas consumption and GHG emissions.

Alternative Energy

Solar thermal and solar electric panels have been installed at several Island Health sites. Though costly, these systems do offset natural gas and purchased electricity and have the potential to provide some level of self sufficiency.

Figure 18 Solar Electric Panels at WCGH

Island Health has spent several years reviewing the costs and benefits of installing biomass boilers at a handful of sites. The most favourable economics seems to be at larger facilities due to the economies of scale and boilers that are more forgiving of variability in fuel quality. In spite of a good business case, it has not been possible yet to secure funding for a biomas boiler plant in part due to capital funding constraints, as well as, increased risk associated with quality and reliability of biomass fuel supply.

Lighting & Lighting Control

Many lighting projects have been implemented at several sites throughout Island Health this past year. Conversion to LED technology wherever possible and implementing lighting controls and daylight harvesting continue to be an opportunity for savings. Lighting projects also result in much lower maintenance costs as well as better comfort for patients and staff.

Steam to Hot Water Conversion

Several acute sites produce steam from their heating plants. While steam is necessary for humidification and sterilization, converting to hydronic (hot water) based systems, where possible, will lower natural gas consumption and decrease GHG emissions.

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, thermal energy exchange systems (i.e. Thermenex, geo-exchange) 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 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 enegry. Our facilities can therefore benefit from zoning and scheduling retrofits that only ventilate indoor spaces when they're 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 wasted energy. 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, VIHA's senior management acknowledges receipt and approval of this Strategic Energy Management Plan.

, date: October 24, 2018

Brett Street, Director of Facilities Maintenance & Operations (South Island)

, date: October 24 2018

BRETT STREET PER

Dean Anderson, Corporate Director of Facilities Management

, date: October 24, 2018

James Hanson, Vice President, Operations and Support Services

Acknowledgements

The Government of British Columbia

The Government of British Columbia is a leader and one of the first jurisdictions in the world to establish carbon reduction targets. The Government's Carbon Neutral Capital Program (CNCP) has been awarding funding to the BC Health Authorities since F2015 for GHG reduction projects. To date, Island Health has secured more than $4MM under this 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 Management Team, access to capital, and the priority given to energy conservation.

BC Hydro

We thank BC Hydro for their support in providing the Energy Management Team with access to funds for energy managers, studies, capital projects, 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 team and energy management program. We also appreciate the ongoing training via 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, as well as, funding for energy studies, capital project incentives, equipment rebates, and training opportunities such as the EWN program.

FortisBC Energy Solutions Manager

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

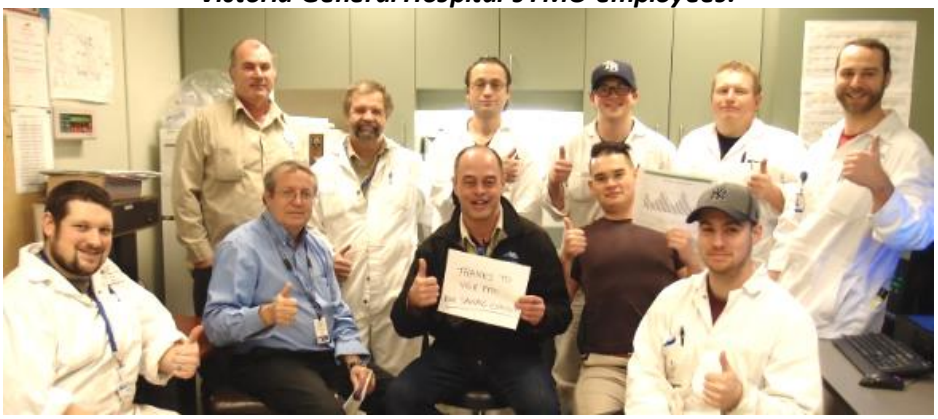
Corporate Director Facilities Management

Thanks also to Cecil Rhodes for his years of support and guidance. We are pleased to welcome Dean Anderson in his new position as Corporate Director and look forward to his leadership and support of the Energy Management Team.

Facilities Maintenance and Operations (FMO)

As best practices in energy management becomes more embedded in building maintence, 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.

Victoria General Hospital's FMO employees.



Design and Construction

The Design and Construction 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 many sites. Recent new buildings have been built to LEED Gold and are world class examples of energy efficient design. We thank them for their support and collaboration.

Capital Planning & Capital Finance

Thank you to Capital Planning and Capital Finance for their support of the Energy Management Team. These departments are essential to securing and managing the necessary funding 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

Energy conservation and action to address climate change in all that we do.

Energy department Purpose

To provide the leadership, direction, and expertise required to achieve energy efficient, sustainable health care facilities on Vancouver Island. By identifying and prioritizing opportunities, communicating plans, securing funding, and monitoring and evaluating performance we will achieve our vision for the health of our communities.

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	ABER
Bamfield Outpost Hospital	BAM
Bamfield Outpost Hospital Nurse Residence	BAM-Res
Cairnsmore Place Residential Care	CPRC
Campbell River Hospital	CRH
Chemainus Health Care Centre	CHCC
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	TOLM
Nanaimo Regional General Hospital	NRGH
Nanaimo Wentworth Street	NWWS
Oceanside Health Centre	OHC
Port Alice Health Centre	PAH
Port Hardy Hospital	PHH
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
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/m²): 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 (m²): 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/m²): 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/m²): 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.

Appendix C - 2018 Energy Management Assessment (EMA) Goals

As a result of the latest EMA workshop with the Island Health facilities management team in February 2018, it is recommended that current efforts focus on the following areas to improve our energy management business practices:

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. Repositioning the energy conservation program as a broader operational improvement initiative that delivers total strategic value, far beyond just lower operating costs.

Organizational Integration

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

Targets / Reporting

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

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.

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.

Specific action plans for addressing the weaknesses in each of these five areas of focus are currently under development. They will be included in next year's SEMP after stakeholder consultantion has concluded and action plans approved. How much progress has been made in each area will also be reported on in the 2019 SEMP.