

# STRATEGIC ENERGY MANAGEMENT PLAN (SEMP)

Justice Institute of British Columbia



Senior Management Support: *Mike Proud, Vice President, Finance & Operations* 

Signature:



Partnering with:



November 30, 2023

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#### 1. EXECUTIVE SUMMARY

This Strategic Energy Management Plan (SEMP) supports the Justice Institute of British Columbia's (JIBC) commitment to energy efficiency and conservation by providing a framework for reducing energy consumption and its associated environmental impact.

This SEMP includes a specific energy reduction target:

JIBC will reduce campus energy intensity in existing buildings (New Westminster and Maple Ridge) by 44% from 2008/2009 fiscal year levels by the end of the 2029/2030 fiscal year with cost-effective energy management initiatives.

Cost-effective energy management initiatives will

#### 3. OUR COMMITMENT

#### 3.1 Energy Commitment

Through signing this SEMP, JIBC's Vice President, Finance & Operations, Mike Proud, has signified JIBC's commitment to energy conservation.

#### 3.2 Climate Change Commitment

Furthermore, energy management also allows JIBC to:

- ∉ Reduce operating costs through energy conservation and efficiency;
- ∉ Minimize the environmental impact of our organization;
- ∉ Reduce greenhouse gas emissions of global importance;
- ∉ Reduce exposure to energy cost escalations;
- ∉ Reduce reliance on the Province's energy infrastructure;
- ∉ Demonstrate effective management of resources;
- ∉

## 4. OUR ORGANIZATION

4.1

#### 4.2 Finance

Overall, in Fiscal 2022/23, JIBC expended \$687,730\* for installing energy-efficient systems at its New Westminster and Maple Ridge campuses, which included lighting retrofits, HVAC equipment retrofits and pump replacement for the Water Treatment Plant B System. These

A summary of the energy intensities by energy source type is shown in Table 3.

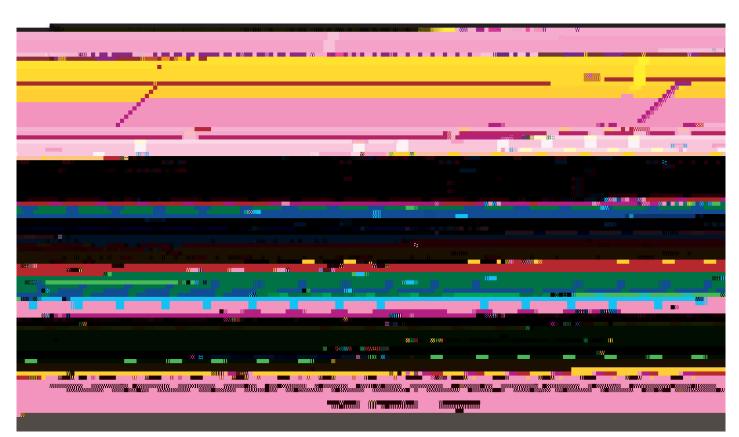


Figure 3: Historical Energy Use Intensity – New Westminster and Maple Ridge Campuses

## 5.3 Base Period Selection

A 'base period' must be selected to provide a platform for comparing energy use to track energy savings. The base periods have been established for each energy account based on the following considerations:

∉

Table 6: Base Period Selection

Site Name	Fuel Type	Account Number	Base Start	Base End	Days
GAS- NEW WESTMINSTER	Natural Gas	738252	April 1, 2008	March 31, 2009	365
GAS- MAPLE RIDGE	Natural Gas	1043565	March 21, 2008	March 20, 2009	365
ELEC-NEW WESTMINSTER	Electrical	1618056-0	March 29, 2008	March 30, 2009	367
ELEC-MAPLE RIDGE	Electrical	1232-7605-951	March 21, 2008	March 20, 2009	365

The baseline calculates energy savings moving forward in time, normalized for weather. Where a correlation between energy consumption and outdoor temperature exists (i.e., 'cooling' or 'heating' in the table above), a model (equation) has been generated for predicting energy consumption based on weather data.

## 5.4 Energy Breakdown

The building energy end-use breakdowns are illustrated below in Figure 4 and Figure 5.

The lighting system is the highest cause of electrical energy use (approximately 41% of overall annual use). The second highest cause of electrical energy use is fans, followed by plug loads (at 31% and 12% respectively).

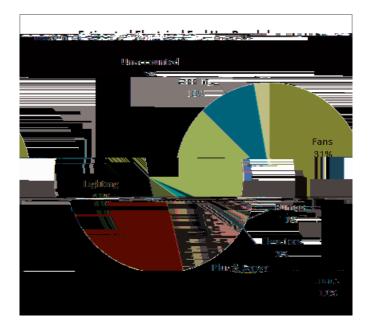


Figure 4: Electrical Energy End-Use Breakdown for New Westminster Campus (2018)

The highest cause of gas use (approximately 51% of overall gas use) is for the envelope losses. The second-highest gas usage cause is ventilation heating, followed by domestic hot water heating (at 37% and 10% respectively).

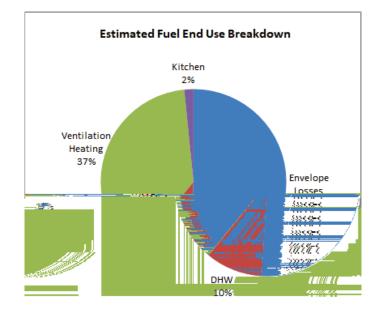


Figure 5: Gas End-Use Breakdown for New Westminster Campus (2018)

## 5.5 Benchmarking

## Comparison to the College Sector

The chart below compares the energy use intensity of JIBC's New Westminster and Maple Ridge campuses compared to other educational institutions located in BC as determined by Prism Engineering's Utility Management and Analysis (PUMA) software. The chart also shows the median energy intensity for seventeen (17) other post-secondary campuses in BC.<sup>1</sup> The energy data is for the **calendar year 2022**.

The chart shows the difference between the post-secondary institutions and the JIBC campuses. The New Westminster Campus has a low energy use intensity (192 ekWh/m<sup>2</sup>), well below the median. The Maple Ridge Campus (386 ekWh/m<sup>2</sup>) has the second highest energy use intensities in the comparison.

<sup>&</sup>lt;sup>1</sup> These 17 buildings are from six colleges and universities in BC.

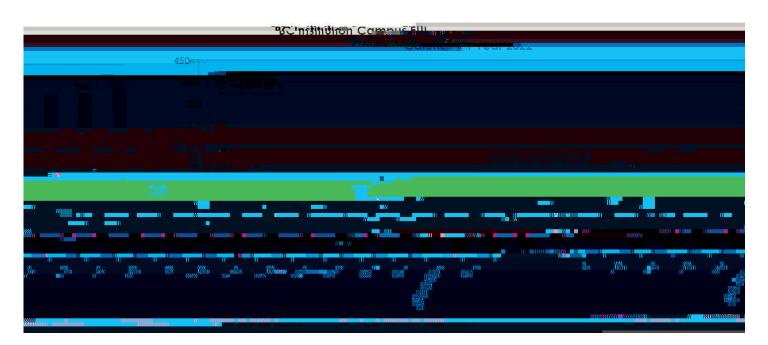


Figure 6: Benchmarking Comparison to Other Post-Secondary Institutions in BC

It should be noted that the above energy use intensities are for the calendar year 2022 (not fiscal year 2022/23). Other charts and tables in this report are based on the 2022/23 fiscal year. Therefore, there is a minor difference in energy use intensities for the calendar and fiscal years.

Notably, the Maple Ridge Campus is designed for hands-on firefighting practice and training. Two water treatment systems are in use at the campus, equipped with two main pumps with high horsepower capacity. The operation of these large-size pumps is unique for a postsecondary institution, resulting in a higher energy use index than other institutions.

#### 6. OUR ACTIONS

A target of a 44% reduction in total electricity and fuel energy use compared to baseline 2008/2009 has been selected to be achieved by fiscal year 2029/2030. The target will be realized through the implementation of cost-effective energy management initiatives.

The target pertains to the New Westminster and Maple Ridge campuses only. Progress towards the target will be corrected for fluctuations in the weather.

#### 6.1 Annual Goals and Objectives

The following tables outline the annual achievements and goals for energy and greenhouse gas emission reduction.

 Table 7: Annual Energy Reduction Targets

		Electricity		Fuel Overall Energy						
	Reduction Target	GHG Intensity	GHG Emissions	Reduction Target	GHG Intensity	GHG Emissions	Reduction Target	GHG Intensity	GHG Emissions	
Fiscal Year	% of Base Period	kgCO2/m <sup>2</sup>								

## Table 8: Annual Greenhouse Gas (GHG) Emissions Reduction Targets

#### ∉Mechanical

New Westminster Campus:

o Install variable speed drives to chilled water pumps (electrical savings).

Maple Ridge Campus:

- Upgrade Water Treatment Plant A System to replace 150HP electric motor-driven pump with 30HP pump package system with variable speed drive control (electrical savings);
- o Install heater shut-off switches on vehicle bay overhead doors; and
- o Replace existing air handling units serving various buildings.

## ∉Electrical

New Westminster Campus:

o Install photovoltaic (PV) solar panels (electrical savings).

## *e* Behavioural Programs & Studies

Both Campuses:

- Participate in BC Hydro's Energy Wise Network Program, which supports organizational behaviour change;
- o Conceptation had big htt inter and very to eight bit if a three with the bit if a three big th

FY Project Location Savings (kWh)	Potential Electrical Demand Savings (kW) (\$)	Total Cost (\$)	BC Hydro/ Fortis BC Incentive
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## Table 9: Summary of Potential Energy Savings Projects – Fiscal Years 2023/2024 & 2024/2025

## Table 10: Summary of Energy Savings Projects - Past

FY Project Location Savings (kWh)	Gas Savings (GJ) Potential Total Savings (Energy + Operational) (\$)	Total Cost (\$)	BC Hydro/ Fortis BC Incentive (\$)
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#### 7. MONITORING AND REPORTING – HOW ARE WE DOING?

## 7.1 Energy Savings

This section of the SEMP tracks the energy savings compared to the baseline and provides the means necessary to track success toward the energy reduction target, as set in Section 6.1.

The following chart shows cumulative savings over time since the 2008/09 base period for utility monitoring for JIBC. As time passes, this graph will be updated, and progress will follow. The cumulative savings shown in the graph are represented by equivalent kWh (ekWh) and **adjusted for weather fluctuations**. *Negative* savings (downward slope) on the graph represent increased consumption and vice-versa.

As can be seen, at the end of Fiscal Year 2022/32, the cumulative energy savings since the base period is positive, representing a decrease in consumption compared to the base period

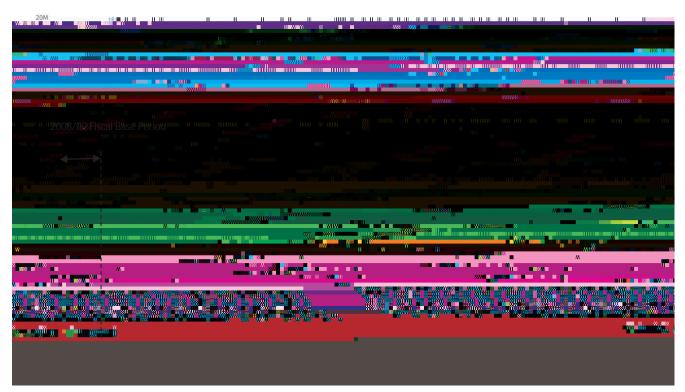


Figure 8: Cumulative Sum of **Energy Savings** –New Westminster Campus



Figure 9: Cumulative Sum of Energy Savings

A breakdown of energy savings by year is shown in Tables 11, 12 and 13 below for JIBC's New Westminster and Maple Ridge campuses, respectively.

Fiscal Year	Electrical	Natural Gas	Natural Gas	Energy Total
	Savings -kWh	Savings - GJ	Savings -ekWh	Savings - ekWh
2008/2009	3,218	16	4,422	7,640
2009/2010	265,858	1,053	292,495	558,353
2010/2011	713,547	2,891	802,990	1,516,537
2011/2012	733,230	3,023	839,644	1,572,874
2012/2013	858,290	3,086	857,269	1,715,559
2013/2014	939,519	3,086	857,202	1,796,721
2014/2015	892,614	1,788	496,640	1,389,254
2015/2016	1,109,657	2,152	597,862	1,707,519
2016/2017	1,097,434	1,104	306,772	1,404,206
2017/2018	1,102,088	2,450	680,593	1,782,681
2018/2019	1,088,238	2,885	801,315	1,889,553
2019/2020	1,217,525	2,686	746,204	1,963,729
2020/2021	1,426,110	2,106	585,129	2,011,239
2021/2022	1,307,739	1,041	289,248	1,596,987
2022/2023	1,235,698	687	190,737	1,426,435
Grand Total	13,990,767	30,055	8,348,519	22,339,286

## Table 11: Summary of Energy Savings by Year

#### Table 12: Summary of Energy Savings by Year – New Westminster Campus

Fiscal Year	Electrical	Natural Gas	Natural Gas	Energy Total
	Savings -kWh	Savings - GJ	Savings -ekWh	Savings - ekWh
2008/2009	1,212	0	0	1,212
2009/2010	229,338	977	271,469	500,807
2010/2011	644,173	2,756	765,434	1,409,607
2011/2012	625,436	2,583	717,493	1,342,929
2012/2013	720,357	2,640	733,347	1,453,704
2013/2014	805,027	2,482	689,316	1,494,343
2014/2015	769,861	1,190	330,539	1,100,400
2015/2016	927,581	1,648	457,797	1,385,378
2016/2017	913,127	643	178,527	1,091,654
2017/2018	909,373	1,946	540,631	1,450,004
2018/2019	919,007	2,238	621,588	1,540,595
2019/2020	1,015,275	2,087	579,680	1,594,955
2020/2021	1,255,660	2,045	568,106	1,823,766
2021/2022	1,191,480	1,052	292,113	1,483,593
2022/2023	1,113,921	424	117,822	1,231,743
Grand Total	12,040,829	24,710	6,863,861	18,904,689

#### Table 13: Summary of Energy Savings by Year – Maple Ridge Campus

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Fiscal Year	Electrical Savings -kWh	Natural Gas Savings - GJ	Natural Gas Savings -ekWh	Energy Total Savings - ekWh
2008/2009	2,006	16	4,423	6,429
2009/2010	36,520	76	21,026	57,546
2010/2011	69,374	135	37,557	106,931
2011/2012	107,794	440	122,151	229,945
2012/2013	137,934	446	123,921	261,855
2013/2014	134,492	604	167,886	302,378
2014/2015	122,753	598	166,101	288,854
2015/2016	182,075	504	140,065	322,141
2016/2017	184,307	462	128,245	312,552
2017/2018	192,716	504	139,961	332,677
2018/2019	169,231	647	179,726	348,957
2019/2020	202,250	600	166,524	368,774
2020/2021	170,450	61	17,023	187,473
2021/2022	116,260	-10	-2,866	113,394
2022/2023	121,777	263	72,915	194,692
Grand Total	1,828,161	5,345	1,484,659	3,434,597

Similarly, as done for energy, the same CUSUM chart for greenhouse gas emission avoidance has been generated, as shown in Figure 10 below.

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Figure 10: Cumulative Sum of GHG Emission Avoidance – Since 2008/09 Base Period

By the end of Fiscal Year 2022/23, the cumulative GHG emission avoidance is approximately 1,642 tonnes of  $eCO_2$ .

A breakdown of Emission Avoidance per year is shown in Table 14 below.

Fiscal Year	Electricity	Natural Gas	Energy Total
2008/2009	0.1	0.8	0.9
2009/2010	6.5	52.5	59.0
2010/2011	14.9	144.1	159.0
2011/2012	6.6	150.7	157.3
2012/2013	8.2	153.9	162.1
2013/2014	11.1	153.9	165.0
2014/2015	9.5	89.2	98.6
2015/2016	10.0	107.3	117.3
2016/2017	9.9	55.1	64.9
2017/2018	9.9	122.2	132.1
2018/2019	9.8	143.8	153.6
2019/2020	11.0	134.0	144.9
2020/2021	12.8	105.0	117.8

Table 14: Summary of Emission Avoidance by Year (Tonnes of Equivalent CO<sub>2</sub>)

## 7.2 Avoided Energy Cost

Cost avoidance is avoided spending, not necessarily decreased spending. If an energy project that yields consumption savings is implemented, but energy rates increase simultaneously. Looking at the actual cost savings/bill decrease will not show the full cost that was avoided. In other words, if that same project had not been implemented and energy rates increased, then more would have been spent than beforehand. By looking at avoided costs rather than just actual cost savings, the full financial impact of the energy management initiatives is captured.

Similarly, as for energy, the same CUSUM chart for energy cost avoidance can be generated, as shown in Figure 11.

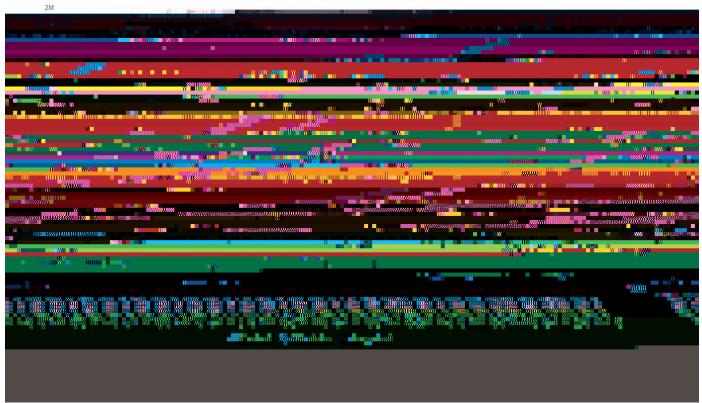


Figure 11: Cumulative Sum of Cost Avoidance

## 8. COMMUNICATIONS

The following communication methods are currently used to keep key stakeholders informed of the energy management efforts at JIBC:

- ∉ Quarterly facility meetings energy projects are discussed, and energy performance from utility monitoring reports is reviewed with operators and management; and
- ∉ Quarterly energy management reporting results from ongoing energy management projects are reviewed, and future potential projects are discussed.

Currently, the greater community of staff and students of JIBC have little exposure to the energy management efforts that support campuses to run efficiently.

In upcoming fiscal years, JIBC will expand methods of communication with the community of staff and students at JIBC campuses by way of the following methods:

∉ 2023/24– Energy management reporting on utility usage will be made available on the Intranet and published quarterly in JIBC News (Just in Time). 9.

#### 10. ADAPTATION TO CLIMATE CHANGE

JIBC is aware of climate change impacts locally and has considered developing the necessary foundations, which are:

- ∉ Identify internal stakeholders (build an internal team with representatives from risk management, sustainability, capital upgrade/ asset planning, and operations):
  - Have the team initiate "low-hanging fruit" adaptation tasks immediately
    - š Back up building documentation;
    - š Move building documentation away from flood zones (e.g., basement mechanical rooms); and
    - š Add window films and shading to reduce overheating.
  - o Other immediate adaptation initiatives that JIBC can consider:
    - š Installing moisture sensors to move elevators above ground in case of flooding; and
    - š Integrating controls to filter or eliminate outdoor air when outdoor air conditions are worse than indoor (e.g., forest fire pollution).
- ∉ Conduct a climate change vulnerability risk assessment of the New Westminster and Maple Ridge campuses and incorporate learnings into building renewal as part of the end-of-life upgrades:
  - Provide training/capacity building for internal staff;
  - o Get stories from operation staff on what is currently vulnerable; and
  - o Pick a framework (and modify it to fit) for the adaptation process at JIBC.
- ∉ Review assets up for renewal (e.g., mechanical equipment) and consider assessing their capacity for future climate (up to 2050 or asset life); and
- ∉ Consider whether to develop an adaptation plan or incorporate adaptation into existing policies.

## 11. APPENDIX – STAKEHOLDERS

Name	Title	Role	Contribution	Program Influence (Advisor / Decision Maker)
<b>Mike Proud</b> CPA, CGA, BCom	Vice President, Finance& Operations	Executive Sponsor	<ul> <li>∉ Signs off on SEMP</li> <li>∉ Allocates required resources and funding</li> </ul>	Decision Maker
<b>Julie Brown</b> BCom, MBA, RPA, CEFP, FMA, SFP	Director, Campus Planning & Facilities Operations	Energy Management Committee Member	<ul> <li>∉ Facilitates meetings</li> <li>∉ Approves energy savings opportunities/projects</li> </ul>	Decision Maker
David Atchison	Senior Manager, Facilities	Energy Management Committee Member	∉ Helps identify and implement energy savings opportunities / projects	Advisor
Blake Smith CEM	Manager, Facilities	Energy Management Committee Member	<ul> <li>∉ Helps identify energy savings opportunities / projects</li> <li>∉ Responsible for SEMP preparation</li> </ul>	Advisor

JIBC Energy Management Consultant
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Contact Info Name

Title

#### 12. APPENDIX – BCH: ENERGY MANAGER ASSESSMENT FORM - SEMP SELF- EVALUATION

File Number		
Quarter	W	
PSE Signature: SEMP Completed		Date:
Drain statistics and DO	PS Program Incentive	<u>kWh</u>
Projects that used PS incentives:	PSP	
	PSP Express	
	New Construction	
	Total	
	Behavioural Program (2%)	
	Turnaround time for 4 <sup>th</sup> Q review:	days

#### For BC Hydro to complete

## Energy Manager: Please complete appropriate year below

∉ Note: All areas (in your contract Year) must be covered in order to receive 4<sup>th</sup> quarter payment

## Year 2 +: Strategic Energy Management Plan requirements

	Elements which must be included in SEMP	Page number where the element is addressed in the SEMP	Energy Manager evaluation	PSE Agrees
1)	A purpose statement which answers the following questions:	-		
	a) What is your kWh reduction target?	Page 14 (Section 6.1)		
	b) What is the Key Performance Indicator?	Page 7 (Section 4.4)	J	
	c) Who do you need to engage to make your plan successful?	Page 30 (Section 11)		
2)	A table that compares all your buildings.	ble that compares all your buildings.		
	a) BEPI	Page 7 (Table 3)	J	
3)	Explain what the opportunities are to become more efficient.	-		
	a) Project list	Page 15 (Table 8)		
	b) Initiative List: Behavioural and Organizational		J	
	<ul> <li>Studies: Outline which buildings have had studies completed</li> </ul>	Page 16 (Section 6.2)		
4)	Outline the budget to implement projects.	-		
	<ul> <li>a) If no budget, explain why not and what you intend to do about getting a budget.</li> </ul>	Page 6 (Section 4.2)	J	
5)	Conclusion: How is your plan doing?	-		
	a) Outlined kWh saved	Pages 21 to 23		
	b) Outlined GHG tonnes saved	Page 24	J	
	c) Actual dollars saved to the organization	-	]	
	d) Outlined avoided cost	Page 25		
6)	Conclusion: Senior Management Support			
	a) Approval of the SEMP: Signature on the SEMP	Cover Page of Final		

## Tracking:

2<sup>nd</sup> Q Draft SEMP Submitted Date

Date PSE Coaching C