

# Strategic Energy Management Plan

Vancouver Island Health Authority  
2017



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## Executive Summary

Island Health's Strategic Energy Management Plan (SEMP) for F2018 provides our road map for the coming year to ensure we meet our goals and targets to reduce energy consumption and greenhouse gas (GHG) emissions. Since the last SEMP was written for F2017 the provincial government has changed; the Climate Leadership Plan was issued August 2016; BC Hydro's mandates have changed and may change again; and FortisBC's mandate also changed to double incentives for gas reduction projects. As these organizations grapple with implementing changes identified in the Climate Leadership Plan and by change in government, Island Health is also looking at how to optimize opportunities while carrying out on going commitments. The important thing for Island Health is to remain focused on the goals to reduce greenhouse gas emissions, eliminate wasteful consumption of utilities and keep utility budgets in check.

Internally the challenges include: increasing size of the organization; increasing reliance on energy intensive technology to deliver health care; decreasing incentives and capital for projects; reductions in operating budgets and escalating energy costs. Within these pressures Island Health has committed to meet legislated carbon emissions reduction targets and will also need to adapt for changing climate. The Energy Efficiency and Conservation (EEC) Department has helped the organization with reducing the effects of the pressures and challenges. Since F2008 energy management has achieved a 10% reduction in the overall energy use per square meter of floor area. Offsetting this reduction is a 12% increase in square footage and a 69% increase in electrical energy prices. Without the decline in overall energy use the cost pressures would have been significantly higher.

One of the tools used to guide the program is BC Hydro's Energy Management Assessment (EMA). The EMA is used to assist Island Health in charting two years of activities so that we will achieve our energy reduction goals and GHG emissions reduction target. The EMA process helps Island Health ensure we are taking a fulsome approach to energy management and sustainability. The five areas of focus we are looking at since the EMA session in February, 2016 are: policies, targets/reporting, plans/actions, teams/committees, and employee awareness/training. This review has resulted in the following five action items which Island Health has either already implemented or is working towards implementing in the coming year:

- update the energy mission statement and enact a sustainability policy;
- work with Facilities Maintenance and Operations (FMO) on site specific targets and establishing a protocol for operations staff to follow to achieve and maintain energy targets;
- work with the organization to reinvest energy savings into energy projects;
- work with FMO to identify an energy conservation champion for the department and work to ensure operating and maintenance procedures support energy conservation; and
- use the behavioral change program to fully benefit from more employees practicing work place conservation.

Some of these objectives have been fairly straightforward to achieve – such as the mission statement and setting site specific targets (see Appendix D). Others, such as developing a green maintenance fund, remain as proposed and have not yet been adopted by Island Health.

In the short term this year's commitments for Island Health are:

- 1.2 GWh reduction in electrical energy
- 12,000 GJ reduction in natural gas

The long term goal is to reduce greenhouse-gas emissions for the entire organization by 33% below our 2007 levels by 2020. *The Carbon Neutral Action Report* provides the overview on how this is being achieved. The challenge is the need to invest at a significantly higher rate than is presently occurring.

The basis for our plans this year and the next five years is from the EEC Department's Master Project List. This repository of ideas, estimates and energy savings calculations allows the department to line up the necessary steps to ensure ongoing energy savings each year and to identify the capital expenditure required to meet the GHG emission reduction targets. By ensuring that we have sufficient energy studies underway and applying for capital, there should be a consistent reduction in energy consumption going forward.

Also shown in the document is the value and benefit received from our strong partnership with BC Hydro who continues to support Island Health by partially funding two Energy Managers, energy studies, and incentives for energy conservation initiatives. Also BC Hydro supports the the energy wise network program, and provides expertise and resources for energy management.

Fortunately for Island Health there is also strong support from FortisBC with three funded Energy Specialists, incentives for energy studies and energy conservation initiatives, special funding for the EEC Department's behavioral change program for all employees and training for Facilities Maintenance and Operations staff. It is through these valuable partnerships that we are able to enhance and optimize energy conservation and sustainability at Island Health.



## Table of Contents

|   |    |
|---|----|
| Executive Summary .....                         | 2  |
| Table of Contents .....                         | 4  |
| 1. Purpose.....                                 | 6  |
| Key Performance Indicators.....                 | 6  |
| Organizational Chart .....                      | 8  |
| 2. Five Year Plan .....                         | 9  |
| 3. How Are We Doing? .....                      | 13 |
| Electrical Energy Savings Booked.....           | 13 |
| Natural Gas Energy Savings.....                 | 14 |
| GHG Emissions and Reduction .....               | 15 |
| Electrical Cost Savings.....                    | 17 |
| Fossil Fuel Cost Savings.....                   | 18 |
| Island Health Roll-Up .....                     | 20 |
| 4. Facility Benchmarks .....                    | 21 |
| Large Acute Care .....                          | 22 |
| Residential Care .....                          | 23 |
| Office/Outpatient Facilities.....               | 25 |
| Mental Health .....                             | 26 |
| Health Centre .....                             | 27 |
| Laundry Facilities.....                         | 28 |
| P3 Performance.....                             | 29 |
| Future Island Health Facilities.....            | 29 |
| Other Benchmarks .....                          | 31 |
| Sites We are Focusing On.....                   | 32 |
| 5. Energy Studies .....                         | 33 |
| 6. Awareness and Behaviour Change Program ..... | 35 |
| 7. Budget .....                                 | 39 |

|  |    |
|--|----|
| 8. Risks .....   | 42 |
| 9. Opportunities .....   | 43 |
| Operations.....  | 43 |
| Capital Projects .....   | 45 |
| Senior Management Approval .....   | 47 |
| Acknowledgements .....   | 48 |
| Appendix A – Policy – Vision, Purpose and Values Statement .....           | 51 |
| Appendix B - Site Acronyms and Definitions .....                           | 56 |
| Appendix C - 2016 Energy Management Assessment (EMA) Goals .....           | 58 |
| Appendix D – Site Specific Targets .....                                   | 59 |
| Appendix E - Green Survey Infographic.....                                 | 61 |
| Appendix F – Past Studies.....   | 62 |
| Appendix G – Summary of Efforts to Implement Biomass at Island Health..... | 63 |

## 1. Purpose

The Strategic Energy Management Plan (SEMP<sup>1</sup>) is our business plan for reducing energy consumption, utility cost 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 Management Team will work with our stakeholders to adjust the plan.

By looking at actual consumption and cost 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 by changing energy rates and taxes. Last fiscal year, Island Health consumed 83,741,596 kWh of electricity (1% decrease from previous year) at a cost of \$6,973,057 (3% increase). We also consumed 530,887 GJ of Natural Gas (6.4% increase) at a cost of \$5,171,568 (0.6% decrease). Our organization had an overall EUI of 486 kWh/m<sup>2</sup> (3.6% increase).

### Key Performance Indicators

Each year, Island Health's EEC department meets with BC Hydro and FortisBC to establish energy reduction targets. Overarching these targets are the BC Government's legislated GHG reduction targets<sup>2</sup> 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 to meet Island Health's objectives.

The main approach used to reduce consumption is thru energy studies that identify energy conservation projects. The energy conservation projects will have paybacks and the utilities will provide incentives to improve the paybacks. Energy conservation projects are made up of one or more energy conservation measures (ECM). The ECM's savings are booked with the utilities and go against the committed targets. As we cannot account for energy creep, weather changes or changes in use of the facility we refer to the energy saved by the completed ECMs as *avoided energy use* – meaning the difference between the actual energy use and the energy we would have used had the ECMs not been implemented.

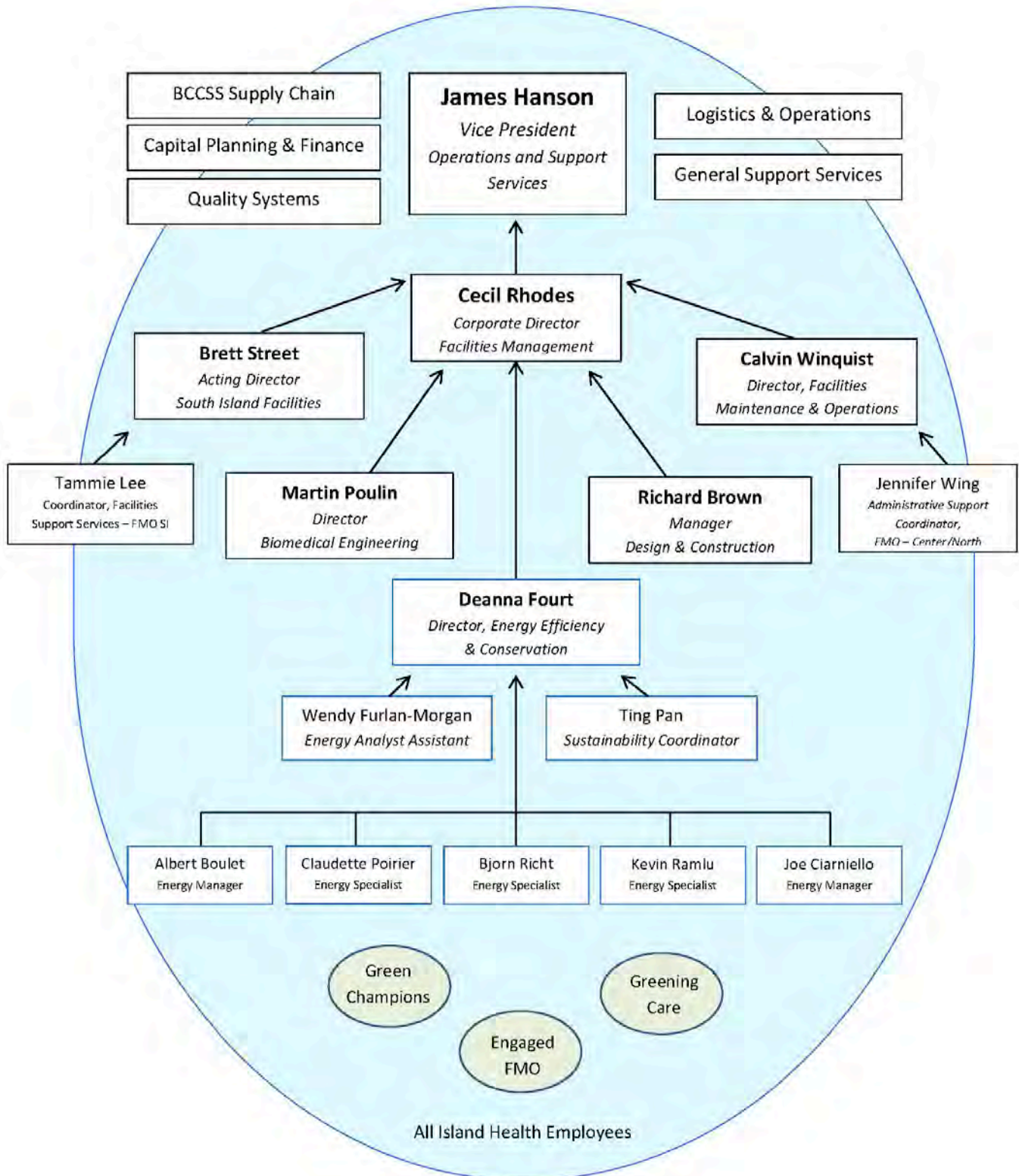
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<sup>1</sup> The SEMP includes the EEC Master List of Projects

There are four key performance indicators we track in order to develop and assess the success of our Energy Management Plan, as follows:

|  |  |
|--|--|
| Electricity Savings<br>Measured in kWh/yr                      | These savings are recognized and “booked” by BC Hydro through one of their Power Smart Partners Programs.  |
| Natural Gas Savings<br>Measured in GJ/yr                       | These are savings that are recognized by FortisBC through their Energy Specialist and Prescriptive Programs.   |
| Offsettable GHG Emissions<br>Measured in tCO <sub>2</sub> e/yr | GHG emissions are based on electricity and fossil fuel consumed at owned & operated facilities, converted into tonnes of carbon dioxide equivalents (tCO <sub>2</sub> e). Emissions from equipment such as back-up generators and other internal combustion engines for activities such as landscaping, fleet vehicles or paper are not included in the SEMP but are included in the Carbon Neutral Action Report. |
| Energy Use Index (EUI)<br>Measured in kWh/m <sup>2</sup> /year | EUI is an 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. Five Year Plan

Each year, Island Health's EEC team updates the Five Year Plan, an integral part of the SEMP, through focused strategic planning sessions. The Five Year Plan identifies electrical and fossil fuel energy savings and resultant carbon reductions from currently approved capital projects and capital projects approved or proposed in the next five years (see Table 1). The Five Year Plan evolves as new and, potentially, better opportunities are uncovered through energy studies and advances in technology. The Five Year Plan:

- i. Allows the EEC team to keep track of the status of all energy projects, and in particular, the expected energy savings from the currently active and planned projects. 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 file allows the team to revise the Strategic Plan in order to ensure the stated objectives are met.
- ii. Any and all ideas are captured in our MPL. Only those that make sense to do at this time make it into the Five Year Plan. All ideas are retained on the master project list to be reevaluated each year should costs or reasons for implementing change. This ensures we do not lose sight of opportunities and that we have a healthy source of new ideas to draw from as funding is made available.



**Table 1 Five Year Plan**

| Fiscal Year                                      | Program Type                                     | Project Name  | Values                          |                                    |                                  |                           | Project Costs [\$]  | Sum of Project Incremental Costs [\$] | Incremental Cost payback | Environmental Value [\$/tCO2*Yr] |
|--|--|---|---------------------------------|------------------------------------|----------------------------------|---------------------------|---------------------|---------------------------------------|--------------------------|----------------------------------|
|  |  |   | Booked Electrical Savings [GWH] | Booked Natural Gas Savings [GJ/yr] | Greenhouse Gas Savings [tCO2/yr] | Estimated Incentives [\$] |                     |                                       |                          |                                  |
| 2017/18  | BOILER   | PRIO - Priory Gas Fired Condensing Boiler Upgrade - CNCP            | 0.000                           | 664                                | 33                               | \$ 30,000                 | \$ 540,000          | \$ 160,800                            | 10                       | \$ 193                           |
|  |  | QAC Main - Upgrade to Condensing Boiler                             | 0.000                           | 298                                | 15                               | \$ 24,318                 | \$ 325,000          | \$ 79,200                             | 9                        | \$ 212                           |
|  | CON-OPS (BCH+FBC)                                | VGH - Phase III Continuous Optimization                             | 0.236                           | 1,380                              | 75                               | \$ -                      | \$ 250,000          | \$ 250,000                            | 7                        | \$ 1,106                         |
|  |  | YLRS - Lighting Upgrade   | 0.206                           | 0                                  | 7                                | \$ 41,770                 | \$ 168,842          | \$ 168,842                            | 5                        | \$ 1,538                         |
|  | CUSTOM (BC Hydro)                                | Styles St - Lighting  | 0.063                           | 0                                  | 2                                | \$ 10,146                 | \$ 30,000           | \$ 30,000                             | 5                        | \$ 414                           |
|  |  | VGH - D&T Lighting - BCHS   | 0.231                           | 0                                  | 6                                | \$ 38,197                 | \$ 110,000          | \$ 110,000                            | 5                        | \$ 1,225                         |
|  | CUSTOM (FortisBC)                                | NRGH - Put Kitchen Chiller Load on Multistack when OAT < 15 Degrees | 0.000                           | 2,319                              | 114                              | \$ -                      | \$ 25,000           | \$ 25,000                             | 1                        | \$ 15                            |
|  |  | VGH-Add VFD to HW Heating loop                                      | 0.026                           | 100                                | 6                                | \$ 4,735                  | \$ 30,000           | \$ 10,000                             | 2                        | \$ 117                           |
|  | PSPX   | NRGH - Phase 3 Zoning & Scheduling - CNCP                           | 1.348                           | 3,513                              | 211                              | \$ 10,000                 | \$ 390,000          | \$ 390,000                            | 3                        | \$ 74                            |
|  |  | RJH - MP Chiller Replacement  | 0.030                           | 0                                  | 1                                | \$ -                      | \$ 112,750          | \$ 50,000                             | 18                       | \$ 2,572                         |
|  | VIHA FUNDED                                      | RJH - EMP Cooling Tower Replacement + Pumps                         | 0.014                           | 0                                  | 0                                | \$ -                      | \$ 320,000          | \$ -                                  | 0                        | \$ -                             |
|  |  | CHC - Energy Upgrades - CNCP  | 0.000                           | 630                                | 30                               | \$ -                      | \$ 179,375          | \$ 179,375                            | 24                       | \$ 295                           |
|  | WCAP   | VGH - OR Zoning -Phase 1 - CNCP - FBCS                              | 0.100                           | 1,770                              | 91                               | \$ -                      | \$ 307,500          | \$ 307,500                            | 9                        | \$ 224                           |
| Green Team 1% of site gas, 1% of site electrical |  | 0.097   | 504                             | 28                                 | \$ -                             | \$ 750                    | \$ 750              | 0                                     | \$ 27                    |                                  |
| <b>2017/18 Total</b>                             |  |   | <b>2.352</b>                    | <b>11,178</b>                      | <b>620</b>                       | <b>\$ 159,166</b>         | <b>\$ 2,789,217</b> | <b>\$ 1,761,467</b>                   | <b>5</b>                 | <b>\$ 8,012</b>                  |
| 2018/19  | BOILER   | ABER - Replace Main Boiler - CNCP - FBCS                            | 0.000                           | 380                                | 19                               | \$ 45,000                 | \$ 530,000          | \$ 160,000                            | 16                       | \$ 336                           |
|  |  | NRGH - Phase III Continuous Optimization                            | 0.330                           | 2,858                              | 152                              | \$ 23,500                 | \$ 400,000          | \$ 400,000                            | 6                        | \$ 878                           |
|  | CON-OPS (BCH+FBC)                                | GLEN - Lighting Upgrade - BCHS                                      | 0.200                           | 0                                  | 5                                | \$ 40,000                 | \$ 150,000          | \$ 150,000                            | 9                        | \$ 1,929                         |
|  |  | RJH - Lighting Upgrade in D&T - BCHS                                | 0.300                           | 0                                  | 8                                | \$ 70,000                 | \$ 250,000          | \$ 250,000                            | 10                       | \$ 2,143                         |
|  |  | PRIO - Lighting Upgrade - BCHS                                      | 0.200                           | 0                                  | 5                                | \$ 45,000                 | \$ 170,000          | \$ 170,000                            | 10                       | \$ 2,186                         |
|  |  | CHC - Lighting Upgrade - BCHS                                       | 0.127                           | 0                                  | 3                                | \$ 31,431                 | \$ 125,724          | \$ 125,724                            | 8                        | \$ 2,553                         |
|  |  | PHH - Lighting Upgrade - BCHS                                       | 0.124                           | 0                                  | 3                                | \$ 25,000                 | \$ 99,000           | \$ 99,000                             | 4                        | \$ 2,053                         |
|  | CUSTOM (BC Hydro)                                | CRL - Dryer Heat Recovery - FBCS - CNCP                             | 0.000                           | 4,324                              | 217                              | \$ 121,121                | \$ 500,000          | \$ 500,000                            | 5                        | \$ 92                            |
|  |  | RJH - EMP Return Air Conversion - FBCS - CNCP                       | 0.000                           | 1,407                              | 69                               | \$ -                      | \$ 175,000          | \$ 150,000                            | 8                        | \$ 87                            |
|  | CUSTOM (FortisBC)                                | NIHP - New Comox Valley Hospital vs Base                            | 2.436                           | 1,177                              | 122                              | \$ 842,670                | \$ 3,134,691        | \$ 3,134,691                          | 12                       | \$ 855                           |
|  |  | NIHP - New Campbell River Hospital vs Base                          | 2.232                           | 450                                | 80                               | \$ 857,942                | \$ 2,684,975        | \$ 2,684,975                          | 11                       | \$ 1,113                         |
|  | NEW CONSTRUCTION                                 | RJH - B3 Replacement  | 0.000                           | 2,000                              | 100                              | \$ -                      | \$ 1,200,000        | \$ 1,200,000                          | 37                       | \$ 478                           |
|  |  | RJH - Steam Trap Repair   | 0.000                           | 1,187                              | 60                               | \$ -                      | \$ 9,210            | \$ 9,210                              | 0                        | \$ 15                            |
|  | VIHA FUNDED                                      | VGH - OR Zoning -Phase 2 - CNCP - FBCS                              | 0.062                           | 1,870                              | 95                               | \$ -                      | \$ 300,000          | \$ 300,000                            | 9                        | \$ 210                           |
|  |  | DPRC - Electronic Zone Control Upgrade - FBCS - CNCP                | 0.000                           | 790                                | 41                               | \$ 15,104                 | \$ 120,000          | \$ 120,000                            | 6                        | \$ 147                           |
|  |  | NRGH - Electrical Vault Cooling (CNCP potential)                    | 0.000                           | 1,106                              | 108                              | \$ -                      | \$ 278,250          | \$ 278,250                            | 10                       | \$ 103                           |
| WCAP   | Green Team 1% of site gas, 1% of site electrical | 0.097   | 504                             | 28                                 | \$ -                             | \$ 750                    | \$ 750              | 0                                     | \$ 27                    |                                  |
|  | <b>2018/19 Total</b>                             |   |                                 | <b>6.107</b>                       | <b>18,054</b>                    | <b>1,116</b>              | <b>\$ 2,116,768</b> | <b>\$ 10,127,600</b>                  | <b>\$ 9,732,600</b>      | <b>10</b>                        |

| Fiscal Year          | Program Type      | Project Name  | Values                          |                                    |                                  |                           | Project Costs [\$]  | Sum of Project Incremental Costs [\$] | Incremental Cost payback | Environmental Value [\$/tCO2*Yr] |
|----------------------|-------------------|---|---------------------------------|------------------------------------|----------------------------------|---------------------------|---------------------|---------------------------------------|--------------------------|----------------------------------|
|                      |                   |   | Booked Electrical Savings [GWH] | Booked Natural Gas Savings [GJ/vr] | Greenhouse Gas Savings [tCO2/vr] | Estimated Incentives [\$] |                     |                                       |                          |                                  |
| 2019/20              | BOILER            | DARS - Boiler Upgrade -CNCP   | 0.000                           | 193                                | 10                               | \$ 6,660                  | \$ 200,000          | \$ 23,123                             | 5                        | \$ 96                            |
|                      | CON-OPS (BCH)     | CDH - Continuous Optimization - BCHS                                | 0.068                           | 454                                | 25                               | \$ 8,879                  | \$ 98,200           | \$ 98,200                             | 8                        | \$ 800                           |
|                      |                   | EPLTC_TLLTC - Continuous Optimization - BCHS                        | 0.052                           | 109                                | 7                                | \$ 4,656                  | \$ 75,200           | \$ 75,200                             | 14                       | \$ 2,204                         |
|                      | CON-OPS (BCH+FBC) | RJH - Phase III Continuous Optimization                             | 0.423                           | 2,858                              | 154                              | \$ -                      | \$ 400,000          | \$ 400,000                            | 6                        | \$ 864                           |
|                      | CUSTOM (BC Hydro) | VGH - Lighting Upgrade in South Tower - BCHS                        | 0.150                           | 0                                  | 4                                | \$ 40,000                 | \$ 150,000          | \$ 150,000                            | 11                       | \$ 2,572                         |
|                      |                   | VGH - Lighting Upgrade in North Tower - BCHS                        | 0.150                           | 0                                  | 4                                | \$ 40,000                 | \$ 150,000          | \$ 150,000                            | 11                       | \$ 2,572                         |
|                      |                   | ABER - Lighting Upgrade - BCHS                                      | 0.300                           | 0                                  | 8                                | \$ 70,000                 | \$ 250,000          | \$ 250,000                            | 10                       | \$ 2,143                         |
|                      | NEW CONSTRUCTION  | DPRC - Lighting Replacement - BCHS                                  | 0.129                           | 0                                  | 3                                | \$ 21,000                 | \$ 84,000           | \$ 78,534                             | 5                        | \$ 1,570                         |
|                      |                   | The Summit @ Quadra Village   | 1.571                           | 11,593                             | 622                              | \$ 369,191                | \$ 1,520,000        | \$ 1,433,800                          | 4                        | \$ 280                           |
|                      | VIHA FUNDED       | EPLTC - Heat Recovery for DHW Pre-Heat                              | 0.004                           | 355                                | 18                               | \$ -                      | \$ 99,700           | \$ 37,700                             | 6                        | \$ 84                            |
|                      |                   | OHC - Control Systems Optimzation                                   | 0.050                           | 80                                 | 5                                | \$ -                      | \$ 50,000           | \$ 50,000                             | 10                       | \$ 942                           |
|                      |                   | LMH - Water Conservation  | 0.000                           | 0                                  | 2                                | \$ -                      | \$ 82,000           | \$ 82,000                             | 6                        | \$ 1,680                         |
|                      |                   | RJH - EMP Air Balancing & Duct Leakage Repair                       | 0.018                           | 0                                  | 0                                | \$ -                      | \$ 12,000           | \$ 12,000                             | 11                       | \$ 5,144                         |
|                      |                   | RJH - D&T Upgrade Final Filters to Dynamic Filters                  | 0.495                           | 0                                  | 13                               | \$ -                      | \$ 329,557          | \$ 239,069                            | 7                        | \$ 1,863                         |
|                      |                   | RJH - Chiller Plant Optimization - Connect CA + RP to Central Plant | 0.081                           | 0                                  | 2                                | \$ -                      | \$ 128,767          | \$ 93,411                             | 6                        | \$ 1,787                         |
|                      |                   | TLLTC - Piping Insulation Upgrade                                   | 0.035                           | 0                                  | 1                                | \$ -                      | \$ 12,000           | \$ 12,000                             | 6                        | \$ 531                           |
|                      |                   | SPH - DHW System Upgrade - CNCP -FBCS                               | 0.000                           | 400                                | 20                               | \$ 6,000                  | \$ 300,000          | \$ 300,000                            | 45                       | \$ 997                           |
|                      |                   | PHH - Zoning for Ventilation & Temperature Setback                  | 0.098                           | 0                                  | 19                               | \$ -                      | \$ 150,000          | \$ 150,000                            | 10                       | \$ 308                           |
|                      |                   | NRGH - Piping Insulation Upgrade                                    | 0.000                           | 0                                  | 72                               | \$ -                      | \$ 70,000           | \$ 70,000                             | 3                        | \$ 39                            |
|                      |                   | CPRC - Piping Insulation Upgrade                                    | 0.000                           | 0                                  | 6                                | \$ -                      | \$ 6,000            | \$ 6,000                              | 3                        | \$ 37                            |
|                      |                   | WCGH - Piping Insulation Upgrade                                    | 0.000                           | 0                                  | 27                               | \$ -                      | \$ 35,000           | \$ 35,000                             | 4                        | \$ 52                            |
|                      |                   | TGH - Piping Insulation Upgrade                                     | 0.000                           | 0                                  | 2                                | \$ -                      | \$ 5,000            | \$ 5,000                              | 4                        | \$ 101                           |
|                      |                   | OHC - Piping Insulation Upgrade                                     | 0.000                           | 0                                  | 0                                | \$ -                      | \$ 2,000            | \$ 2,000                              | 14                       | \$ 177                           |
|                      |                   | EPLTC - Piping Insulation Upgrade                                   | 0.000                           | 0                                  | 4                                | \$ -                      | \$ 7,000            | \$ 7,000                              | 6                        | \$ 72                            |
|                      |                   | YLRS - Heat Pump Installation - CNCP                                | 0.000                           | 3,720                              | 182                              | \$ -                      | \$ 450,000          | \$ 450,000                            | 9                        | \$ 99                            |
|                      |                   | CICHC - DHW System Renewal - CNCP                                   | 0.000                           | 0                                  | 68                               | \$ -                      | \$ 300,000          | \$ 200,000                            | 6                        | \$ 147                           |
|                      | WCAP              | Green Team 1% of site gas, 1% of site electrical                    | 0.097                           | 504                                | 28                               | \$ -                      | \$ 750              | \$ 750                                | 0                        | \$ 27                            |
| <b>2019/20 Total</b> |                   |   | <b>3.720</b>                    | <b>20,267</b>                      | <b>1,307</b>                     | <b>\$ 566,386</b>         | <b>\$ 4,967,174</b> | <b>\$ 4,410,787</b>                   | <b>6</b>                 | <b>\$ 27,189</b>                 |

| Fiscal Year          | Program Type         | Project Name  | Values   |                                    |                                  |                           |                     | Project Costs [\$]  | Sum of Project Incremental Costs [\$] | Incremental Cost payback | Environmental Value [\$/tCO2*Yr] |
|----------------------|----------------------|---|--|------------------------------------|----------------------------------|---------------------------|---------------------|---------------------|---------------------------------------|--------------------------|----------------------------------|
|                      |                      |   | Booked Electrical Savings [GWH]                  | Booked Natural Gas Savings [GJ/vr] | Greenhouse Gas Savings [tCO2/vr] | Estimated Incentives [\$] |                     |                     |                                       |                          |                                  |
| 2020/21              | CON-OPS (BCH)        | WCGH - Continuous Optimization - BCHS                               | 0.082  | 243                                | 14                               | \$ 7,597                  | \$ 93,000           | \$ 93,000           | 10                                    | \$ 1,301                 |                                  |
|                      |                      | CPRC - Continuous Optimization - BCHS                               | 0.011  | 110                                | 6                                | \$ 1,971                  | \$ 34,000           | \$ 34,000           | 13                                    | \$ 1,170                 |                                  |
|                      | CUSTOM (BC Hydro)    | VGH - Lighting Upgrade D&T Floor 2 & 4 - BCHS                       | 0.200  |                                    | 5                                | \$ 45,000                 | \$ 170,000          | \$ 170,000          | 10                                    | \$ 2,186                 |                                  |
|                      |                      | TLLTC - Lighting Upgrade - BCHS                                     | 0.114  | 0                                  | 3                                | \$ 21,923                 | \$ 87,691           | \$ 87,691           | 7                                     | \$ 1,974                 |                                  |
|                      | CUSTOM (BCH+FBC)     | NRGH - Exhaust Air Heat Recovery in Ambulatory Care                 | 0.003  | 263                                | 13                               | \$ 4,636                  | \$ 95,000           | \$ 95,000           | 20                                    | \$ 358                   |                                  |
|                      |                      | NRGH - Steam Coil Conversion to Hot Water Coil                      | 0.000  | 3,731                              | 184                              | \$ -                      | \$ 560,000          | \$ 283,000          | 6                                     | \$ 62                    |                                  |
|                      | CUSTOM (FortisBC)    | CPRC - Ventilation Upgrades - CNCP                                  | 0.003  | 697                                | 35                               | \$ -                      | \$ 99,000           | \$ 99,000           | 9                                     | \$ 113                   |                                  |
|                      |                      | LCHC - HVAC Upgrade Part 1 Boiler Return Water                      | 0.050  | 230                                | 13                               | \$ -                      | \$ 99,000           | \$ 99,000           | 15                                    | \$ 309                   |                                  |
|                      | VIHA FUNDED          | LMH - Control System Modifications                                  | 0.022  | 0                                  | 10                               | \$ -                      | \$ 99,000           | \$ 99,000           | 14                                    | \$ 509                   |                                  |
|                      |                      | RJH - EMP AHU Replacement   | 0.046  | 2,630                              | 133                              | \$ 50,000                 | \$ 2,200,000        | \$ 820,000          | 17                                    | \$ 246                   |                                  |
|                      |                      | RJH - Chiller Plant Optimization - Convert to Variable Primary Flow | 0.264  | 0                                  | 7                                | \$ -                      | \$ 380,582          | \$ 276,084          | 8                                     | \$ 1,612                 |                                  |
|                      |                      | RJH - Chiller Plant Optimization - AFD for 1000 Ton Chiller         | 0.247  | 0                                  | 6                                | \$ -                      | \$ 212,832          | \$ 160,000          | 11                                    | \$ 1,001                 |                                  |
|                      |                      | YLRs - Energy Efficiency Upgrades - CNCP                            | 0.000  | 830                                | 41                               | \$ -                      | \$ 176,100          | \$ 150,000          | 10                                    | \$ 148                   |                                  |
|                      |                      | DPRC - Heat Recovery Chiller - CNCP                                 | 0.000  | 1,350                              | 65                               | \$ -                      | \$ 490,000          | \$ 290,000          | 18                                    | \$ 178                   |                                  |
|                      |                      | NRGH - Kitchen Heat Recovery - CNCP                                 | 0.000  | 839                                | 42                               | \$ -                      | \$ 95,000           | \$ 95,000           | 7                                     | \$ 91                    |                                  |
|                      |                      | CHCC - Replace Main Heating Boilers - FBCS - CNCP                   | 0.000  | 563                                | 28                               | \$ 18,200                 | \$ 637,000          | \$ 111,800          | 9                                     | \$ 158                   |                                  |
|                      | WCAP                 | Green Team 1% of site gas, 1% of site electrical                    | 0.097  | 504                                | 28                               | \$ -                      | \$ 750              | \$ 750              | 0                                     | \$ 27                    |                                  |
| <b>2020/21 Total</b> |                      |   | <b>1.139</b>                                     | <b>11,990</b>                      | <b>633</b>                       | <b>\$ 149,327</b>         | <b>\$ 5,528,955</b> | <b>\$ 2,963,325</b> | <b>10</b>                             | <b>\$ 11,443</b>         |                                  |
| 2021/22              | VIHA FUNDED          | LCHC - Re-Commissioning   | 0.040  | 230                                | 13                               | \$ -                      | \$ 60,000           | \$ 60,000           | 10                                    | \$ 477                   |                                  |
|                      |                      | YLRs - Kitchen Hood Demand Ventilation                              | 0.008  | 270                                | 14                               | \$ -                      | \$ 40,000           | \$ 40,000           | 8                                     | \$ 116                   |                                  |
|                      |                      | YLRs - Perimeter Heating Controls Integration                       | 0.000  | 0                                  | 3                                | \$ -                      | \$ 40,000           | \$ 40,000           | 44                                    | \$ 628                   |                                  |
|                      |                      | LCHC - HVAC Upgrade Part 2  | 0.000  | 230                                | 12                               | \$ -                      | \$ 99,000           | \$ 99,000           | 25                                    | \$ 343                   |                                  |
|                      |                      | CRH - HVAC System Admin   | 0.000  | 50                                 | 4                                | \$ -                      | \$ 78,000           | \$ 23,000           | 7                                     | \$ 260                   |                                  |
|                      |                      | NRGH - Replace Rehab Chiller with HR and HE Models - CNCP           | 0.000  | 14,319                             | 706                              | \$ -                      | \$ 1,500,000        | \$ 750,000          | 4                                     | \$ 53                    |                                  |
|                      |                      | CLRC - Energy Efficiency Upgrades                                   | 0.052  | 560                                | 29                               | \$ -                      | \$ 165,200          | \$ 165,200          | 8                                     | \$ 281                   |                                  |
|                      |                      | NRGH - Lighting Upgrade in Rehab - BCHS                             | 0.150  | 0                                  | 4                                | \$ 25,000                 | \$ 99,000           | \$ 99,000           | 7                                     | \$ 1,698                 |                                  |
|                      |                      | CLRC - Replace RTUs with HRV and Heat Pumps - CNCP                  | 0.000  | 1,410                              | 71                               | \$ -                      | \$ 250,000          | \$ 250,000          | 11                                    | \$ 142                   |                                  |
|                      |                      | DPRC - Boiler Room Upgrade - FBCS - CNCP                            | 0.000  | 1,340                              | 67                               | \$ 63,000                 | \$ 575,000          | \$ 150,000          | 4                                     | \$ 89                    |                                  |
|                      |                      | WCAP  | Green Team 1% of site gas, 1% of site electrical | 0.097                              | 504                              | 28                        | \$ -                | \$ 750              | \$ 750                                | 0                        | \$ 27                            |
|                      | <b>2021/22 Total</b> |   |  | <b>0.347</b>                       | <b>18,913</b>                    | <b>949</b>                | <b>\$ 88,000</b>    | <b>\$ 2,906,950</b> | <b>\$ 1,676,950</b>                   | <b>5</b>                 | <b>\$ 4,113</b>                  |

### 3. How Are We Doing?

#### Electrical Energy Savings Booked

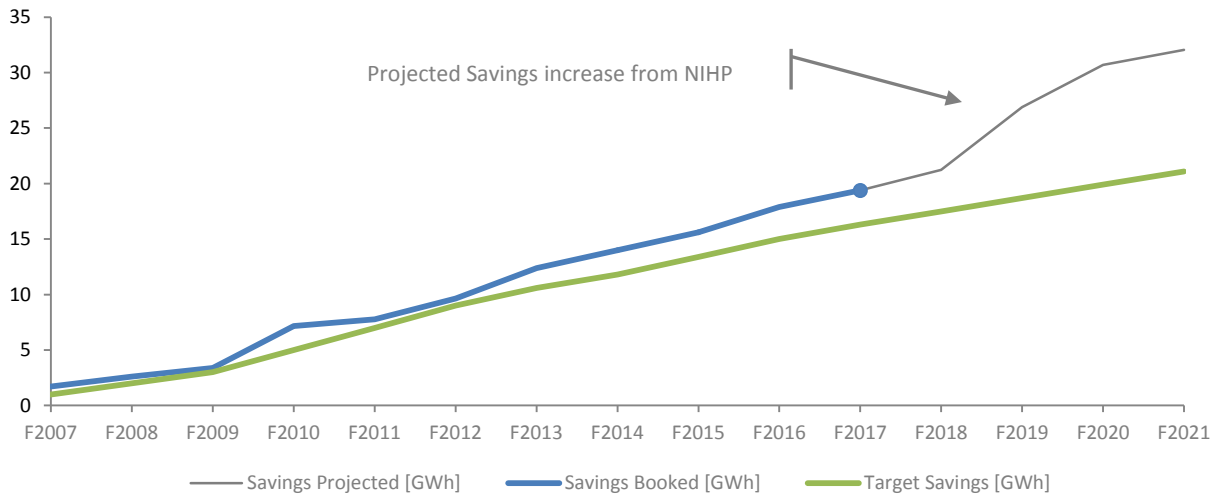
Table 2 shows electrical savings booked with BC Hydro for the past eleven years as well as the projected savings in the next four years. Energy savings accumulated over time is more indicative of the energy management program performance, rather than savings achieved in any one year. A graphical representation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

**Table 2 Booked Electrical and Projected Savings based on Five Year Plan**

| Fiscal Year | BC Hydro Booked Savings [GWh] | Cumulative Booked Savings [GWh] | Savings Achieved/Projected [GWh] | Cumulative Savings Achieved/Projected [GWh] | BC Hydro Base Target Savings [GWh] | Cumulative Base 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       |                               |                                 | 2.352                            | 21.747                                      | 1.200                              | 17.500                               |
| F2019       |                               |                                 | 6.107                            | 27.854                                      | 1.200                              | 18.700                               |
| F2020       |                               |                                 | 3.720                            | 31.574                                      | 1.200                              | 19.900                               |
| F2021       |                               |                                 | 1.139                            | 32.713                                      | 1.200                              | 21.100                               |



**Figure 1 Booked Electrical Savings F2007 – F2017 [GWh]**



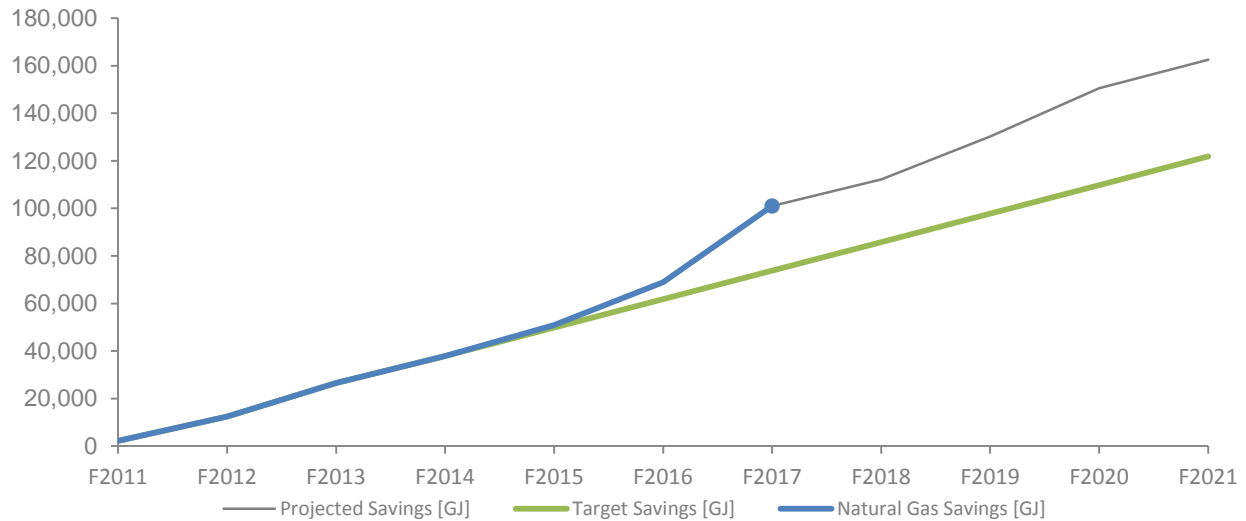
### Natural Gas Energy Savings

Natural gas savings are credited by FortisBC through their various programs, while other natural gas savings that did not fit into any FortisBC program have been tracked by the EEC Department. Table 3 below tracks natural gas savings since F2011 and Figure 2 shows our performance against the target.

**Table 3 Natural Gas Savings Claimed and Projected based on Five Year Plan**

| Fiscal Year | FortisBC Gas Savings [GJ] | Cumulative Savings Tracked [GJ] | Total Savings Achieved/Projected [GJ] | Cumulative Savings Projected [GJ] | FortisBC Savings Target [GJ] | Cumulative Target Savings [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                                | 101,008                           | 12,000                       | 73,824                         |
| F2018       |                           |                                 | 11,178                                | 112,187                           | 12,000                       | 85,824                         |
| F2019       |                           |                                 | 18,054                                | 130,240                           | 12,000                       | 97,824                         |
| F2020       |                           |                                 | 20,267                                | 150,507                           | 12,000                       | 109,824                        |
| F2021       |                           |                                 | 11,990                                | 162,498                           | 12,000                       | 121,824                        |

**Figure 2 Tracked Natural Gas Savings F2011 – F2017 [GJ]**

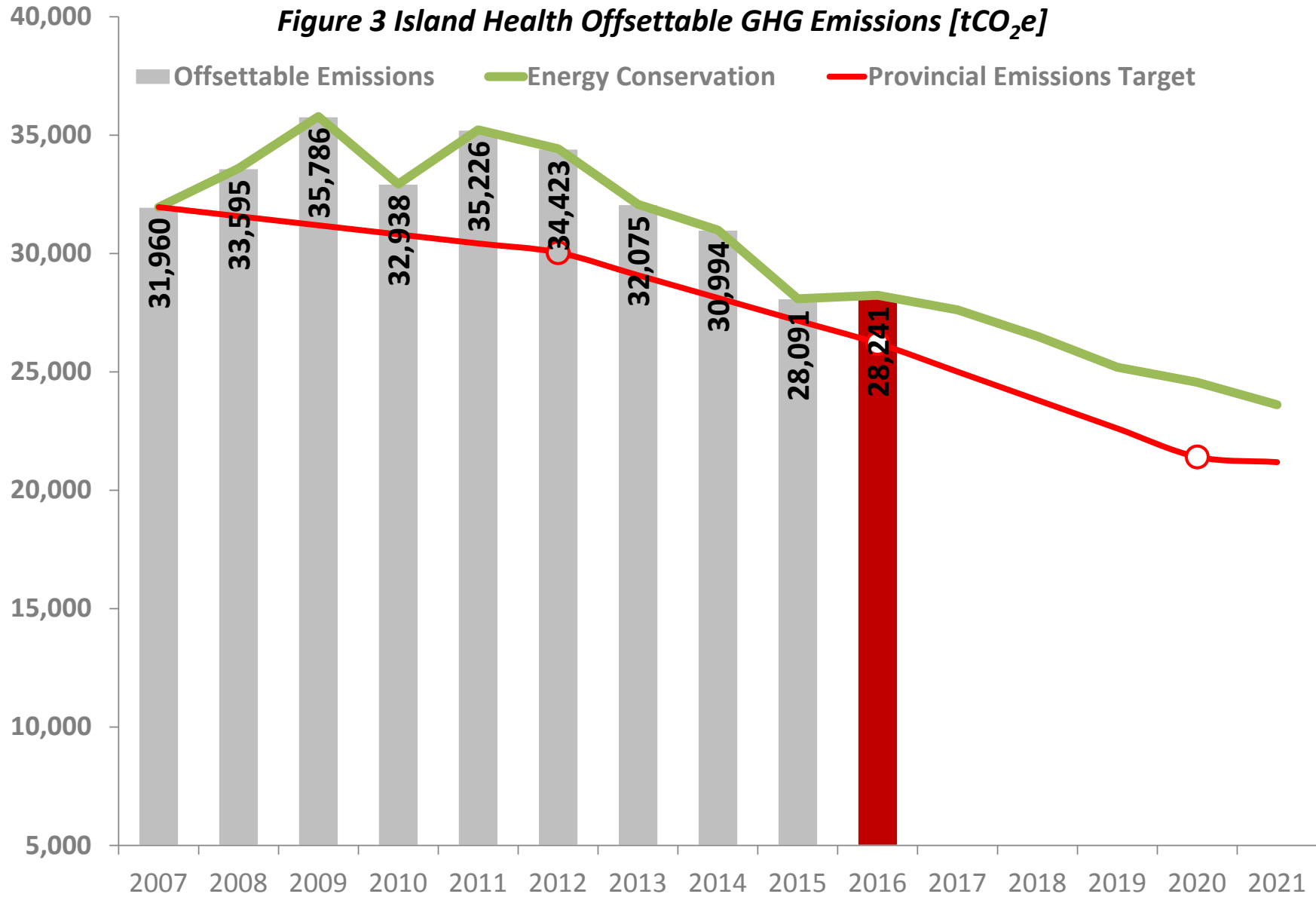


### GHG Emissions and Reduction

Since 2007, the majority of Island Health’s GHG emission reductions have 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 benefits are necessary, our heating plants consume fossil fuels and produce the GHG emissions that contribute to climate change.

As shown below in the graph showing *Island Health Offsettable GHG Emissions*, our conservation efforts have had an impact and our emissions have declined since 2009, even as the organization has grown. The red line indicates the Provincial Emissions Reduction Target and the green line shows where we will be with our current investment level. As we project into the future, we can see that the 2020 target will not be met through energy conservation measures alone. Up until recently a biomass boiler had been proposed for Island Health’s second largest GHG emitting site that would have resulted in Island Health meeting the emissions reduction target. Unfortunately funding was not approved for this initiative so reductions will have to be found from other opportunities. See Appendix G for summary of efforts to implement biomass plants at Island Health.

**Figure 3 Island Health Offsettable GHG Emissions [tCO<sub>2</sub>e]**



### Electrical Cost Savings

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

To show the value of the energy management program, the table sums the kWh savings from electrical projects, shown as Cumulative Savings in Effect. The rate is determined in the Blended Cost column and shows the blended cost of energy; that is the total cost of electricity charged to Island Health 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.

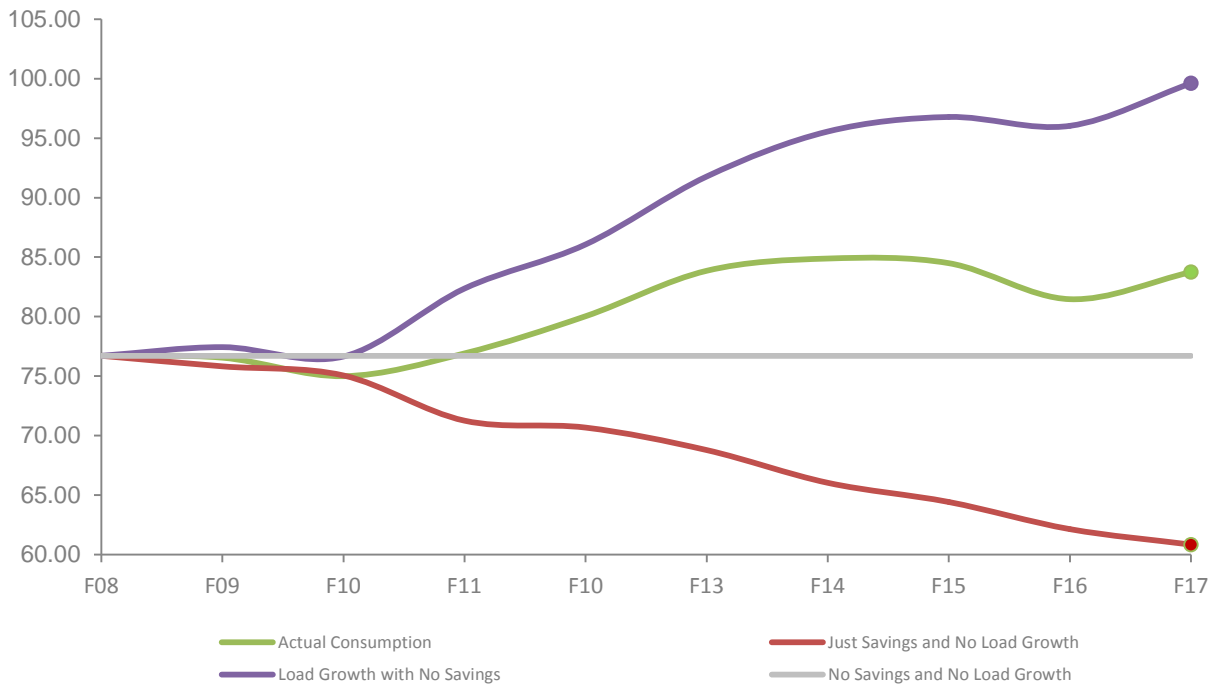
**Table 4 Avoided Electrical Energy Costs from Capital Projects**

| 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                | \$84,558             | \$84,558                 |
| F2009       | 767,000              | 886,000                 | 2,608,000                          | 0.0524                | \$136,534            | \$221,092                |
| F2010       | 3,798,000            | 767,000                 | 3,375,000                          | 0.0568                | \$191,636            | \$412,728                |
| F2011       | 581,000              | 3,798,000               | 7,173,000                          | 0.0574                | \$411,754            | \$824,483                |
| F2012       | 1,890,000            | 581,000                 | 7,754,000                          | 0.0611                | \$473,431            | \$1,297,913              |
| F2013       | 2,750,000            | 1,890,000               | 9,644,000                          | 0.0679                | \$654,830            | \$1,952,743              |
| F2014       | 1,613,000            | 2,750,000               | 12,394,000                         | 0.0732                | \$906,876            | \$2,859,619              |
| F2015       | 1,602,000            | 1,613,000               | 14,007,000                         | 0.0763                | \$1,069,143          | \$3,928,763              |
| F2016       | 2,280,500            | 1,602,000               | 15,609,000                         | 0.0800                | \$1,249,305          | \$5,178,068              |
| F2017       | 1,489,000            | 2,280,500               | 17,889,500                         | 0.0832                | \$1,489,104          | \$6,667,171              |
| F2018       |                      | 1,489,000               | 19,378,500                         | 0.0861                | \$1,668,489          | \$8,335,660              |

This table shows that the cost of electricity in F2018 would be \$1,668,489 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 \$8,335,660 in avoided cost.

In reality, our electric utility bills, unfortunately, do not reflect the level of savings shown in Table 4, despite energy management. This is due to increasing energy consumption across the organization, caused by three main factors: increasing floor area, electrification of clinical services, and plug loads. Figure below illustrates where we are today and where we would be if we had no energy management program. It also projects where we could be if we had no increasing demand for electricity and still realized all the savings from energy management.

**Figure 4 Impact of Island Health’s Energy Management Program [GWh]**



The difference between the purple line and green line shows the true impact of the energy management program while the gap between the green and gray lines is the net increase as observed on our utility bills. The growth in our electrical load is represented by the gap between the purple line and grey line. The slight uptick in the last fiscal is due to the increase in Gas consumption.

### Fossil Fuel Cost Savings

Fossil fuel cost savings can be attributed to two main actions: savings resulting from energy efficiency projects and natural gas procurement strategies through a gas marketer. 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<sup>2</sup>).

Prior to F2013 most of our energy management efforts focused on reducing electrical energy. Since then however several major projects to reduce natural gas have been completed which are now yielding measurable savings in natural gas as is seen in Table 5.



**Table 5 Actual and Normalized Fossil Fuel Consumption and Cost**

| Fiscal Year | Floor Area m <sup>2</sup> | Actual  |                   | Normalized |                   | Actual      |                   | Normalized  |                   |
|-------------|---------------------------|---------|-------------------|------------|-------------------|-------------|-------------------|-------------|-------------------|
|             |                           | GJ      | GJ/m <sup>2</sup> | GJ         | GJ/m <sup>2</sup> | \$          | \$/m <sup>2</sup> | \$          | \$/m <sup>2</sup> |
| F2008       | 425,467                   | 548,963 | 1.29              | 536,727    | 1.26              | \$6,810,391 | \$16.01           | \$6,658,771 | \$15.65           |
| F2009       | 428,497                   | 560,928 | 1.31              | 532,437    | 1.24              | \$7,579,436 | \$17.69           | \$7,203,773 | \$16.81           |
| F2010       | 430,958                   | 518,986 | 1.20              | 529,589    | 1.23              | \$7,279,093 | \$16.89           | \$7,424,853 | \$17.23           |
| F2011       | 441,550                   | 561,189 | 1.27              | 548,764    | 1.24              | \$7,597,690 | \$17.21           | \$7,431,616 | \$16.83           |
| F2012       | 471,937                   | 601,708 | 1.27              | 580,826    | 1.23              | \$8,207,367 | \$17.39           | \$7,930,554 | \$16.80           |
| F2013       | 471,458                   | 577,003 | 1.22              | 575,569    | 1.22              | \$7,991,124 | \$16.95           | \$7,971,208 | \$16.91           |
| F2014       | 475,539                   | 566,757 | 1.19              | 557,899    | 1.17              | \$8,288,582 | \$17.43           | \$8,156,972 | \$17.15           |
| F2015       | 475,805                   | 509,233 | 1.07              | 542,474    | 1.14              | \$6,471,022 | \$13.60           | \$6,936,755 | \$14.58           |
| F2016       | 476,014                   | 515,606 | 1.08              | 517,876    | 1.09              | \$5,202,585 | \$10.93           | \$5,452,374 | \$11.45           |
| F2017       | 476,014                   | 530,887 | 1.11              | 527,467    | 1.11              | \$5,171,568 | \$10.86           | \$5,249,273 | \$11.03           |

In Table 5, it is evident that the normalized fossil fuel consumption per square meter has been steadily decreasing and the cost per square meter of floor area has fluctuated since F2008. This is due to changes in consumption as well as changes in fossil fuel costs. The impact of fossil fuel saving projects and active management of fuel procurement is evident in the difference between F2014, F2015, F2016 and F2017. Table 6 compares the fossil fuel savings using F2014 as the baseline. In F2017 the total savings is 30,432 GJ (normalized) in fossil fuel for a cost impact of \$2,907,699; overall saving Island Health \$6.11 per m<sup>2</sup> of floor space.

**Table 6 Fossil Fuel Cost Savings (since F2014)**

| Fiscal Year | vs F2014 Actual |                   | vs F2014 Normalized |                   | vs F2014 Actual |                   | vs F2014 Normalized |                   |
|-------------|-----------------|-------------------|---------------------|-------------------|-----------------|-------------------|---------------------|-------------------|
|             | GJ              | GJ/m <sup>2</sup> | GJ                  | GJ/m <sup>2</sup> | \$              | \$/m <sup>2</sup> | \$                  | \$/m <sup>2</sup> |
| F2015       | 57,523          | 0.12              | 15,424              | 0.03              | \$1,817,560     | \$3.83            | \$1,220,217         | \$2.57            |
| F2016       | 51,178          | 0.11              | 40,023              | 0.09              | \$3,085,997     | \$6.50            | \$2,704,598         | \$5.70            |
| F2017       | 35,870          | 0.07              | 30,432              | 0.06              | \$3,117,014     | \$6.55            | \$2,907,699         | \$6.11            |

### Island Health Roll-Up

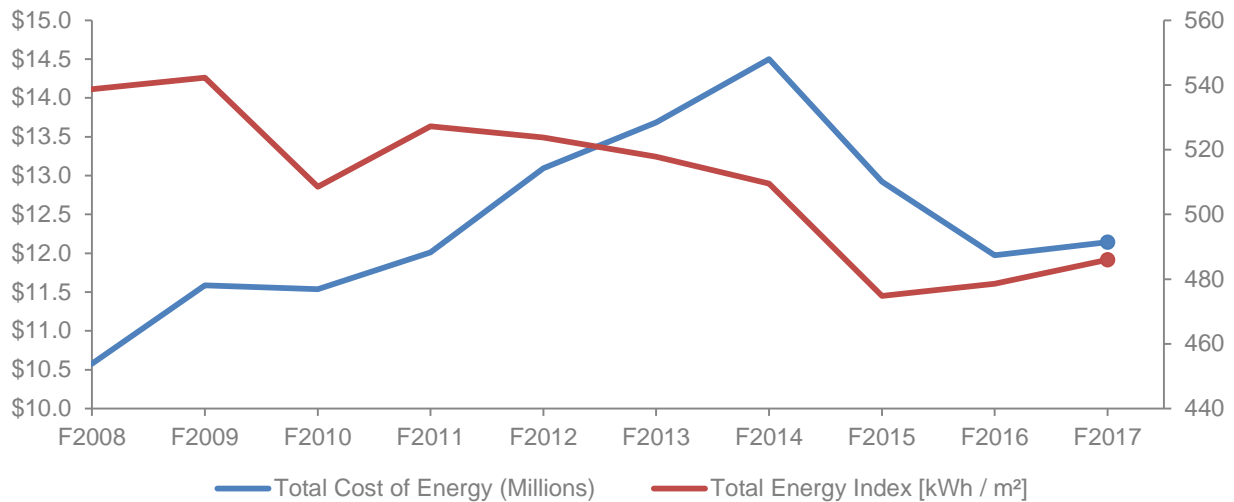
Table 7 shows total energy consumption and cost for the 42 owned and operated sites since F2008. The table includes the overall Energy Use Index (EUI) based on total energy consumed divided by the total building area. **Since F2008 Island Health has realized a 10% reduction in overall EUI while increasing our floor area by 12%.**

**Table 7 Overall Energy Consumption, Costs, and Energy Use Index for Island Health 41 Owned & Operated Sites**

| Fiscal Year | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel [GJ] | Total Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | Total Energy Cost \$ | Total Cost Index \$/m <sup>2</sup> |
|-------------|------------------------------|-------------------|------------------|--------------------|--|----------------------|------------------------------------|
| F2008       | 425,467                      | 76,710,679        | 548,963          | 229,200,283        | 539                                      | \$10,577,242         | \$24.86                            |
| F2009       | 428,497                      | 76,553,093        | 560,928          | 232,366,397        | 542                                      | \$11,587,137         | \$27.04                            |
| F2010       | 430,958                      | 74,998,482        | 518,986          | 219,161,384        | 509                                      | \$11,537,593         | \$26.77                            |
| F2011       | 441,550                      | 76,915,330        | 561,189          | 232,801,167        | 527                                      | \$12,012,887         | \$27.21                            |
| F2012       | 471,937                      | 80,037,476        | 601,708          | 247,178,588        | 524                                      | \$13,094,160         | \$27.75                            |
| F2013       | 471,458                      | 83,855,239        | 577,003          | 244,133,771        | 518                                      | \$13,684,917         | \$29.03                            |
| F2014       | 475,539                      | 84,884,227        | 566,757          | 242,316,595        | 510                                      | \$14,499,610         | \$30.49                            |
| F2015       | 475,805                      | 84,493,463        | 509,233          | 225,947,206        | 475                                      | \$12,920,342         | \$27.15                            |
| F2016       | 476,014                      | 84,592,807        | 515,606          | 227,816,827        | 479                                      | \$11,972,694         | \$25.15                            |
| F2017       | 476,014                      | 83,741,596        | 530,887          | 231,210,200        | 486                                      | \$12,144,625         | \$25.51                            |

Figure 5 compares the actual cost of energy with the EUI and illustrates that, while sourcing our Natural gas from a marketer provided significant savings for F2015 and F2016, higher consumption in F2017 has provided a blip in the downward trend. This also highlights the need to maintain and enhance energy management programming in order to keep energy costs minimized.

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



#### 4. Facility Benchmarks

It is important to evaluate building energy performance over time, comparing how the facility performed in the past and how it is performing relative to other similar facility types. Typically, Energy Managers would use either internal benchmarks or external benchmarks. At Island Health we use internal benchmarks.

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 compares them to other similar facilities.

The total energy use represents electricity and fossil fuel consumed to meet building needs for heating, cooling, lighting, HVAC distribution, 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 fuels are not included.

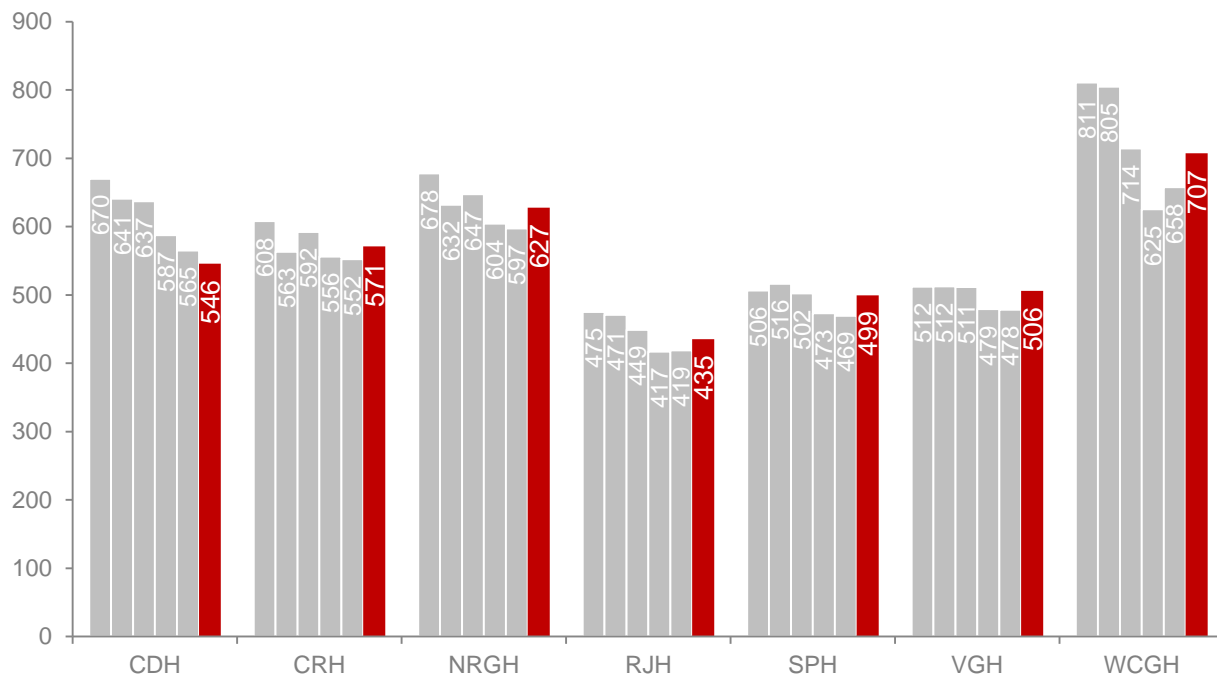
### Large Acute Care

Large Acute Care hospitals are our flagship facilities at Island Health. These buildings have unique requirements, provide the most services and are mission critical to service delivery at Island Health. As such Large Acute facilities consume the most energy of all our buildings accounting for 72.6% of our energy consumption, 71.6% of cost and 69% of our emissions in F2017. The color code in the tables below help highlight the percentage improvement, on a site by site basis, in EUI from 2008 with the least improvement shown in red and most improvement in green.

**Table 8 Large Acute Care EUI for F2017**

| Site | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | EUI % Difference vs F2008 | Total Cost Index [\$/m <sup>2</sup> ] | Emissions [tCO <sub>2</sub> e] |
|------|------------------------------|-------------------|--------------------------|--|---------------------------|---------------------------------------|--------------------------------|
| RJH  | 170,653                      | 27,014,090        | 47,211,678               | 435                                      | -4.89%                    | \$22                                  | 8,217                          |
| NRGH | 54,441                       | 13,954,975        | 20,204,250               | 627                                      | -8.12%                    | \$34                                  | 3,503                          |
| VGH  | 49,554                       | 9,655,689         | 15,414,250               | 506                                      | 3.01%                     | \$26                                  | 2,870                          |
| CDH  | 16,498                       | 3,187,519         | 5,818,803                | 546                                      | -13.25%                   | \$28                                  | 1,079                          |
| CRH  | 16,335                       | 3,316,504         | 6,013,973                | 571                                      | -6.29%                    | \$29                                  | 1,115                          |
| SPH  | 14,302                       | 3,219,154         | 3,921,813                | 499                                      | -7.07%                    | \$29                                  | 738                            |
| WCGH | 14,117                       | 3,204,499         | 6,777,722                | 707                                      | -6.92%                    | \$34                                  | 1,251                          |

**Figure 6 Large Acute F2012 to F2017 Performance**



\* SPH & WCGH are mixed use sites with both Acute and Long Term Care

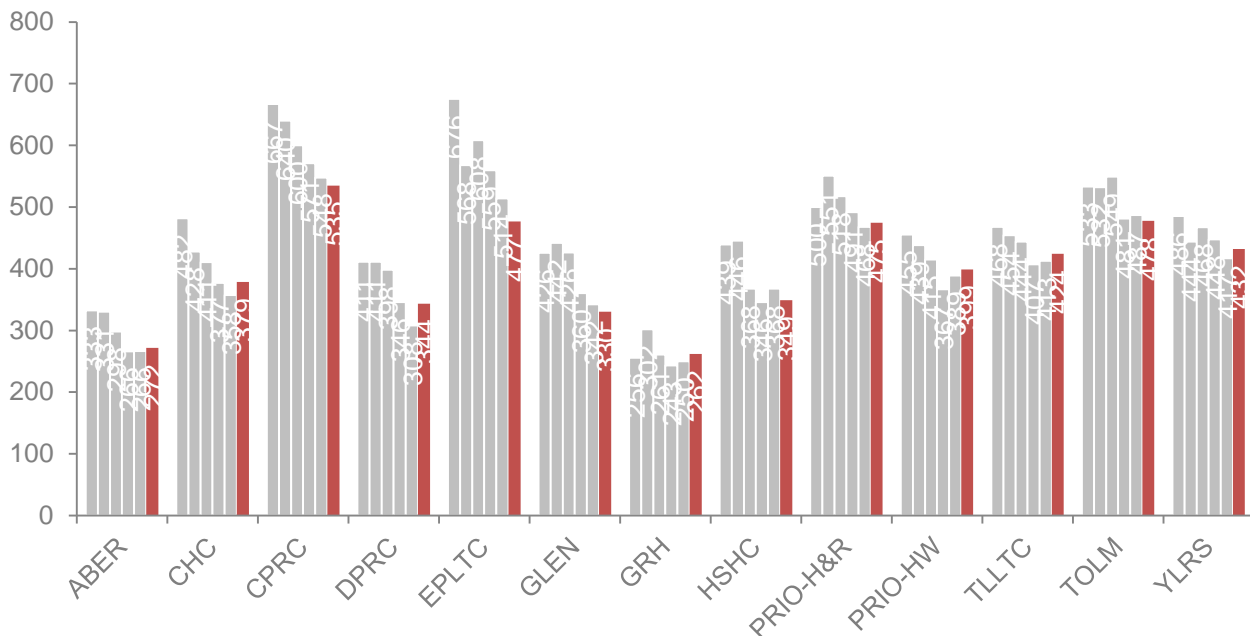
## Residential Care

Residential Care facilities are the second highest consumer of energy and are the largest peer groups at Island Health. 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, 11.7% of cost and 12% of our emissions for F2017.

**Table 9 Residential Care EUI for F2017**

| Site     | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | EUI % Difference vs F2008 | Total Cost Index [\$/m <sup>2</sup> ] | Emissions [tCO <sub>2</sub> e] |
|----------|------------------------------|-------------------|--------------------------|--|---------------------------|---------------------------------------|--------------------------------|
| GRH      | 17,517                       | 1,041,861         | 3,544,306                | 262                                      | -27.42%                   | \$12                                  | 647                            |
| ABER     | 9,726                        | 1,178,465         | 1,466,444                | 272                                      | -26.86%                   | \$16                                  | 276                            |
| GLEN     | 7,609                        | 845,674           | 1,667,083                | 330                                      | -24.86%                   | \$17                                  | 308                            |
| DPRC     | 6,928                        | 718,469           | 1,661,972                | 344                                      | -10.16%                   | \$17                                  | 306                            |
| YLRS     | 5,467                        | 882,865           | 1,479,583                | 432                                      | -14.69%                   | \$23                                  | 275                            |
| CHC      | 5,328                        | 800,143           | 1,217,444                | 379                                      | -25.11%                   | \$22                                  | 227                            |
| TLLTC    | 4,651                        | 1,859,673         | 114,285                  | 424                                      | -32.25%                   | \$24                                  | 40                             |
| EPLTC    | 4,000                        | 536,547           | 1,370,889                | 477                                      | -13.39%                   | \$24                                  | 252                            |
| PRIO-HW  | 3,852                        | 523,206           | 1,012,417                | 399                                      | -16.09%                   | \$22                                  | 187                            |
| CPRC     | 3,662                        | 529,217           | 1,429,167                | 535                                      | -15.66%                   | \$27                                  | 262                            |
| PRIO-H&R | 3,297                        | 339,491           | 1,225,556                | 475                                      | -5.78%                    | \$24                                  | 224                            |
| TOLM     | 2,629                        | 201,233           | 1,054,861                | 478                                      | -11.35%                   | \$22                                  | 192                            |
| HSHC     | 1,600                        | 308,148           | 250,142                  | 349                                      | -6.90%                    | \$26                                  | 48                             |

**Figure 7 Residential Care F2012 to F2017 Performance**





\* ABER & GRH are mixed use sites and include substantial areas for administrative use.

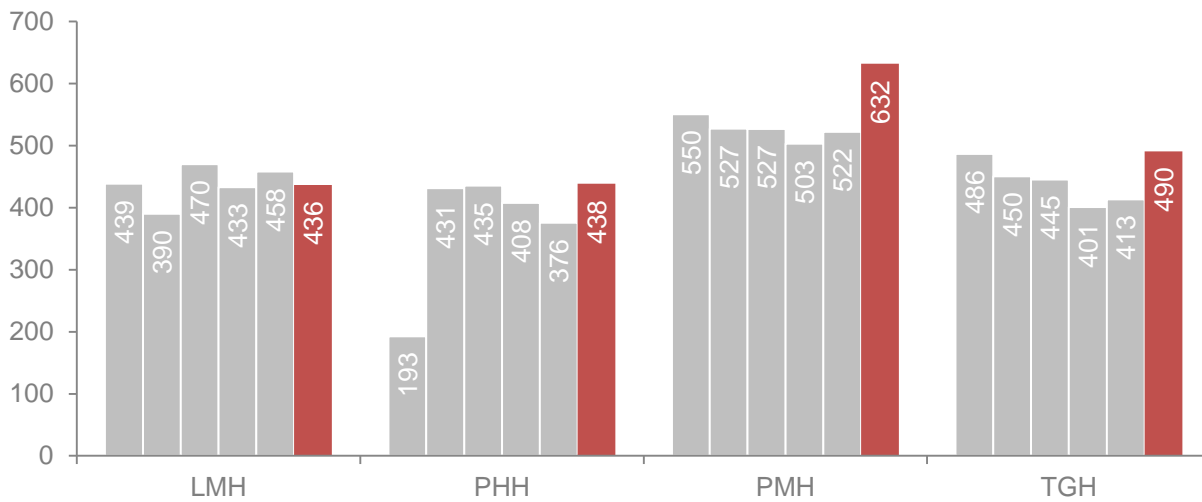
### Small Acute Care

Small Acute facilities are mostly located in and serve rural communities. They represent 2.2% of our energy consumption, 3.5% of cost and 2% of our emissions for F2017.

**Table 10 Small Acute Care EUI for F2017**

| Site | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | EUI % Difference vs F2008 | Total Cost Index [\$/m <sup>2</sup> ] | Emissions [tCO <sub>2</sub> e] |
|------|------------------------------|-------------------|--------------------------|--|---------------------------|---------------------------------------|--------------------------------|
| PHH  | 4,463                        | 1,566,507         | 389,958                  | 438                                      | -20.72%                   | \$32                                  | 120                            |
| LMH  | 3,981                        | 458,187           | 1,279,050                | 436                                      | -25.05%                   | \$48                                  | 282                            |
| TGH  | 1,700                        | 292,305           | 541,530                  | 490                                      | 1.22%                     | \$48                                  | 145                            |
| PMH  | 1,176                        | 370,180           | 373,020                  | 632                                      | 5.75%                     | \$75                                  | 85                             |

**Figure 8 Small Acute F2012 to F2017 Performance**



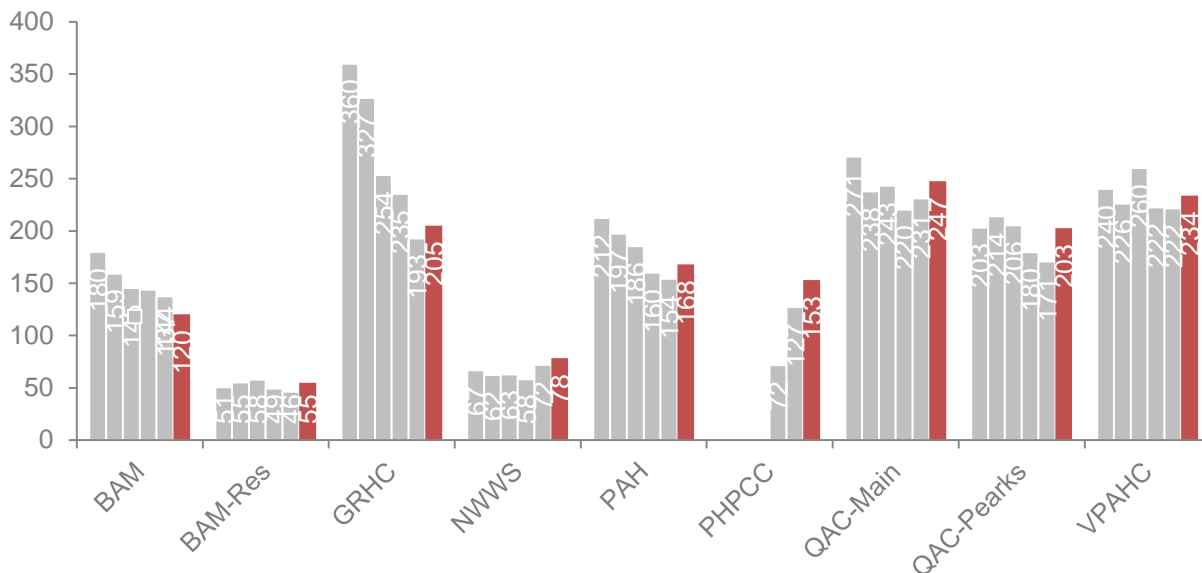
### Office/Outpatient Facilities

These facilities have been grouped together due to their similar usage profiles. Operating typically on office hours, these facilities consume the least amount of energy within our portfolio. Office/Outpatient facilities represent 1.6% of our energy consumption, 1.9% of cost and 2% of our emissions for F2017.

**Table 11 Office/ Outpatient EUI F2017**

| Site        | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | EUI % Difference vs F2008 | Total Cost Index [\$/m <sup>2</sup> ] | Emissions [tCO <sub>2</sub> e] |
|-------------|------------------------------|-------------------|--------------------------|--|---------------------------|---------------------------------------|--------------------------------|
| QAC-Main    | 8,909                        | 706,182           | 1,498,444                | 247                                      | -1.45%                    | \$13                                  | 277                            |
| QAC-Pearkes | 3,905                        | 175,004           | 615,806                  | 203                                      | -12.40%                   | \$11                                  | 112                            |
| NWWS        | 1,858                        | 88,935            | 56,815                   | 78                                       | 62.84%                    | \$7                                   | 11                             |
| VPAHC       | 1,181                        | 130,253           | 145,952                  | 234                                      | 0.00%                     | \$18                                  | 28                             |
| GRHC        | 799                          | 163,770           | 0                        | 205                                      | -29.09%                   | \$24                                  | 2                              |
| BAM         | 700                          | 66,146            | 18,178                   | 120                                      | -24.71%                   | \$16                                  | 5                              |
| PHPCC       | 475                          | 72,739            | 0                        | 153                                      | 0.00%                     | \$19                                  | 1                              |
| PAH         | 468                          | 78,662            | 0                        | 168                                      | -19.54%                   | \$21                                  | 1                              |
| BAM-Res     | 279                          | 15,322            | 0                        | 55                                       | -41.39%                   | \$7                                   | 0                              |

**Figure 9 Office/ Outpatient F2012 to F2017 Performance**



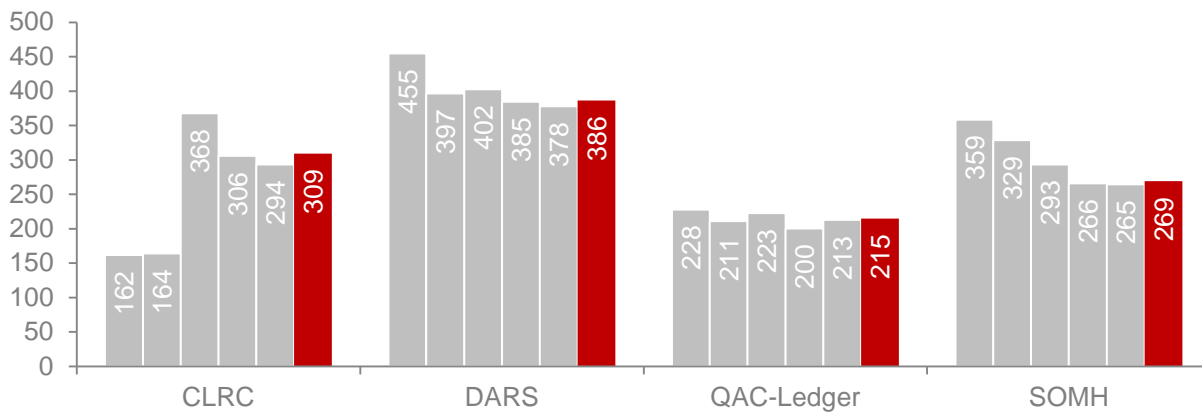
## Mental Health

These facilities serve a variety of patients who require Mental Health and Substance Use services. These facilities represent 1.7% of our energy consumption, 1.9% of cost and 2% of our emissions for F2017.

**Table 12 Mental Health EUI F2017**

| Site       | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | EUI % Difference vs F2008 | Total Cost Index [\$/m <sup>2</sup> ] | Emissions [tCO <sub>2</sub> e] |
|------------|------------------------------|-------------------|--------------------------|--|---------------------------|---------------------------------------|--------------------------------|
| CLRC       | 5,440                        | 611,000           | 1,071,417                | 309                                      | -31.57%                   | \$17                                  | 199                            |
| SOMH       | 3,497                        | 362,253           | 578,960                  | 269                                      | -22.84%                   | \$17                                  | 108                            |
| QAC-Ledger | 2,772                        | 204,189           | 391,584                  | 215                                      | -22.09%                   | \$14                                  | 72                             |
| DARS       | 1,733                        | 174,682           | 495,053                  | 386                                      | -12.63%                   | \$23                                  | 91                             |

**Figure 10 Mental Health F2012 to F2017 Performance**



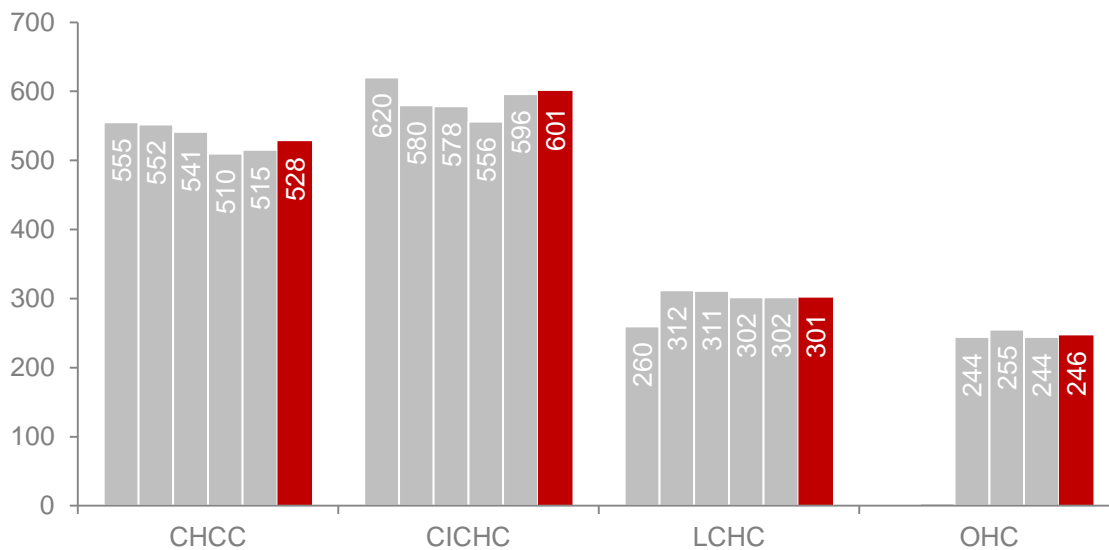
### Health Centre

These facilities serve patients on a short term, Primary Care or Urgent Care basis. Health Centres represent 2.6% of our energy consumption, 3.5% of cost and 3% of our emissions for F2017.

**Table 13 Health Centre EUI F2017**

| Site  | Floor Area [m <sup>2</sup> ] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | EUI % Difference vs F2008 | Total Cost Index [\$/m <sup>2</sup> ] | Emissions [tCO <sub>2</sub> e] |
|-------|------------------------------|-------------------|--------------------------|--|---------------------------|---------------------------------------|--------------------------------|
| CHCC  | 5,116                        | 854,945           | 1,845,500                | 528                                      | -10.79%                   | \$27                                  | 340                            |
| CICHC | 2,129                        | 459,728           | 819,259                  | 601                                      | 15.23%                    | \$68                                  | 183                            |
| LCHC  | 3,348                        | 407,661           | 601,417                  | 301                                      | -46.14%                   | \$20                                  | 112                            |
| OHC   | 3,638                        | 665,491           | 231,301                  | 246                                      | 0.00%                     | \$19                                  | 49                             |

**Figure 11 Health Centre F2012 to F2017 Performance**



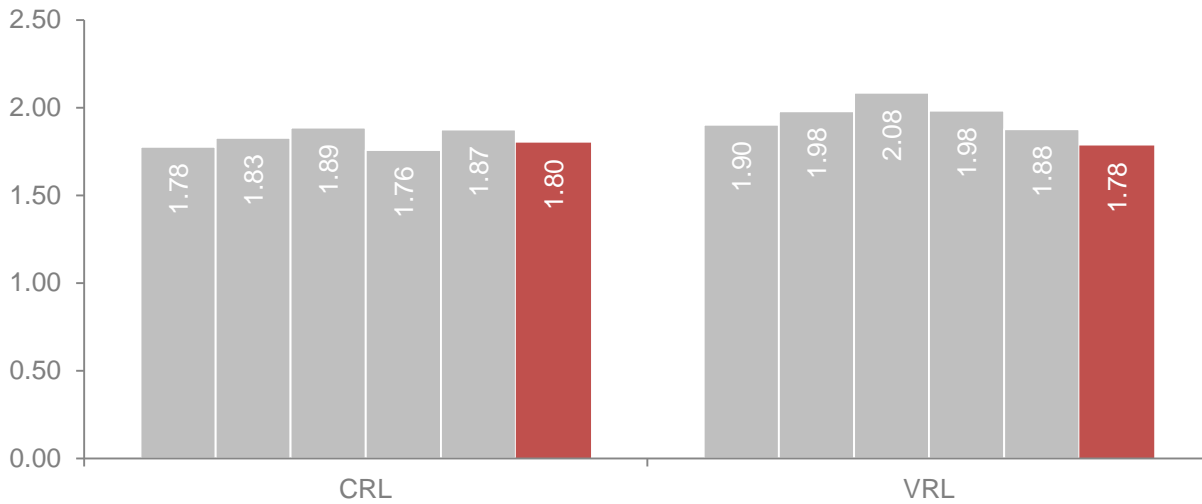
## Laundry Facilities

Laundry facilities are unique because the major driver of energy use is 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 10% of our emissions for F2017.

**Table 14 Laundry Facilities EUI F2017**

| Site | Laundry [kg] | Electricity [kWh] | Fossil Fuel Energy [kWh] | Total Energy Index [kWh/kg] | EUI % Difference vs F2008 | Total Cost Index [\$/kg] | Emissions [tCO <sub>2</sub> e] |
|------|--------------|-------------------|--------------------------|-----------------------------|---------------------------|--------------------------|--------------------------------|
| CRL  | 3,076,726    | 611,628           | 4,930,472                | 1.87                        | -21.57%                   | \$0.07                   | 892                            |
| VGHL | 5,951,163    | 1,888,405         | 8,728,250                | 1.88                        | -8.33%                    | \$0.07                   | 1,587                          |

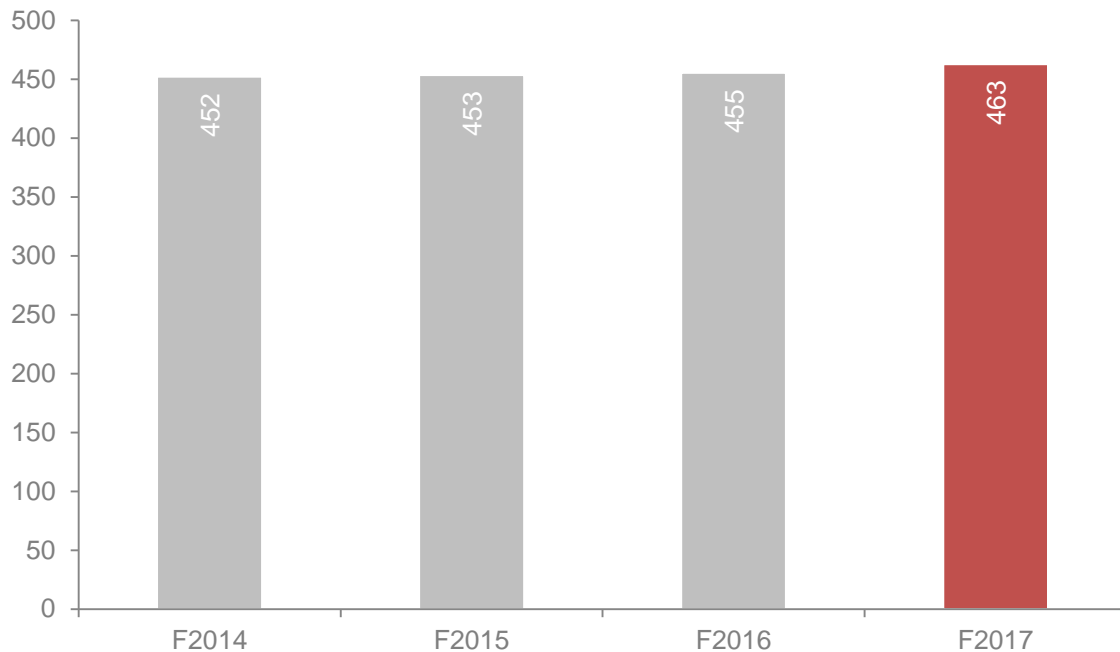
**Figure 12 Laundry Facilities F2012 to F2017 Performance**



### P3 Performance

The energy performance of the Patient Care Centre at the Royal Jubilee Hospital is monitored and reported monthly. The Project Agreement<sup>3</sup> stipulates that the Adjusted Energy Target for the Patient Care Centre is 1.84 GJ/m<sup>2</sup>/year. This translates to 511 kWh/m<sup>2</sup>/year. Figure shows that the monitored EUI of the Patient Care Centre has continued to be steady over past several years and has never exceeded the Adjusted Energy Target, as per the terms of the Project Agreement<sup>4</sup>.

**Figure 13 RJH Patient Care Centre Monitored EUI**



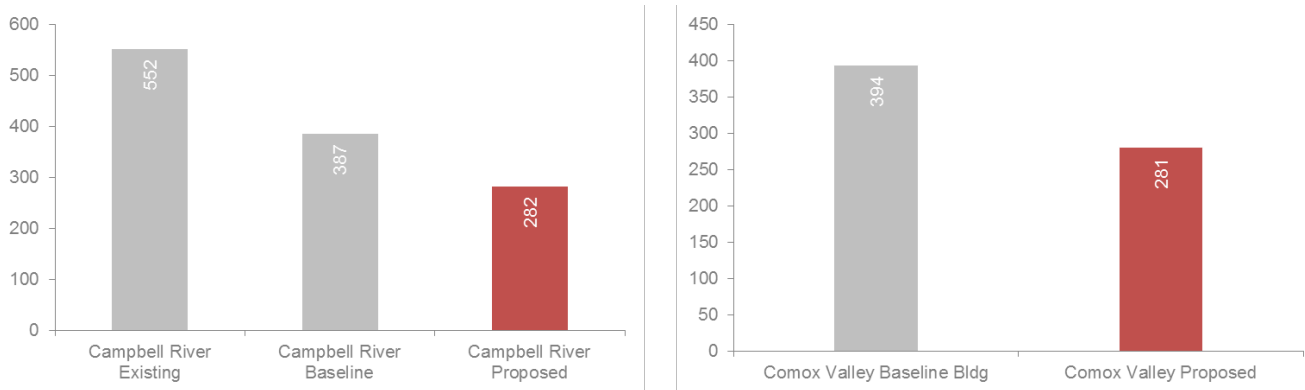
### Future Island Health Facilities

Three major new facilities will be operational in the next two years. The North Island Hospitals Project (NIHP) is replacing the aged facilities in Campbell River and the Comox Valley. The new Campbell River (CBR) and Comox Valley (CMX) hospitals are designed to be the most energy efficient in the Province and will be among the most efficient hospitals in the world. The hospitals will use roughly half the energy of the existing hospitals per square metre (refer to Figure ). In addition, GHG emissions will be 73% lower than the existing facilities. The North Island Hospitals are slated to open for service in September and October 2017.

<sup>3</sup> Refer to Project Agreement Appendix 2K can Change Certificate #2

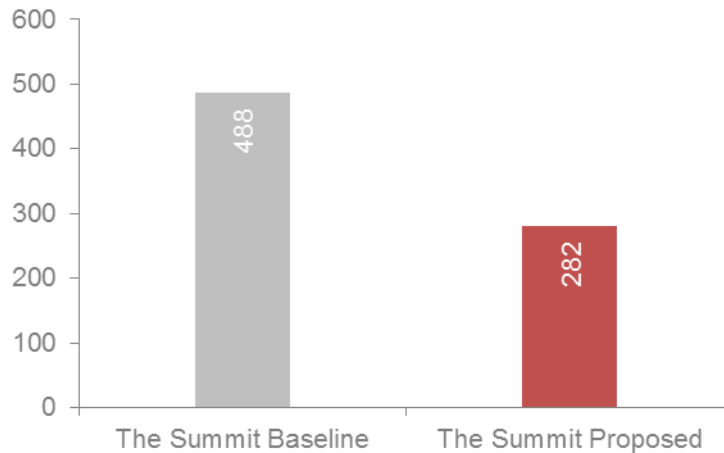
<sup>4</sup> Calculated using the same method outlined by Caneta Energy, the Independent Energy Consultant

**Figure 14 Campbell River & Comox Valley Modelled EUI**



The third building is The Summit, a new 320-bed residential care facility. This facility is being constructed on behalf of Island Health by the Capital Region Hospital District. The EEC Team was able to enroll the building in the BC Hydro New Construction program and, as a result, secure a higher performance building. Completion is expected in F2019. The Summit was an excellent example of how BC Hydro’s New Construction program influencing decisions to achieve a better energy performance. Due to very tight construction budgets considerable negotiation and calculation were necessary to find the right fit for the buildings. Unfortunately this program has been scaled back and will not benefit the new NRGH ICU or the proposed Hospice building at VGH. Hopefully the program will be available for the new CDH Hospital for the Cowichan Valley.

**Figure 15 The Summit at Quadra Village Modelled EUI**

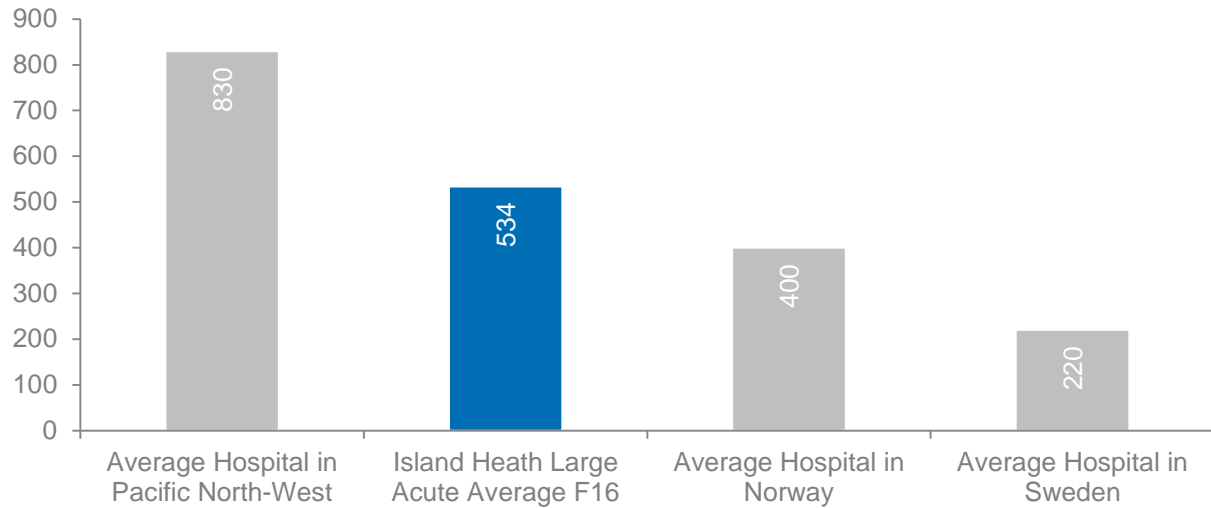




### Other Benchmarks

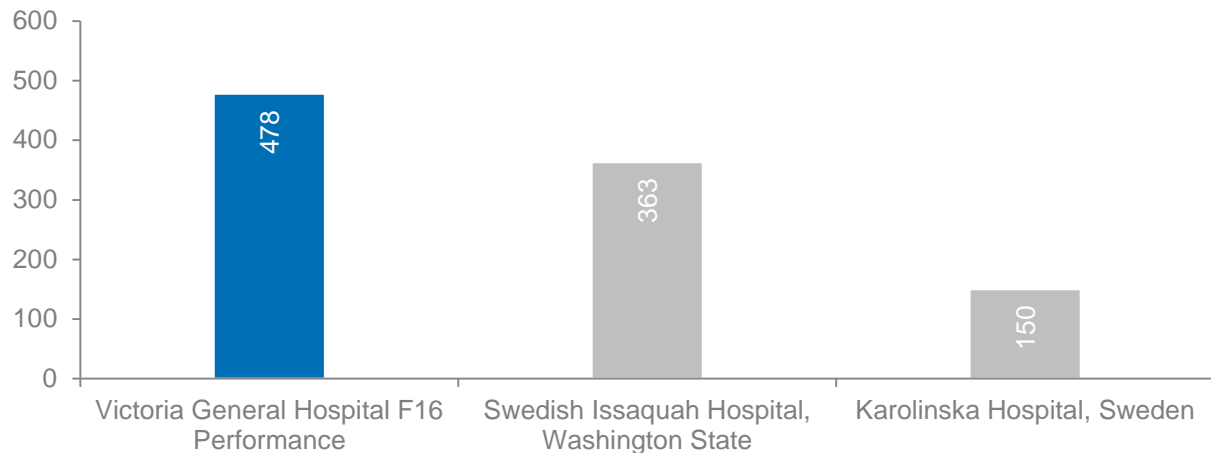
The figures below compare the EUI performance of Island Health facilities in F2016 with hospitals in other jurisdictions.

**Figure 16 Performance Comparison of Island Health Large Acute Hospitals with Hospitals in other Jurisdictions**



5

**Figure 17 Performance Comparison of VGH with Selected Hospitals Outside BC**



6

<sup>5</sup> Average EUI performance for Hospitals in Pacific North-West, Norway & Sweden taken from University of Washington’s Integrated Design Lab Target 100

<sup>6</sup> Performance of Swedish Issaquah Hospital and taken from ASHRAE Journal, June 2013

### Sites We are Focusing On

The sites we are focusing most of our efforts on are listed in Table 15. This table shows each site’s energy use in F2017 as well as how much of Island Health’s total energy use that is, in terms of percentage. These eight sites combined account for approximately 71% of all energy and is the main reason our efforts are concentrated on these facilities, as detailed in our Five Year Plan. Last year these sites made up 74% of our total consumption. This shows that the majority of our savings are occurring at the larger sites since they now represent a smaller portion of the energy pie.

**Table 15 Largest energy consumers accounting for 71% of Island Health’s total energy use**

| Site | Electricity [kWh] | Total Energy Index [kWh/m <sup>2</sup> ] | % of VIHA Total |
|------|-------------------|--|-----------------|
| RJH  | 27,014,090        | 435                                      | 32.0%           |
| NRGH | 13,954,975        | 627                                      | 14.6%           |
| VGH  | 9,655,689         | 506                                      | 10.6%           |
| WCGH | 3,204,499         | 707                                      | 4.2%            |
| CDH  | 3,187,519         | 546                                      | 4.2%            |
| SPH  | 3,219,154         | 499                                      | 3.0%            |
| GRH  | 1,041,861         | 262                                      | 2.0%            |

## 5. Energy Studies

Table 16 lists energy studies Island Health has completed in F2017 and is planning for F2018 and F2019. 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. In the next several years, as studies are completed at the sites, a SEMP for the site will be developed to show what is necessary for the site to meet the energy targets, greenhouse gas emissions targets, as well as what should be done in terms of adaptation to climate change. Appendix F has a listing of all our completed studies.

On average Island Health invests over \$200,000 per year in studies. Historically BC Hydro covered 100% of the cost of studies that met their fairly broad energy reduction criteria. BC Hydro has reduced their scope down to just covering 50% of the cost of lighting studies. 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 energy conservation measures 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. Also energy studies are required to apply for Carbon Neutral Capital Program capital funding. In recognition of this Island Health has created a Sustainable Studies operating cost centre. The budget will be \$200,000 and will depend on a minimum of \$30,000 being recovered from incentives.

**Table 16 List of studies recently completed and planned**

| Study Site and Title By Year                    | Cost Study       | Eligible for Rebate |
|---|------------------|---------------------|
| <b>Complete F2017</b>                           |                  |                     |
| CPRC Biomass Boiler Plant Study                 | \$41,000         |                     |
| NRGH Climate Data to 2050 Study                 | \$24,500         |                     |
| NRGH PIEVC Study                                | \$80,000         | Yes - NRCan         |
| NRGH Chiller Systems Study                      | \$61,000         |                     |
| Cumberland Gap Analysis Study                   | \$9,800          |                     |
| Cumberland Laundry Energy Study                 | \$17,406         | Yes                 |
| Dufferin Controls Upgrade Engineering           | \$7,000          |                     |
| Dufferin FortisBC Study                         | \$ 3,000         | Yes                 |
| CICHC Solar PV Back-Up Power System Feasibility | \$4,500          |                     |
| Priory Boiler Replacement and DHW De-coupling   | \$8,000          |                     |
| Aberdeen Boiler Replacement                     | \$7,000          |                     |
| RJH Royal West                                  | \$12,950         | Yes                 |
| VGH Steam Trap survey                           | \$2,000          |                     |
| EMP Return Air & Heat Recovery Penthouse        | \$6,353          | Yes                 |
| <b>Total</b>                                    | <b>\$284,508</b> |                     |

|   |                  |     |
|---|------------------|-----|
|   |                  |     |
| <b>Proposed Energy Studies F 2018 and F2019</b>                   |                  |     |
| C-Op Round II: EPLTC, TLLTC, CDH                                  | \$40,000         | Yes |
| CICHC DHW Heat Pump System Study                                  | \$13,500         |     |
| TLLTC Eplus Boiler Replacement Options                            | \$13,600         |     |
| WCGH Site-Wide Zone Isolation & Scheduling Study                  | \$20,000         |     |
| NRGH Kitchen/Food Services Energy Study                           | \$20,000         |     |
| Remote Sites BC Hydro Comprehensive Energy Studies                | \$40,000         | Yes |
| Residential Sites BC Hydro Comprehensive Studies                  | \$40,000         | Yes |
| Cumberland Laundry Boiler Study                                   | \$15,000         | Yes |
| RJH Final Look at D&T Airside Heat Recovery                       | \$40,000         | Yes |
| RJH C-Op  | \$110,000        |     |
| RJH MRI Heat Recovery Chiller                                     | \$15,000         |     |
| Victoria Pandora Health Centre                                    | \$10,000         | Yes |
| Mt Tomlie BC Hydro Energy Study                                   | \$30,000         | Yes |
| GLH BC Hydro Energy Study   | \$30,000         | Yes |
| DARS BC Hydro Energy Study  | \$30,000         | Yes |
| VGH Dedicated DHW Boiler for Cooling Season (Optimize DHW System) | \$20,000         |     |
| GRH Zone Control & Exhaust HR                                     | \$5,000          |     |
| ABH Zone Control & Exhaust HR                                     | \$5,000          |     |
| SPH Zone Control & Exhaust HR                                     | \$10,000         |     |
| GLH Zone Control & Exhaust HR                                     | \$5,000          |     |
| Heat Pump Opportunity at Priory Heritage Woods                    | \$5,000          | Yes |
| Heat Pump Opportunity at SOMH                                     | \$5,000          | Yes |
| SPH Optimize DHW System   | \$20,000         |     |
| Sewer Heat Pump for RJH & VGH                                     | \$2,000          | Yes |
| <b>Total F2018 &amp; F2019</b>                                    | <b>\$554,100</b> |     |

## 6. Awareness and Behaviour Change Program

Island Health recognizes the impact that staff has on reducing energy consumption, GHG emissions and contributing to a culture of sustainability. To support staff, the EEC department participated in the Workplace Conservation Awareness (WCA) program, with resource support from BC Hydro and FortisBC. In 2016, the WCA program was replaced with the new Energy Wise Network (EWN) program. Island Health has been accepted into the program again for the F2017/18 cycle.

Island Health developed the Greening Care program which has three components: organization-wide staff communications and engagement; the Green Champion Program for staff who carry out green initiatives at select facilities; and a Facilities Maintenance and Operations (FMO) Engagement Program aimed towards FMO staff at all owned sites.

In terms of resources for the Greening Care program, the support from external sources has become more limited. Internal capacity was increased through the addition of a Sustainability Coordinator's position in 2016 but there is little departmental budget dedicated to the program. In 2015 and 2016, Island Health received \$13,000 incentive and approximately 500 consulting hours in total. For F2017/2018, Island Health will receive \$1,200 incentive and 10 consulting hours for the Energy Wise Network program. Over the past year, an equivalent of one FTE staff time has been allocated. Our Sustainability Coordinator leads the Greening Care Program with two Energy Specialists supporting the efforts on communication material development, recruiting, training and coaching Green Champions, and providing technical assistance.

Strategic planning is underway to evaluate the best options for maximizing impacts with available resources.

### Green Island Health Communications

Island Health's Environmental Sustainability program is communicated to staff through a variety of methods. Employees can learn about successes, goals and progress of Island Health's Environmental Sustainability by visiting the public [Environmental Sustainability](#) webpage which hosts recent news and publications, such as the Carbon Neutral Action Report and the Strategic Energy Management Plan.

The internal Green Island Health site hosts information on Island Health's green strategy, projects and initiatives as well as how Island Health staff can participate in greening their sites and a variety of tips useful for both home and at work.

Green Tips are published in the staff digital newsletter *The Weekly*. Success stories about facility upgrades are published in *The Currents* monthly magazine and awards stories, campaigns or contests are publicized across the organization via the intranet homepage.

The annual Green Survey began in 2011 and enjoys a participation rate between 15% and 27%. This valuable tool allows us to track employees' attitudes and behaviour change over time and helps with program planning. The data collected has confirmed that our efforts are raising awareness and having an impact on influencing behaviours. However, in the last two years, the survey results yielded little new information. Considering the time and resources the annual survey requires for data collection, analysis and reporting, the Energy Management team decided to conduct the survey biannually or on an as-needed basis in the future.

Key results from the 2016 Green Survey are shared in the form of a Survey Infographic (see Appendix E).

### Green Champions Program

The Green Team program was initiated in 2011 and was replaced with the Green Champion program in 2015 to better address staff workflows. Staff members who become Green Champions receive up to 20 hours to carry out green initiatives upon their managers’ approval.

The Green Champions program includes an initial four-hour training workshop and self-directed campaign toolkits that Champions implement in their departments. The training is based on Community Based Social Marketing strategies and helps ensure all Champions are enabled to initiate change in their departments while being able to handle any challenges that may arise.

In the past, the training has always been offered on-site in-person with the intention to build a strong community of support among Champions. To enable motivated staff members who are not able to attend in-person training, the Energy Team piloted an online training module in April 2017 with \$1,500 funding support from FortisBC.

**Table 17 Green Champion Sites**

| Site                              | Number of Green Champions |
|-----------------------------------|---------------------------|
| Nanaimo Regional General Hospital | 5                         |
| Victoria General Hospital         | 11                        |
| Cowichan District Hospital        | 2                         |
| Royal Jubilee Hospital            | 2                         |
| Saanich Peninsula Hospital        | 11                        |
| Aberdeen Hospital                 | 2                         |
| Gorge Road Hospital               | 5                         |
| <b>Total</b>                      | <b>38</b>                 |

### FMO Engagement Program

The Energy Management Team developed a year-long Building Energy Challenge Campaign targeting FMO staff. This campaign includes a series of activities focusing on different continuous optimization measures that are suitable for FMO staff to pursue. The intent is to encourage new habits of looking for energy saving opportunities in daily operations.

Figure 18 Island Health 2017 Building Energy Challenge Poster



The first campaign on eliminating unnecessary lighting hours helped uncover many areas that were illuminated when not in use. If the identified measures are implemented, the energy savings from this campaign is estimated to be 7,367 kWh per year. The Central West region won the challenge by identifying most ideas. The actual implementation is dependent on budget availability.

The second campaign on variable frequency drive (VFD) optimization prompted operators and control technicians to identify pumps and fans that run 24/7 at full capacity but could potentially be scaled back automatically. A total of 46 pumps and fans were identified as potential candidates. The Energy Team then conducted a cost-effectiveness analysis and recommended 7 of them which are estimated to save 24,506 kWh per year. The Victoria General Hospital team won this challenge by identifying the greatest number of pumps and fans.



**Figure 19 VGH Staff Participated In the VFD Campaign**



It has been observed through the early experience with these campaigns that relevant educational events could be offered at the launch of the campaigns to prepare staff and make the best use of their time. In addition, dialogue among FMO staff across the island has proven to be valuable and should continue to be facilitated.

FortisBC provided generous funding support for a series of successful technical training webinars for the FMO staff last year. The Energy Team will receive \$10,375 from FortisBC to host three webinars for FMO again in the fall 2017 and early 2018. This partnership has been critical to provide continued education in order to enable FMO staff's energy conservation behaviors.

## 7. Budget

The tables below summarize capital funding approved for energy related projects. Table 18 shows projects that were initiated in either 2016 or 2017 and are underway.

Table 19 shows projects approved prior to F2016 and are now completed.

Island Health's total expenditure on energy related projects goes beyond the capital outlined below. Every year operating funds are used to address items that impact energy use (i.e. minor lighting retrofits, emergency equipment replacements) and not all of this is recognized through BC Hydro or FortisBC funding programs. Island Health continues to fund a full time Director level position and Energy Analyst to lead the Energy Team. Travel, benefits and other expenses incurred by the entire EEC department are funded by Island Health.

**Table 18 Currently Approved Capital for Energy Projects effective 2016/2017**

| Project                               | Budget             | Incentive        | Island Health<br>Capital<br>Investment | Year of Spend<br>(CY) |
|---------------------------------------|--------------------|------------------|--|-----------------------|
| VGH HW/CW Upgrade                     | \$95,000           |                  | \$95,000                               | 2017                  |
| VGH MRI CW System Upgrade             | \$300,000          |                  | \$300,000                              | 2017                  |
| VGH OR Zone control                   | \$307,500          |                  | \$307,500                              | 2017                  |
| RJH EMP Cooling Tower                 | \$320,000          |                  | \$320,000                              | 2017 - 2018           |
| RJH Boiler #3 Replacement             | \$1,200,000        |                  | \$1,200,000                            | 2017 - 2018           |
| QAC Boiler & DHW Upgrade              | \$512,500          | \$24,318         | \$512,500                              | 2017                  |
| Priory Boiler & DHW Upgrade           | \$540,000          | \$30,000         | \$540,000                              | 2017                  |
| Continuous Optimization Phase 3       | \$650,000          | \$25,000         | \$650,000                              | 2015 - 2017           |
| WCGH Replace Chiller                  | \$1,477,000*       |                  | \$1,477,000                            | 2016-2017             |
| CPRC Exhaust Air Heat Recovery        | \$179,500*         |                  | \$179,500                              | 2017                  |
| RJH EMP Chiller Replacement           | \$459,000          |                  | \$459,000                              | 2017                  |
| YLRG Lighting Upgrade                 | \$168,842          | \$41,770         | \$168,842                              | 2017                  |
| DPRC Pneumatic to Electronic Controls | \$107,402          |                  | \$107,402                              | 2016-2017             |
| VGH Cooling Tower                     | \$550,000          |                  | \$550,000                              | 2017                  |
| Styles St Lighting Upgrade            | \$30,000           | \$10,146         | \$0                                    | 2017                  |
| VGH D&T Lighting Upgrade              | \$140,000          | \$38,197         | \$140,000                              | 2017                  |
| VGH VFD for HW Loop                   | \$30,000           | \$4,735          | \$30,000                               | 2017                  |
| NRGH Electrical Vault Cooling         | \$75,000*          |                  | \$75,000                               | 2017                  |
| NRGH Phase 3 Zoning                   | \$390,000          | \$10,000         | \$390,000                              | 2017                  |
| CHC Energy Upgrades                   | \$180,000          |                  | \$180,000                              | 2017                  |
| <b>Total</b>                          | <b>\$7,711,744</b> | <b>\$184,166</b> | <b>\$7,681,744</b>                     |                       |

**Table 19 Capital for Energy Projects completed between 2010 and 2016**

| Project  | Cost Estimate | Incentive   | Island Health<br>Capital Investment | Year of Spend<br>(CY) |
|--|---------------|-------------|-------------------------------------|-----------------------|
| Oceanside Health Centre  | \$320,600     | \$32,000    | \$320,600                           | 2012-2013             |
| Various Lighting Projects  | \$3,414,308   | \$2,152,807 | \$1,697,729                         | 2009 - 2015           |
| Power Factor Correction at CHC   | \$21,424      |             | \$21,424                            | 2012 - 2013           |
| Coil Cleaning Various sites  | \$70,100      | \$22,304    | \$47,796                            | 2012 - 2014           |
| NRGH Emergency Department  | \$2,576,300   | \$405,868   | \$2,170,432                         | 2011 - 2012           |
| Solar Thermal (VGH, SPH, ABER,<br>CPRC)  | \$666,798     | \$522,400   | \$144,398                           | 2011 - 2012           |
| Bundled Measures at VGH  | \$749,506     | \$749,506   |                                     | 2011 - 2012           |
| Bundled Measures at NRGH   | \$558,229     | \$558,229   |                                     | 2011 - 2013           |
| Bundled Measures at Cumberland<br>Kitchen Ventilation Controls –<br>Various    | \$424,100     | \$424,100   |                                     | 2011 - 2012           |
| NRGH Energy Initiatives (mainly<br>heat recovery chiller systems)              | \$192,931     | \$192,931   |                                     | 2011 - 2012           |
| NRGH Elevator Upgrade  | \$990,000     |             | \$990,000                           | 2011 - 2013           |
| PSP Express (to March 31, 2014)  | \$650,000     |             | \$650,000                           | 2011 - 2012           |
| Continuous Optimization Phase 1  | \$460,868     | \$141,987   | \$318,881                           | 2011 - 2014           |
| IMIT Server Virtualization   | \$753,185     | 328,174     | \$425,011                           | 2012 - 2014           |
| Various Boiler & DHW Upgrade   | \$250,856     | \$97,411    | \$153,445                           | 2011 - 2013           |
| GRH DHW Upgrade  | \$2,065,600   | \$163,930   | \$1,944,072                         | 2011 - 2015           |
| NRGH Valve Replacement   | \$29,125      | \$7,500     | \$21,625                            | 2012 - 2013           |
| NRGH Synchronous Belts   | \$100,000     |             | \$100,000                           | 2011 - 2012           |
| Sustainable Energy Feasibility<br>Study RJH                                    | \$24,000      | \$14,192    | \$9,808                             | 2011 - 2012           |
| TGH & WCGH Controls Upgrade  | \$25,000      |             | \$25,000                            | 2014                  |
| CHC Controls & Energy Upgrade  | \$80,000      |             | \$80,000                            | 2011 - 2012           |
| Chiller Replacement Phase II at<br>VGH   | \$40,000      |             | \$40,000                            | 2011 - 2012           |
| RJH Boiler Economizer & Lighting   | \$772,500     |             | \$772,500                           | 2013 - 2014           |
| LMH Boilers and Lighting   | \$335,640     | \$109,296   | \$226,344                           | 2013 - 2014           |
| Cowichan Valley Energy Projects  | \$386,680     | \$386,680   |                                     | 2010 - 2012           |
| HVAC Upgrade at SPH  | \$238,125     |             | \$238,125                           | 2010 - 2012           |
| CRH BAS Upgrade  | \$1,231,200   |             | \$1,231,200                         | 2012 - 2014           |
| Energy Efficiency Upgrades at<br>WCGH  | \$45,000      |             | \$45,000                            | 2010                  |
| CDH Flight Dishwasher  | \$820,000     | \$69,000    | \$751,000                           | 2012 - 2014           |
| NRGH SF2/SF3 Zoning  | \$127,339     | \$20,000    | \$107,339                           | 2013                  |
| NRGH MRI Chiller   | \$345,000     | \$92,398    | \$345,000                           | 2015                  |
| NRGH Replace 3 Electric Combi-<br>Ovens  | \$47,918      |             | \$47,918                            | 2012                  |
| Sustainable Energy Systems Phase<br>1 (biomass and district energy at<br>NRGH) | \$185,000     | \$14,131    | \$185,000                           | 2015                  |
| Continuous Optimization Phase 2  | \$250,000     |             | \$250,000                           | 2012 - 2014           |
|  | \$585,000     | \$130,000   | \$455,000                           | 2013 - 2015           |



| Project                           | Cost Estimate       | Incentive          | Island Health<br>Capital Investment | Year of Spend<br>(CY) |
|-----------------------------------|---------------------|--------------------|-------------------------------------|-----------------------|
| VRL Heat Recovery                 | \$356,000           | \$188,505          | \$425,000                           | 2015                  |
| GRH Boiler Upgrade                | \$710,000           | \$40,000           | \$710,000                           | 2016                  |
| VGH Boiler Draft Control          | \$65,000            |                    | \$65,000                            | 2016                  |
| VGH Tower Zone control            | \$185,000           |                    | \$185,000                           | 2016-2017             |
| GRH GHG reduction Measures        | \$290,000           |                    | \$290,000                           | 2015 - 2016           |
| Energy Efficiency Upgrades at CDH | \$1,487,063         | \$17,466           | \$1,469,597                         | 2012 - 2015           |
| CHCC DHW Decouple                 | \$65,170            | \$1,995            | \$65,170                            | 2016                  |
| CHCC Zone Control                 | \$72,000            | \$22,681           | \$72,000                            | 2016                  |
| NRGH Pot Light Replacement        | \$99,861            | \$36,788           | \$99,861                            | 2016                  |
| RJH Heating system upgrades       | \$4,228,000         |                    | \$4,228,000                         | 2013 - 2016           |
| SPH ED Heating Optimization       | \$40,000            |                    | \$40,000                            | 2016                  |
| ABH DHW Upgrade                   | \$120,000           |                    | \$120,000                           | 2016                  |
| NRGH SF2/SF3 Zoning Phase 2       | \$152,207           | \$26,087           | \$152,207                           | 2015                  |
| <b>Total</b>                      | <b>\$27,702,633</b> | <b>\$6,959,366</b> | <b>\$21,736,482</b>                 |                       |

## 8. Risks

There are several risks that need to be considered in future iterations of this SEMP, including:

- Impact of expansions, renovations, and new facilities, such as:
  - New North Island Hospitals (Comox and Campbell River)
  - Renovations (various) – completed without energy targets
  - New Summit building (residential care home) – intended to replace Mount Tolmie and Oak Bay Lodge
  - NRGH ICU
  - NRGH Thermal Energy Plant
- 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, and in order to achieve the longer term GHG reduction targets, Island Health must implement alternative low/no GHG emissions technologies and fuels.
- 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. Using energy savings for continued investment in energy conservation is still under review at Island Health. At this time there does not seem to be a simple mechanism for transferring operational savings into capital projects. With good energy consumption projection Green Maintenance is possible within an operating budget and is something that is being considered by FMO.
- Reduction in program funding from BC Hydro - Energy Managers are currently only funded for 50% of their salary. Energy studies are only funded 50% and Continuous Operations Program funding has been reduced to about 15% of what it was. Project incentives for mechanical retrofits have been eliminated and only lighting upgrades now qualify. Going forward, incentive agreements have an expiry date corresponding to the end of current fiscal year. This adds more complexity in project planning.

Risks are being addressed by setting aggressive energy and greenhouse gas emission targets for all new construction. 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 renovations, additions and alterations to facilities include energy reduction as part of the mandate.

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 ensuring we only purchase the most energy efficient products and equipment and capitalize on all available incentive programs.

## 9. Opportunities

Fortunately, there are more opportunities for saving energy and reducing GHG emissions than there are risks.

### Operations

#### Recommissioning and Continuous Commissioning

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 and NRGH have completed the investigation phase and RJH has just started.

Continuous Optimization is the best opportunity to significantly impact the attitudes and actions of the operators and prove to them that their actions mean something. It takes diligence, patience, and consistent support to achieve success. However, once the site has gone through the program, the savings can exceed expectations. For example WCGH is reporting higher than expected savings with an 8% reduction on energy bills.

**Table 20 Con-Ops Sites within Island Health**

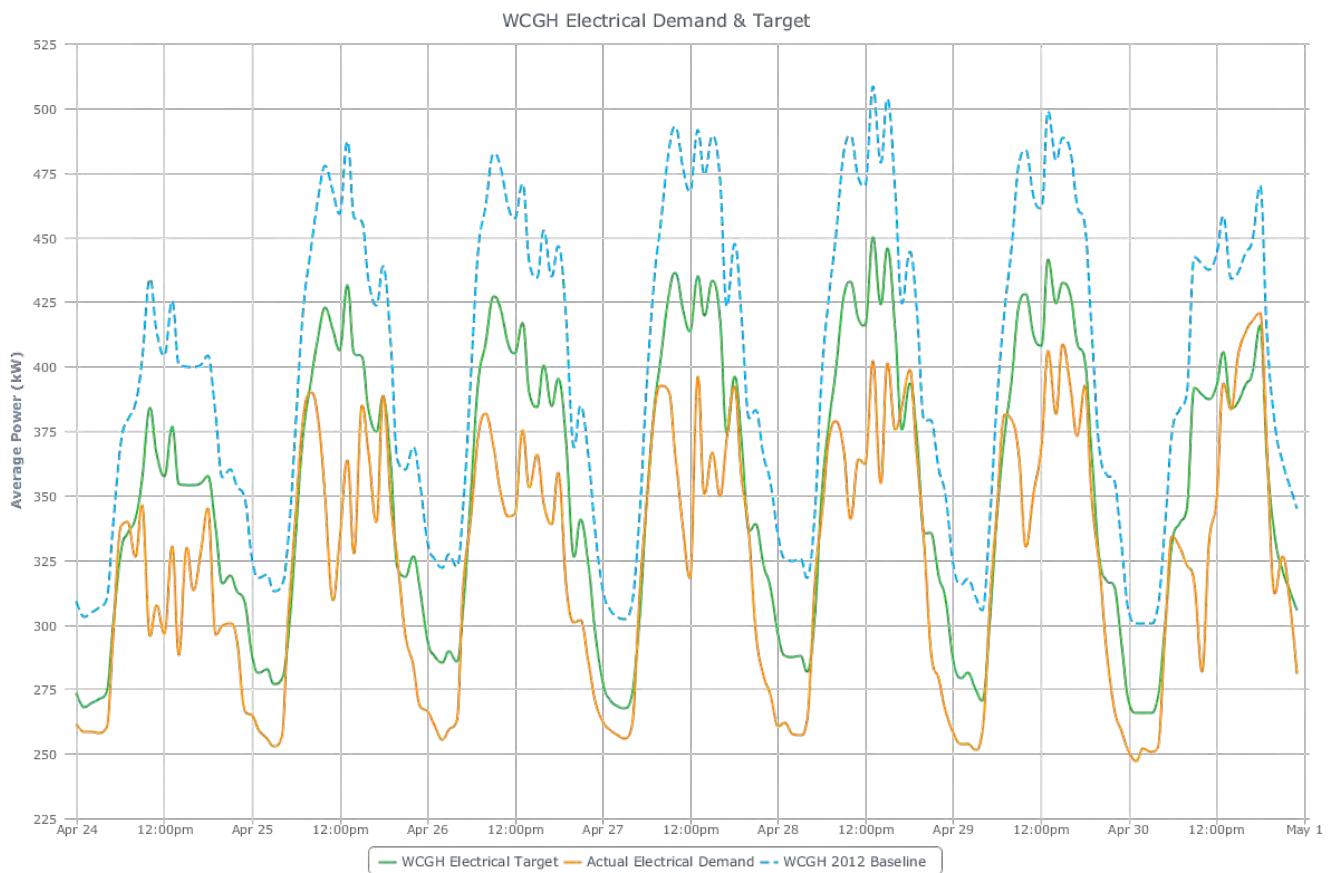
|           |   |
|-----------|---|
| Phase I   | <ul style="list-style-type: none"> <li>Queen Alexandra Centre for Children</li> <li>Saanich Peninsula Hospital</li> <li>Aberdeen Hospital</li> <li>Priory Hospital</li> <li>Ladysmith Community Health Centre</li> <li>Trillium Lodge</li> <li>Eagle Park</li> <li>Cowichan District Hospital</li> <li>Chemainus Health Care Centre</li> <li>Cairnsmore Place</li> <li>West Coast General Hospital</li> </ul> |
| Phase II  | <ul style="list-style-type: none"> <li>Cowichan Lodge</li> <li>Lady Minto</li> <li>Gorge Road Hospital</li> <li>Glengarry Hospital</li> <li>Yucalta Lodge</li> <li>Dufferin Place</li> <li>Cumberland Health Centre</li> <li>Port Hardy Hospital</li> <li>Campbell River Hospital</li> </ul>  |
| Phase III | <ul style="list-style-type: none"> <li>Victoria General Hospital</li> <li>Nanaimo Regional General Hospital</li> <li>Royal Jubilee Hospital</li> </ul>  |

## Energy Management Information System (EMIS)

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

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 and the Energy Team 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 Pulse Energy EMIS system installed have site specific targets in place.

**Figure 20 Pulse Trend showing Baseline, Actual, and Target Energy Use**



## 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 (such as ENERGYSTAR), furniture and materials 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, indoor environmental quality, material quality and lowest energy use. It is our goal 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. Using this process has resulted in high performance buildings that exceed energy targets.

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 North Island Hospital Project and The Summit building. The Summit is a partnership with the Capital Regional District of Victoria. 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 whether owned or leased to LEED Gold Standard, using renewable and low carbon building materials. The 2016 Climate Leadership Plan further mandates a 10 year emissions reduction plan and a 10 year adaptation plan. To meet those requirements the new facilities will have to have very low greenhouse gas emissions and be adapted for future climate (2050 or beyond).

### Heat Recovery

Heat recovery will become a larger focus for retrofit and new construction installation. By utilizing heat from waste sources and upgrading it through heat pump technology has the effect of lowering natural gas consumption and GHG emissions.

### Alternative Energy

Solar thermal and solar photovoltaic alternative energy sources have already been studied at several sites. These systems offer increased resilience and provide energy self-sufficiency, as well as reducing demand costs at our facilities.



Island Health has spent several years studying and reviewing opportunities for installing a biomass boiler at one of its facilities. This option has been considered at five different sites ranging in size and location. The best paybacks are at the larger sites but to date it has not been possible to come up with funding. The project that was developed the furthest – to schematic design stage – could not get funding approved even though there was a good business case for proceeding. A summary table of the sites studied is provided in Appendix G.

To date the only method to have increased capital for major projects to include energy conservation or low carbon options is to have an incentive from an outside agency.

### Lighting & Lighting Control

Many lighting projects have been implemented at several sites throughout Island Health this past year. Conversion to LED lighting wherever possible and implementing lighting controls and daylight harvesting continue to be an opportunity for demand and energy savings. Lighting projects also result in 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 heating and DHW. High efficiency condensing boilers, coupled or decoupled DHW, thermal energy exchange systems (i.e. Thermenex, geo-exchange) will continue to be investigated and implemented on a site-by-site basis.

### Scheduling & Zoning Upgrades

Island Health provides a wide array of services to patients at our facilities. Often, a facility may have many services operating under one roof, some operating 24/7, others operating at different times and still others may operate on office hours. With such a variety of schedules, many of our buildings can benefit from zoning upgrades.

Zoning breaks out the building into discrete areas with a common operating schedule and supplies the right amount of conditioned air when needed. This allows for more precise control of air flow and temperature in the space only when needed, reducing waste. The zoning project completed at NRGH found significant energy savings from both electricity and natural gas, reducing GHG emissions and improving occupant comfort.



### Senior Management Approval

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

*Deanna Fourt*

\_\_\_\_\_ date :August 30, 2017

Deanna Fourt, Director of Energy Efficiency and Conservation

*Deanna Fourt*

\_\_\_\_\_ , date: August 30, 2017

Deanna Fourt on behalf of Cecil Rhodes, Corporate Director, Facilities Operations

*JH*

\_\_\_\_\_ , date: August 30, 2017

James Hanson, Vice President, Operations and Support Services

## Acknowledgements

### The Government of British Columbia

The Government of British Columbia is a leader; as one of the first jurisdictions in the world to establish carbon reduction targets. The Government's Carbon Neutral Capital Program (CNCP) has awarded funding to the BC Health Authorities starting in F2015. Island Health has been awarded over \$3,345,200 in capital funding for carbon reduction projects under this program.

### Island Health Executive

The Executive leadership is critical for Island Health being successful in energy management. We thank the Island Health Executive and Board for their support for the Energy Management Team and the priority given to energy conservation. Island Health supports [Environmental Sustainability](#) and was acknowledged by *The Globe and Mail* as one of [Canada's Greenest Employers](#).

### BC Hydro

We thank BC Hydro for their support in providing the Energy Management Team with access to funds for studies, capital projects, EWN program consultant, and 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. BC Hydro's recognition of our accomplishments by way of awards and newspaper ads shows the value of the Energy Management Team's work to our leaders, as well as the community and province.

### BC Hydro Key Account Manager

Thank you to Jeff Whitson for his guidance and leadership for the Healthcare sector. Jeff's support to FMO and the Energy Management Team is invaluable.

### FortisBC

We thank FortisBC for the funding for three Energy Specialist positions, as well as sharing in the funding for energy studies, incenting capital projects, providing training workshops and equipment that is part of their prescriptive programs. We appreciate the opportunity to receive funding for behavior change campaigns focusing on natural gas reduction.

### FortisBC Energy Solutions Manager

Thanks to Jennifer Coulthard for continued support and advocacy on behalf of the Island Health Energy Management Team at FortisBC.

**Figure 21 FortisBC awarded Island Health Energy Specialists with the 2016 Achievement in Gigajoules Saved.**



## Corporate Director Facilities Management

Thank you to Cecil Rhodes for his leadership and support of the Energy Management Team.

## Facilities Maintenance and Operations (FMO)

FMO provides the expertise, insights and resources to successfully implement energy projects. They service the buildings around the clock ensuring patients, residents and staff are comfortable and safe. Without their knowledge and support, the Energy Program could not exist. We can't do energy projects without them!

**Figure 22 Biomedical Engineering, Design & Construction, Energy Efficiency & Conservation and Facilities Maintenance & Operations**



## Design and Construction

Design and Construction focuses on the 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. 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 in securing and managing the necessary funding from the Ministry of Health (MoH) and Regional Health Districts (RHDs).

## General Support Services (Housekeeping & Food Services)

Thank you to General Support Services staff. GSS have been active participants in Green Team initiatives and provide valuable input on Green Program design. The Energy Management Team has been collaborating with General Support Services on Victoria General Hospital's Recycling Improvement Pilot. A series of posters and

signage was created based on another Health Authority’s successful recycling system and is now being piloted for one year at Island Health with the hopes of expansion to other sites in the future.

**Figure 3 General Support Services’ “Waste & Recycling Guide” on the green website**



## Green Employees

Thank you to all who volunteer their energy to mentor, inspire, increase awareness, and encourage staff to conserve energy and other resources. We also thank all employees for all the actions you do - such as turning off the computer monitors and contributing to a culture of sustainability.

**Figure 4 VGH Plumber & Green Champion Rob hosted Fix-A-Leak-Week, seen here presenting prize to employee and winner Tara.**





## 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](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](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 Efficiency and Conservation Teams develop a Vision, Purpose and Values statement that aligns and even 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 Efficiency and Conservation 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

##### EEC Vision

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

##### EEC 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.

##### EEC 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/m<sup>2</sup>):** Building energy use index based on annual electricity consumed per m<sup>2</sup> of building area.

**Electrical Emissions (tCO<sub>2</sub>e):** 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<sup>2</sup>):** 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<sup>2</sup>):** Building energy use index based on annual fossil fuel energy consumed per m<sup>2</sup> of building area.

**Fossil Fuel Emissions (tCO<sub>2</sub>e):** 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<sup>2</sup>):** Total energy consumed, annually, from electricity and fossil fuels per m<sup>2</sup> of building area.

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

**Offsettable Emissions (tCO<sub>2</sub>e):** Sum of GHG emissions from electricity and fossil fuel.

## **Appendix C - 2016 Energy Management Assessment (EMA) Goals**

As a result of the latest EMA workshop session with the Island Health management team, it is recommended that initial efforts focus on the following areas to improve energy management business practices:

### ***Policy***

Clarify the energy management program scope, charter, and long-term objective for key operating personnel. Develop operating regulations with specific instructions that interpret current policy into required actions for all key operating areas.

### ***Targets / Reporting***

Set comprehensive reduction targets that account for both capital projects and non-capital activities, preferably based on energy intensity. Establish site energy intensity reduction targets that cascade up to the overall annual reduction target set for each year of the long-term goal in the energy management program mandate.

### ***Plans / Actions***

Continue to utilize current understanding of opportunities for savings from capital projects, operational opportunities, and behavioral initiatives to develop comprehensive, multi-year SEMP that correlate potential savings from both capital and non-capital opportunities to consumption reduction targets.

### ***Teams / Committees***

Augment current project planning protocols associated with key operating functions, including new construction design, major building renovations, and energy intensive equipment selection to ensure that maximum energy efficiency is implemented within the bounds of prescribed financial investment criteria and organizational risk profile.

### ***Employee Awareness / Training***

Review energy intensity reports with key management personnel and establish protocols for troubleshooting and resolving operating variances from established targets.

## Appendix D – Site Specific Targets

This table outlines the energy reduction targets EEC and FMO have forecasted for sites; based on the projects and programs implemented at the site.

| Facility Type                             | Facility Name                              | Electrical Reduction Target % | Fossil Fuel Reduction Target % |
|---|--|-------------------------------|--------------------------------|
| Large Acute Care                          | Royal Jubilee Hospital                     | 3.5                           | 15.2                           |
|   | Nanaimo Regional General Hospital          | 5.2                           | 3.3                            |
|   | Victoria General Hospital                  | 2.5                           | 2.2                            |
|   | Cowichan District Hospital                 | 8.5                           | 22.3                           |
|   | Campbell River Hospital                    | 3.8                           | 6.8                            |
|   | Saanich Peninsula Hospital                 | 6.5                           | 2.0                            |
|   | West Coast General Hospital                | 11.5                          | 22.2                           |
| Residential Care                          | Gorge Road Hospital                        | 11.0                          | 6.0                            |
|   | Aberdeen Hospital                          | 0.5                           | 1.0                            |
|   | Glengarry Hospital                         | 1.5                           | 5.0                            |
|   | Dufferin Place                             | 3.7                           | 5.1                            |
|   | Yucalta Lodge                              | 2.8                           | 8.3                            |
|   | Cumberland Health Centre                   | 3.0                           | 6.3                            |
|   | Trillium Lodge                             | 4.8                           | 0.0                            |
|   | Eagle Park Lodge                           | 26.4                          | 1.1                            |
|   | Priory Hospital - Heritage Woods           | 0.5                           | 1.0                            |
|   | Cairnsmore Place Residential Care          | 7.2                           | 12.2                           |
|   | Priory Hospital - Hiscock                  | 0.5                           | 1.0                            |
|   | Mount Tolmie Hospital                      |                               |                                |
| Hillside Seniors Health Centre            |  |                               |                                |
| Small Acute Care                          | Port Hardy Hospital                        | 8.2                           | 0.0                            |
|   | Lady Minto Hospital                        | 8.5                           | 0.0                            |
|   | Tofino General Hospital                    |                               |                                |
|   | Port McNeill Hospital                      |                               |                                |
| Office/ Outpatient                        | Queen Alexandra Centre - Main/Fisher       | 0.5                           | 1.0                            |
|   | Queen Alexandra Centre - Parkes            | 0.5                           | 1.0                            |
|   | Nanaimo Wentworth Street                   |                               |                                |
|   | Victoria Pandora Avenue Health Centre      |                               |                                |
|   | Gold River Health Clinic                   |                               |                                |
|   | Bamfield Outpost Hospital                  |                               |                                |
|   | Port Hardy Primary Care                    |                               |                                |
|   | Port Alice Health Centre                   |                               |                                |
| Bamfield Outpost Hospital Nurse Residence |  |                               |                                |
| Mental Health                             | Cowichan Lodge                             | 7.5                           | 27.4                           |
|   | Seven Oaks Tertiary Mental Health Facility |                               |                                |
|   | Queen Alexandra Centre - Ledger House      | 0.5                           | 8.4                            |



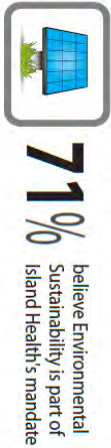
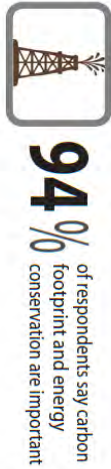
|               |  |     |     |
|---------------|--|-----|-----|
|               | Drug & Alcohol Rehab Society             |     |     |
| Health Centre | Chemainus Health Care Centre             | 0.2 | 3.7 |
|               | Cormorant Island Community Health Clinic |     |     |
|               | Ladysmith Community Health Centre        | 4.1 | 2.6 |
|               | Oceanside Health Centre                  |     |     |
| Laundry       | Victoria Regional Laundry                |     |     |
|               | Cumberland Regional Laundry              |     |     |

## Appendix E - Green Survey Infographic

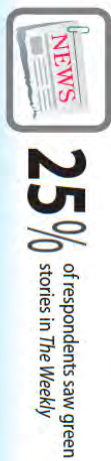
# Greening Care Green Survey Results 2016

The 2016 green survey was completed by 2,253 respondents. Island Health emitted slightly more Greenhouse Gases than in 2015, partly due to the unusual weather at the end of the year. Please help shrink our environmental footprint by looking for ways to reduce energy, travel, water and other resources. We can do this!

### Employees' Sustainability Values



### Opportunities for Action



### Sustainability Facts



Learn more: [intranet.viha.ca/green](http://intranet.viha.ca/green)

Green Team



## Appendix F – Past Studies

| Site Code | Facility Name                              | Completed  | Study type       | Description             |
|-----------|--|--|------------------|-------------------------|
| ABER      | Aberdeen Hospital                          | A <sub>FBC</sub> , COP, C <sub>FBC</sub> 14, L   | C <sub>BCH</sub> | BC Hydro comprehensive  |
| HSHC      | Hillside Seniors Health Centre             | A <sub>FBC</sub>   | C <sub>FBC</sub> | Fortis Custom           |
| BAM       | Bamfield Outpost Hospital                  |  | COP              | Continuous optimization |
| CDH       | Cowichan District Hospital                 | C <sub>BCH</sub> 03, A <sub>FBC</sub> 11, C <sub>BCH</sub> 12, COP13, C <sub>FBC</sub> 14  | L                | Lighting                |
| CHC       | Cumberland Health Centre                   | C <sub>BCH</sub> 08, COP15, C <sub>BCH</sub> 16, L16   | G                | Gas only                |
| CHCC      | Chemainus Health Care Centre               | A <sub>FBC</sub> 12, COP13, C <sub>FBC</sub> 14, L15   | E                | Electrical only         |
| CICHC     | Cormorant Island Community Health C        | S <sub>TH</sub> , S <sub>PV</sub>  | A <sub>FBC</sub> | Fortis assessment       |
| CLRC      | Cowichan Lodge                             | C <sub>BCH</sub> 05, A <sub>FBC</sub> 11, COP15, C <sub>BCH</sub> 16   | CH               | Chiller systems         |
| CPRC      | Cairnsmore Place Residential Care          | C <sub>BCH</sub> 07, A <sub>FBC</sub> 12, COP13, C <sub>FBC</sub> 14,  | H                | HVAC systems            |
| CRH       | Campbell River Hospital                    | A <sub>FBC</sub> 12, COP13   | S <sub>TH</sub>  | Solar thermal           |
| CRL       | Cumberland Regional Laundry                | C <sub>BCH</sub> 10, L13, A <sub>FBC</sub> 13, C <sub>FBC</sub> 16   | S <sub>PV</sub>  | Solar PV                |
| DARS      | Drug & Alcohol Rehab Society               | A <sub>FBC</sub>   | GEO              | Geothermal              |
| DPRC      | Dufferin Place (Extended Care at NRG       | C <sub>BCH</sub> 07, A <sub>FBC</sub> 11, COP15, C <sub>BCH</sub> 16, L16  | BIO              | Biomass                 |
| EPLTC     | Eagle Park Lodge                           | A <sub>FBC</sub> 11, COP13, L14, C <sub>FBC</sub> 14,  | W                | Water                   |
| GLEN      | Glengarry Hospital                         | A <sub>FBC</sub> , C <sub>FBC</sub> , COP15, L   |                  |                         |
| GRH       | Gorge Road Hospital                        | L11, A <sub>FBC</sub> 12, C <sub>FBC</sub> 14, COP15   |                  |                         |
| GRHC      | Gold River Health Clinic                   |  |                  |                         |
| KYU       | Kyuquot Outpost Hospital                   |  |                  |                         |
| LCHC      | Ladysmith Community Health Centre          | C <sub>BCH</sub> 08, COP13,  |                  |                         |
| LMH       | Lady Minto Hospital                        | C <sub>BCH</sub> 08, L14, COP15, W16   |                  |                         |
| NRGH      | Nanaimo Regional General Hospital          | C <sub>BCH</sub> 03, C <sub>BCH</sub> 10, G11, C <sub>BCH</sub> 15, C <sub>FBC</sub> 15, L15, Spv16, COP,                          |                  |                         |
| Nw/WS     | Nanaimo Wentworth Street                   |  |                  |                         |
| OHC       | Oceanside Health Centre                    |  |                  |                         |
| PAH       | Port Alice Health Centre                   |  |                  |                         |
| PHH       | Port Hardy Hospital                        | C <sub>BCH</sub> 08, COP15, C <sub>BCH</sub> 16, L16   |                  |                         |
| PMH       | Port McNeill Hospital                      | S <sub>TH</sub> , S <sub>PV</sub>  |                  |                         |
| PRIO-H&F  | Priory Hospital-Hiscock+Rosewood &         | A <sub>FBC</sub> 12, COP13, L  |                  |                         |
| QAC-Main  | Queen Alexandra Centre - Main, Ledg        | L08, E10, A <sub>FBC</sub> 12, COP13   |                  |                         |
| RJH       | Royal Jubilee Hospital                     | C <sub>BCH</sub> 09, G10, IMIT10, C <sub>BCH</sub> 12, C <sub>FBC</sub> 14, CH   |                  |                         |
| SOMH      | Seven Oaks Tertiary Mental Health Facility |  |                  |                         |
| SPH       | Saanich Peninsula Hospital                 | C <sub>BCH</sub> 11, GEO11, S <sub>TH</sub> 10, COP13, C <sub>FBC</sub> 14   |                  |                         |
| TGH       | Tofino General Hospital                    | L14, S <sub>PV</sub> 15  |                  |                         |
| THC       | Tahsis Health Centre                       |  |                  |                         |
| TLLTC     | Trillium Lodge                             | C <sub>BCH</sub> 07, COP13, L16  |                  |                         |
| TOLM      | Mount Tolmie Hospital                      | A <sub>FBC</sub> 12  |                  |                         |
| VGH       | Victoria General Hospital                  | C <sub>BCH</sub> 08, L15, C <sub>BCH</sub> 16  |                  |                         |
| VPAHC     | Victoria Pandora Avenue Health Centre      |  |                  |                         |
| VRL       | VIHA Regional Laundry Sl                   | A <sub>FBC</sub> 12, L14, C <sub>FBC</sub> 14  |                  |                         |
| WCGH      | West Coast General Hospital/ Westha        | C <sub>BCH</sub> 03, C <sub>BCH</sub> 11, L11, A <sub>FBC</sub> 12, S <sub>TH</sub> , S <sub>PV</sub> , COP13, C <sub>FBC</sub> 14 |                  |                         |
| YLRS      | Yucalta Lodge                              | A <sub>FBC</sub> 11, COP15, C <sub>BCH</sub> 16, L16   |                  |                         |

## Appendix G – Summary of Efforts to Implement Biomass at Island Health

| Site and Location  | Status and Reason for Failure to Proceed  | Cost of Biomass Plant  | Payback (Years) | Biomass Plant Size | GHG Reduction (tCO <sub>2</sub> e) | Opportunity   | System Information   | Level of Documentation or Investigation   |
|--|---|------------------------|-----------------|--------------------|------------------------------------|---|--|---|
| NRGH<br>Nanaimo Regional General Hospital,<br>1200 Dufferin Crescent,<br>Nanaimo, BC | Not Approved<br><br>Business case was good.<br><br>Capital funding not approved | \$4.62 M<br>(2017 est) | 6.0             | 2.5 MW             | 3,100                              | <ol style="list-style-type: none"> <li>1. Slated for plant replacement. Significant fuel supply</li> <li>2. Significant GHG emissions reduction.</li> <li>3. Total plant cost for all biomass equipment plus natural gas peaking and redundant boilers and new building \$18.9M.</li> <li>4. Gas plant is proceeding.</li> <li>5. There is space and potential to build at a later date.</li> </ol> | <ol style="list-style-type: none"> <li>1. 1963 steam plant replacement.</li> <li>2. Steam plant used for process load for sterilization and kitchen also DHW.</li> <li>3. Some legacy heating infrastructure on steam over 50% of the space heating load is converted to hot water.</li> </ol> | 2017 - Schematic Design completed including emissions screening model and construction cost estimate. |
| CPRC<br>Cairnsmore Place Residential Care Facility,<br>250 Cairnsmore Street,        | Not Economic<br><br>Long payback with current gas prices and size of plant.     | \$0.36<br>(2017 est)   | 49.0            | 0.2 MW             | 181                                | <ol style="list-style-type: none"> <li>1. Boiler plant due for replacement</li> <li>2. Other biomass boiler in vicinity</li> <li>3. Reasonable fuel supply.</li> <li>4. If 30% increase to building addition may be an opportunity to</li> </ol>  | <ol style="list-style-type: none"> <li>1. Aged natural gas plant provides hot water – oversized and poorly controlled for current facility needs.</li> </ol>   | 2017 - Detailed Feasibility Study   |

|  |   |                        |      |       |       |  |   |  |
|--|---|------------------------|------|-------|-------|--|---|--|
| Duncan, BC   |   |                        |      |       |       | proceed with the biomass boiler and reduce some of the installation cost.  |   |  |
| WCGH<br>West Coast General Hospital,<br>3949 Port Alberni Highway,<br>Port Alberni, BC | Not Approved<br><br>No capital funding and concern about responsibility in becoming thermal energy provider       | \$1.4 M<br>(2015 est)  | 10.8 |       | 478   | <ol style="list-style-type: none"> <li>1. City of Port Alberni (CoPA) had grant funding for district energy system (DES)</li> <li>2. Good fuel supply</li> <li>3. Space in existing boiler room and existing plant is new enough and of sufficient capacity to provide reliable backup and peaking loads.</li> <li>4. Likely CoPA grant funding has expired.</li> <li>5. Once Emergency Dept addition is completed locating boiler inside existing boiler room will likely not be feasible.</li> </ol> | <ol style="list-style-type: none"> <li>1. Municipal run district energy system.</li> <li>2. City of Port Alberni (CoPA) proposed that Island Health own and operate low carbon boiler plant and CoPA purchase thermal energy from Island Health and distribute energy via a run municipal district energy system.</li> <li>3. Island Health would install a biomass boiler to create low carbon plant.</li> </ol> | 2015 - Prefeasibility Stage  |
| RJH<br>Royal Jubilee Hospital,<br>1952 Bay Street,<br>Victoria, BC                     | Not Approved<br><br>Poor timing – existing plant needed immediate replacement and no capital funding for biomass. | \$10.3 M<br>(2014 est) | 4.5  | 5.2MW | 7,136 | <ol style="list-style-type: none"> <li>1. Space available adjacent to existing boiler plant when defunct Food Services building is demolished.</li> <li>2. Fuel supply could be a challenge.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Concept 2 Feasibility Study May 2104 and prefeasibility study showed a business case for clean energy plant – base plant biomass expanded out to</li> </ol>   | 2014 - Concept 2 Feasibility Study complete with construction cost estimate. |

|   |  |       |   |   |   |  |  |   |
|---|--|-------|---|---|---|--|--|---|
|   |  |       |   |   |   |  | <p>DES showed a 30% savings in utility costs with biomass.</p> <p>2. Issued an Expression of Interest to identify possible utility provider for low GHG thermal energy plant. Complex business arrangement for a premium on thermal energy – better business case to self- fund.</p> |   |
| <p>NIH CV North Island Hospital Comox Valley, Lerwick Avenue, Courtenay, BC</p> | <p>Not Approved</p> <p>No capital funding. Logistics with P3 facility too complicated and insufficient time to work through details.</p> | \$1 M | - | - | - | <p>1. Lots of fuel supply</p> <p>2. Motivated City</p> <p>3. New facility went with heat recovery chillers and was constructed with DES connection for future opportunity to sell or buy thermal energy.</p> | <p>1. Include a biomass boiler as part of the thermal plant for the hospital and use the low carbon plant to sell thermal energy to the adjacent Aquatic Centre, school and North Island College facilities.</p>   | <p>2012 –Issued letter to consider using system for new hospital (09/10/12). City of Courtenay did a feasibility study for DES. VIHA completed a biomass fuel survey.</p> |

August 30, 2017