Strategic Energy Management Plan 2020

THOMPSON RIVERS UNIVERSITY

September 2020

Senior Management Support: _____
_____

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Section 1

Institution/Facility Profile

Section1: Institute Profile

Institute Name: Thompson Rivers University

Address:
805 TRU Way
Kamloops, British Columbia
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Tel: (250) 828-5000
Fax: (250) 828-5086

1.1 Key Personnel

Key Executive:	Matt Milovick	Title:	VP Administration & Finance
Telephone:	(250) 828-5011	E-mail:	mmilovick@tru.ca
Key Contact:	James Gudjonson	Title:	Director, Sustainability Office
Telephone:	(250) 852-7253	E-mail:	jgudjonson@tru.ca

1.2 Institute Survey

Date Institute Formed:	1970
Total Area (m^2):	120, 174.17
Number of Campuses:	2
Name of Campuses:	Kamloops: 31
(#of Buildings):	Williams Lake: 1
Number of Employees:	2, 711
Number of Students on campus:	12, 474
Number of Full Time Students:	9, 617
Number of Part Time Students:	19, 723
Full Time Equivalents (FTE):	11,396

Institute Fiscal Year Dates:	Apr. 1 – Mar. 31
% Total Area heated:	98%
Number of Buildings:	32
Number of Buildings <10 years old:	2
Number of Buildings 10-25 years old:	7
Number of Buildings 25-40 years old:	5
Number of Buildings over 40 years old:	18

Primary Facility Profile						
Building Code	**Building Name**	**Year Built**	**Size (m^2)**	**Additions (size/year)**	**Combined BEPI ($ekWh/m^2$)**	
					2015	**2016**
AE	Arts and Education	1991	5,661.62		279.35	266.37
AHT	Animal Health Technology	2002	1,180.66		686.11	569.35
CAC	Campus Activity Centre	1992	6,413.48	500/2012	261.09	287.53
CT	Clock Tower	1990	2,976.30		186.03	168.56
G	Gymnasium	1980	3,703.59		123.05	110.57
IB	International Building	2005	4,586.69		222.26	145.59
HOL	House of Learning	2011	6,552.7		140.75	246.82
LIB	Library	1975	3,350.64		123.79	226.64
OM	Old Main	1970	19,814.14	4500/2013	191.75	221.75
S	Science	1980	10,831.14		185.83	205.13
TT	Trades and Technology	1997	10,326.46		247.66	346.21
New Rez	Residence and Conference Centre	2005	19,717		185.65	n/a
ITTC	Industrial Training and Technology Centre	2018	5344		n/a	n/a
NPH	Nursing and population Health	2020	4130.99		n/a	n/a
WL*	Williams Lake Campus	1973	7,435		97.43	95.19
TOTAL AREA- average BEPI			**107,893.4**	**5000**	**225.4**	**235.27**

1.2.1 Facility Profile

Table 1 Summary of Primary Facilities

Secondary Facility Profile					
Building Code	**Building Name**	**Year Built**	**Size (m^2)**	**BEPI ($ekWh/m^2$)**	
				2015	**2016**
BCCOL	BC Centre for Online Learning	2007	4,334.81	288.11	275.06
CATC	Culinary Arts	1970	1,858.87	726.66	681.63
CS	Chemical Storage	1970	34.80		
DAY*	Daycare	1993	441.90	239.7	238.32
ED	Electrical Distribution Shed	1970	147.50	75.16	67.86
FAA***	Faculty Annex A	1971	***571.33	n/a	n/a
FB	Facilities Annex	1973	92.02	n/a	507.75
FSS*	Human Resources	1970	543.56	89.72	n/a
H01	House 1- Faculty Association	1945	128.90	n/a	n/a
H04	House4- Sustainability Office	1945	134.20	n/a	n/a
H05*	House 5- Aboriginal Cultural Centre	1945	138.50	26.95	25.13
H06*	House 6- Research Centre	1945	161.00	n/a	165.55
H07*	House 7- Research Centre	1945	175.50		
H08*	House 8- Radio Station	1945	130.80	n/a	n/a
H09*	House 9- Foundation/ Alumni	1945	267.18	n/a	173.14
H10*	House 10- Horticulture	1945	346.39	n/a	
HS*	Horticulture	1985	326.90	344.58	n/a
MDC	Materials Distribution Centre	2006	1,689.94	438.62	672.46
TTO	Trades Storage (no heating)	1997	1,184.00	n/a	n/a
WS	Weather Station	2005	144.00	n/a	n/a
BEPI	Average- secondary buildings (kWh/m^2)		**	278.69	311.88
TOTAL AREA			**12,280.77**		

Table 2 Summary of Secondary Facilities

1.3 Background Description

1.3.1 General

TRU has two main campuses. The primary campus is located at 805 TRU Way, Kamloops. The secondary campus is located at 1250 Western Avenue, Williams Lake. There are also several minor regional campuses in Clearwater, Barrier, Lillooet, and Ashcroft.

1.3.2 Facility Components

Lighting and Electrical Systems:

All interior lighting is being upgraded to LED luminaries. Traditionally, buildings have utilized 32 W T8 lamps, though these are now being replaced by 12 W TLED lamps. These lamps are run primarily by standard efficiency instant start electronic ballasts. The majority of interior lighting is also controlled by timers and sensors.

Exterior lighting has just been upgraded to LED lighting. Exterior lighting is largely controlled by photocells and operates an average of twelve hours per day throughout the year. HIDs are also used in high ceiling areas such as the Library atrium, Trades building workshops and the Gymnasium, but these are mostly Metal Halide lamps.

Across campus, exit signs are utilizing LED lamps.

HVAC Systems:

Each building has an independent heating system that uses a combination of natural gas and electricity. Current heating equipment varies in efficiency and age throughout the campus, with all aged equipment being replaced by high efficiency models or on the upgrading list. Cooling is supplied by electric powered chillers and air conditioners (smaller buildings). A complete list of HVAC equipment is available in a central database. TRU is committed to become carbon neutral by 2030, in turn, both new buildings (ITTC and NPH) are heated by electric boilers.

1.3.3 Energy/Utility Supply

Kamloops Campus

- Electricity for the Kamloops Campus is supplied by BC Hydro at rate 1611 (LGS conservation Rate).

Utility	Vendor	Rate	In effect	Marginal Electricity ($/kWh)	Marginal Demand ($/kW)
Electricity	BC Hydro	1611	now	• Basic charge: $0.2673 per day • Energy charge: $0.0606 per kWh • Minimum Charge: Equal to 50% of the highest Demand Charge during the previous November 1 to March 31 period. The Basic Charge, Energy Charge, and Demand Charge are replaced by the Minimum Charge if their sum is less than this amount. • Power Factor surcharge: Applicable if power factor is below 90%.	$12.34 per kW
Electricity	BC Hydro	1611	April 2015	• Part 1 • $0.1114 per kWh for first 14,800 kWh of your baseline1. • $0.0536 per kWh for remaining kWh up to baseline • Part 22 • $0.1009 per kWh for usage up to 20% above baseline. • $0.1009 per kWh for savings down to 20% below baseline (credit). • Usage or savings beyond 20% of baseline are based on Part 1 prices.	• $0 per kW for first 35 kW. • $5.72 per kW for next 115 kW. • $10.97 per kW for remaining kW.
Electricity	BC Hydro	1211	April 2014	• $0.1010/kWh for first 14,800kWh • $0.0486/kWh for remaining kWh up to baseline	• $0.00 /kW for first 35kW • $5.19 /kW for next 115kW • $9.95/kW for remaining kW
Electricity	BC Hydro	1211	January 2011	• Conservation Rate $0.068	• $8.66

Table 3 Electricity Rates (Not Including Taxes)

- Natural gas is transported by Fortis BC at rate 25.

[1] Every year, a new baseline is calculated for each month by BC Hydro to reflect changes in energy usage. The customer's baseline is a rolling three-year average of said customer's historic usage each month.

[2] In Part 2, the customer receives a credit for using less electricity than their baseline, or a charge for using more.

Utility	Source	Rate	In effect	($/GJ)	
Natural Gas	Fortis BC(transporter)	25	July 1, 2019	Fixed charges: A daily basic charge and administration charge/month:$469 &$39 A demand volume charge:407GJ@23.358/GJ Variable charges: Transportation charge	
	Shell (supplier)	n/a	Now	• Commodity charge: based on floating NG market price and supplier charge • Transport recover fee[3] • Fuel recover fee[4] • Customer management fee: $0.01/GJ	
Natural Gas	Fortis BC (transporter)	25	Jan 1, 2016	$6.71	• Basic charge/month: $587 • Administrative charge/month: $78 • Delivery charge/GJ: $0.603 • Demand change per month per GJ of Daily Demand[5]: $20.077 (range $1.58-$19.29)
Natural Gas	Shell[6] (supplier)	n/a	Nov 1, 2014	$3.43	• Commodity charge: based on floating NG market price and supplier charge • Transport recover fee[7] • Fuel recover fee[8] • Customer management fee: $0.01/GJ (Range $2.65-$4.03)
Natural Gas	Renewable NG[9]	n/a	March 22, 2016	5000GJ @$14.414	

[3] The Transport Recover fee illustrates the cost of shipping gas on the Spectra Transmission Line down to Savona where Fortis connects into the transmission line to serve the Interior of BC.

[4] The fuel recover fee illustrates the cost of natural gas to run the compressors to move the gas south ward in the pipeline.

[5] Daily Demand is equal to 1.25 multiplied by the greater of: the customer's highest average daily consumption of any month during the winter period (November 1 to March 31), or one half of the customer's highest average daily consumption of any month during the summer period (April1 to October 31). The calculation of Daily Demand will be based on the customer's actual gas use during the preceding contract year.

[6] BC's public post-secondary sector has formed a purchasing consortium partnering all 25 institutions as part of Public Post-Secondary Administrative Service Delivery Transformation (ASDT) procurement initiative. After a Province wide gas supplier selection process, Shell was picked as the supplier of choice. Therefore, TRU, as one of the partners of the Joint Procurement, has committed to purchase NG from Shell.

[7] The Transport Recover fee illustrates the cost of shipping gas on the Spectra Transmission Line down to Savona where Fortis connects into the transmission line to serve the Interior of BC.

[8] The fuel recover fee illustrates the cost of natural gas to run the compressors to move the gas south ward in the pipeline.

[9] Renewable natural gas is derived from biogas, which is produced from decomposing organic waste from landfills, agricultural waste (such as cow or chicken manure) and wastewater from treatment facilities. When captured and cleaned, renewable natural gas (also called biomethane) is

Carbon Tax	BC Government	n/a	2010-2012 average	$1.50
Carbon Offset	BC Government	n/a	January 2011	$1.25
Total				**$12.89**

Table 4. NG Rates (Not Including taxes)

Other campuses/locations

Locations	Utility	Source	Rate	($/GJ)
Williams Lake	Electricity	BC Hydro	1600	Same as 1611
Williams Lake	Natural Gas	FotisBC	23	• Basic charge/month: $132.52 • Administrative charge/month: $78 • Delivery Charge: $2.939/GJ
Clearwater	Electricity	BC Hydro	1300	• Basic Charge-$0.2347 per day • Energy Charge-$0.2347 per day
Knutsford	Electricity	BC Hydro	1300	

Table 5. Other Campuses/Locations NG & Electricity Rates (Not including taxes)

1.4 Energy Metrics/Key Performance Indicators

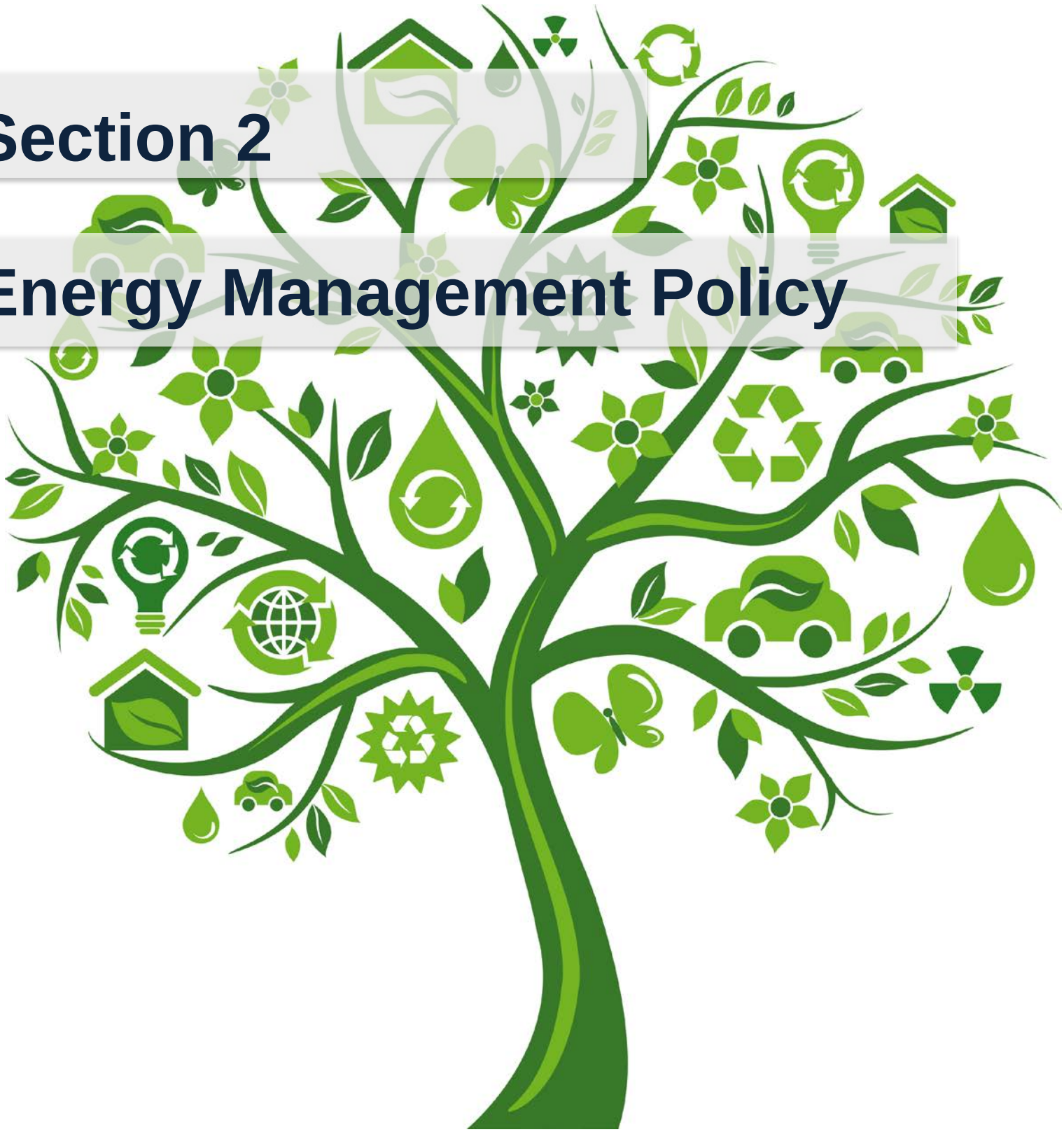
- A Building Energy Performance Index (BEPI) has been established for all buildings greater than 1000 m^2. Several buildings smaller than 1000 m^2 had meters installed and a BEPI from February 2013. Pulse software will allow for BEPI reports for 22 buildings (to be done monthly).

- An averaged BEPI has also been established for all (occupied) buildings on campus. The averaged BEPI will allow the comparison of TRU to other institutions (see figure 5, p.16). In addition, the averaged BEPI will also factor in expansion and new buildings. New buildings will also be sub-metered to allow for comparison between buildings on campus.

injected into our existing natural gas system. It is a carbon neutral* substitute for conventional natural gas and can be used with all natural gas appliances.

Section 2

Energy Management Policy



Section 2: Energy Management Policy

2.1 Commitment by Institute

One of Thompson Rivers University's seven founding principles is to be the "University of Choice for Environmental Sustainability". According to TRU's Strategic Plan, TRU is committed to:

- Develop and expand programming and associated research activities in the areas of environmentally sustainable technologies, policy development, and environmentally and socially responsible economic development.
- Develop policies and best practices that support environmental stewardship and sustainability in the university's operations.
- Foster environmental literacy amongst students, staff, faculty and alumni, and cooperate with other community partners to increase environmental awareness.
- Encourage the development of partnerships with public and private sector organizations in support of environmental stewardship and sustainability.

In April of 2010, the president of TRU signed the Talloires Declaration[10] (TD), a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. It has since been signed by over 350 university presidents and chancellors in over 40 countries. Originally composed in 1990 at an international conference in Talloires, France, this is the first official statement made by university administrators of a commitment to environmental sustainability in higher education.

For TRU's Sustainability Policy see Appendix B, page 24

[10] http://www.ulsf.org/programs_talloires.html

In 2014, TRU developed a Strategic Sustainability Plan (SSP) in order to align divisional and departmental resources to meet the goal of "Increasing Sustainability", one of 5 Strategic Priorities (2014-2019). The SSP is comprehensive in nature and includes 130 time bound, measurable goals and initiatives in 4 key theme areas (Operations & Planning, Engagement, Academics, Governance). Over 30 of the 130 goals and initiatives are directly linked to energy conservation. The plan, which was approved by the president and board of governors, includes an energy reduction target of 33 percent by 2022. The immediate effect has been an increase of 100% for the Sustainability Office's operational and capital budgets for 2015–giving the office a clear mandate to continue to focus on energy conservation. More information on the SSP can be found at http://www.tru.ca/__shared/assets/2014_Campus_Strategic_Sustainability_Plan_Final33659.pdf

2.2 Energy Management Objectives

TRU's commitment to effective energy management is guided by the following objectives:

- To reduce energy usage, greenhouse gas emissions and operating costs through a comprehensive energy management program.

- To reduce energy usage, greenhouse gas emissions and operating costs by implementing and improving upon:
    1. Sound operating and maintenance practices
    2. Institution wide "green" purchasing policies
    3. Incorporation of energy efficiency into all new building designs
    4. Utilization of an effective monitoring and tracking system

- To reduce energy usage, greenhouse gas emissions and operating costs by implementing an effective behavioral change program.

2.3 Energy Management Targets/Budget (2012-2019)

The first year of energy management objectives included a Detailed Energy Audit (DEA) of the primary buildings on campus, and a preliminary energy audit of the secondary buildings. The results of the DEA indicated TRU's commitment to a 10% reduction target in electrical and gas consumption was a realistic target for 2010-2011. The energy conservation project was completed in July of 2011 with the initial M&V reports indicating an 11-12% reduction was achieved.

The TRU energy reduction target for the period 2020-2021 is to achieve an additional reduction of approximately 3% for a total reduction of 42% below baseline from 2010.

Targets

Year	Reduction	Projects	Target met
2010-2011	10 % = 1.5 GWh	See table 4.1.1	✓ (11-12%)
2012-2013	6.6 % = 1 GWh	See table 4.1.2	✓ (6.6%)
2014-2015	3.6 % = .55 GWh	See table 4.1.3	✓ (4.2%)
2015-2016	6.6 % = 1 GWh	See table 4.1.3	✓ (6.6%)
2016-2017	5 % = .75 GWh	See table 4.1.3	✓ (5%)
2017-2018	3%	See table 4.1.3	✓ (3%)
2018-2019	3%	See table 4.1.3	✓ (3%)
2019-2020	3%	See table 4.1.3	✓ (3%)
2020-2021	3%	See table 4.1.3	(3%)
2010-2019 (total)	41.4%	See tables 4.1.2- 4.1.3	41.4%

Table 6. Energy Management Target

Budgets

Department	Dates	Budget
Environment & Sustainability- Energy projects	2012	$170,000 (projects completed)
Environment & Sustainability – Operating	2013	$500,000
Environment & Sustainability – Energy Projects	2014-2015	$600,000 (not including VDI transfer project)
Environment & Sustainability – Energy Projects	*2015-2016	$700,000
Facilities Operation	2016	5.1 million
Facilities Maintenance	2016	2.4 million
Facilities Operation	2017	1.5 million
Sustainability Energy Projects	2017-2018	1.2 million
Sustainability Energy Projects	2018-2020	2 million
Sustainability Energy Projects	2020-2021	1 million

Table 7. Energy Management Budgets

2.4.1 Key Personnel

Planning Team		
Name	**Title**	**Roles/Responsibility**
Matt Milovick	VP Finance/Administration	Executive sponsor
Warren Asuchak	Director, Facilities & Sustainability	Energy Manager, Organize in house staff, technicians and resources
Natalie Yao	Energy Specialist	Implement energy projects
James Gordon	Environmental Programs and Research Coordinator	Support behaviour change programs
Environment Advisory Committee	Energy Sub-committee: Revolving Fund	Review and evaluate energy projects funded through revolving fund

Table 8.a. Planning Team Description

2.4.2 External/Internal Stakeholders

Name	Title/Organization	Roles/Responsibility
Student	Student representatives on Environmental Sustainability Advisory Committee	Promote ongoing sustainability awareness campaign
Faculty/Staff	Environmental Advisory Committee	Draft/present sustainability policy to board of governors
City/Greater community	City of Kamloops	Work together towards energy reductions (district energy talks, waste heat recovery, transportation issues for students/staff)
BC Hydro Power Smart staff	BC Hydro	Provide support/resources to help TRU reduce energy
FortisBC Energy Efficiency & Conservation Team	FortisBC	Provide support/resources to help TRU reduce energy
Climate Action Secretariat	BC Government	Draft policies, provide support to public sector to promote reduction in GHG emissions

Table 8.b. Stakeholders Description

Section 3

Energy Use and Costs

Section 3: Energy Use and Costs

3.1 Energy Consumption and Costs

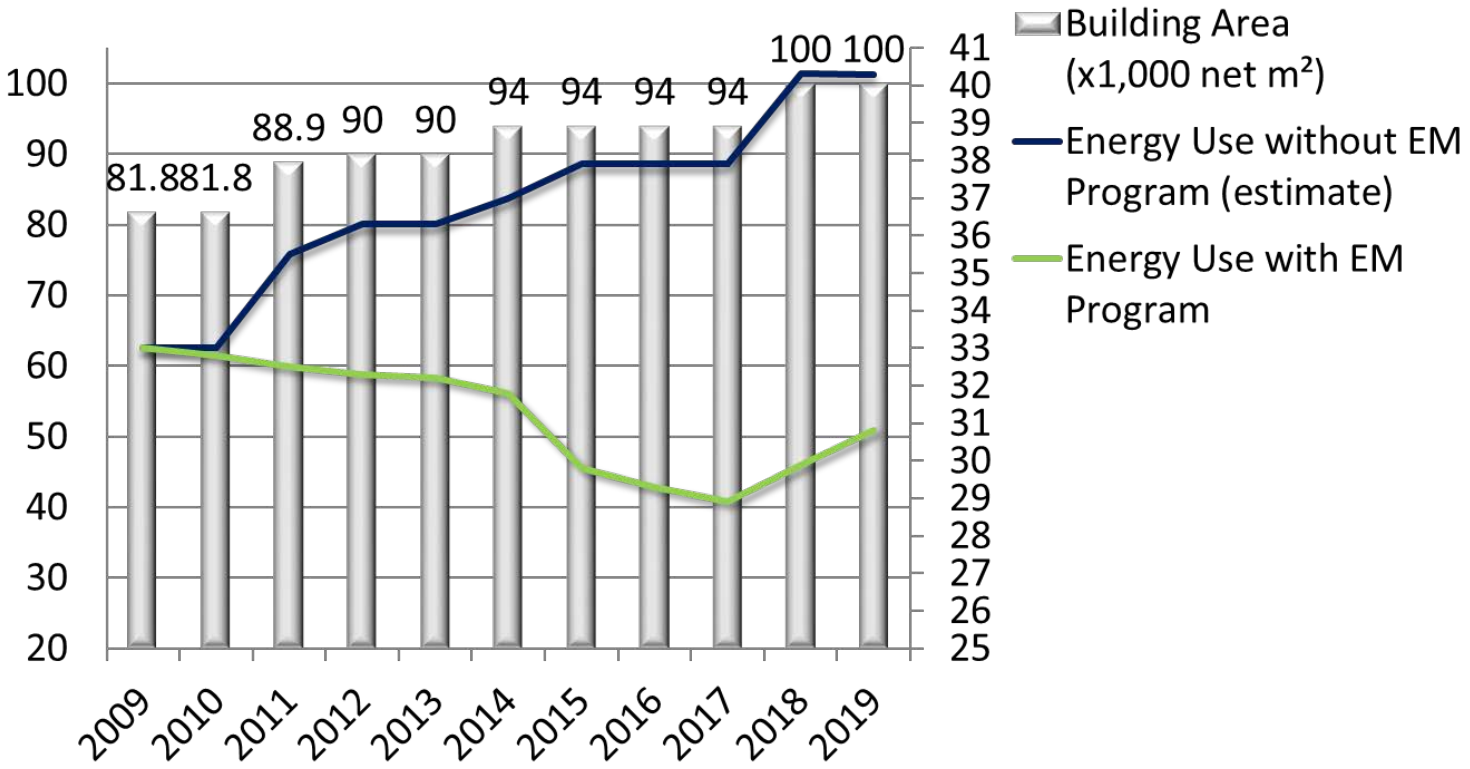


Table 9.a. Comparison of Annual Energy Use w/ and w/out Energy Management Program (EKWh)

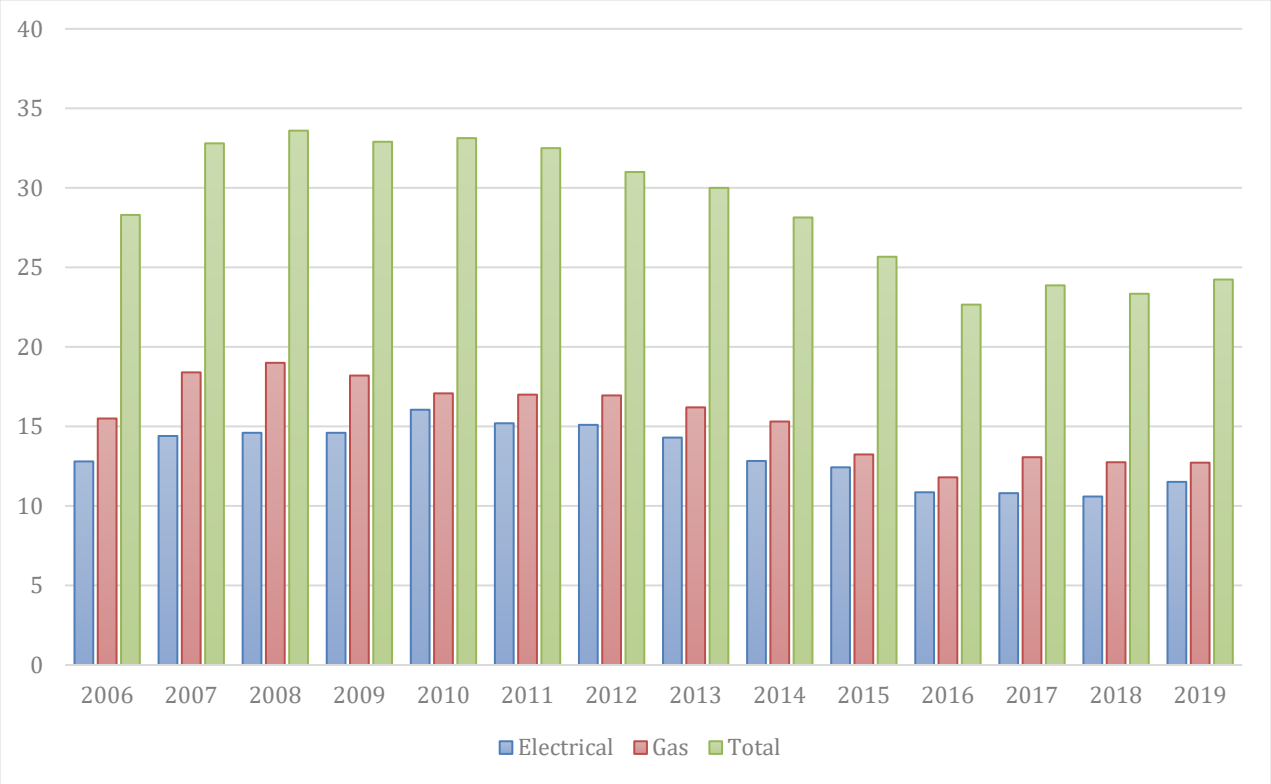


Table 9. b. Building Energy Performance Index (BEPI)

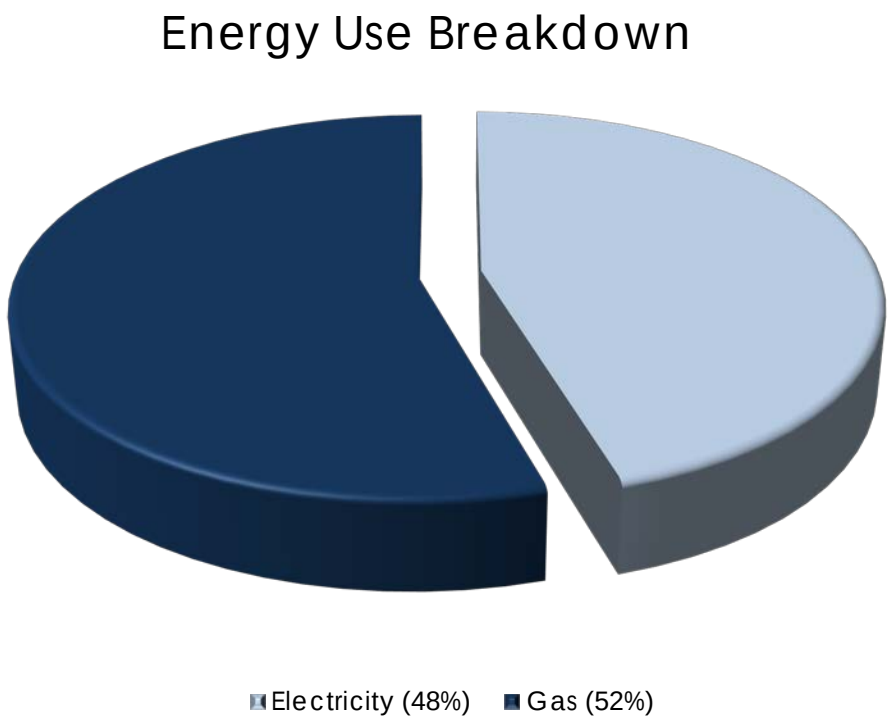


Figure 1. Breakdown of Institute Energy Use

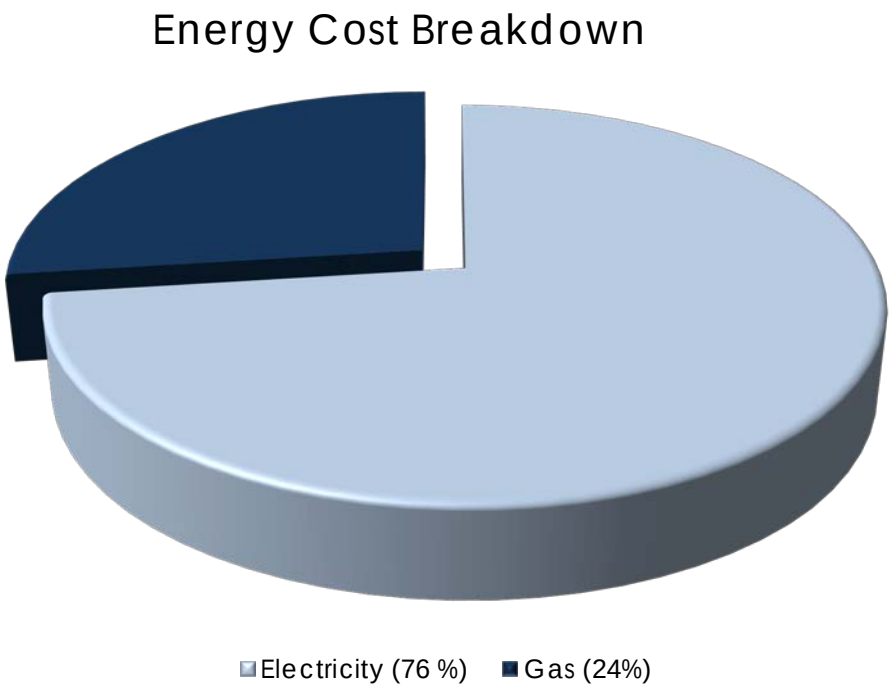


Figure 2.Breakdown of Institute Energy Use Costs

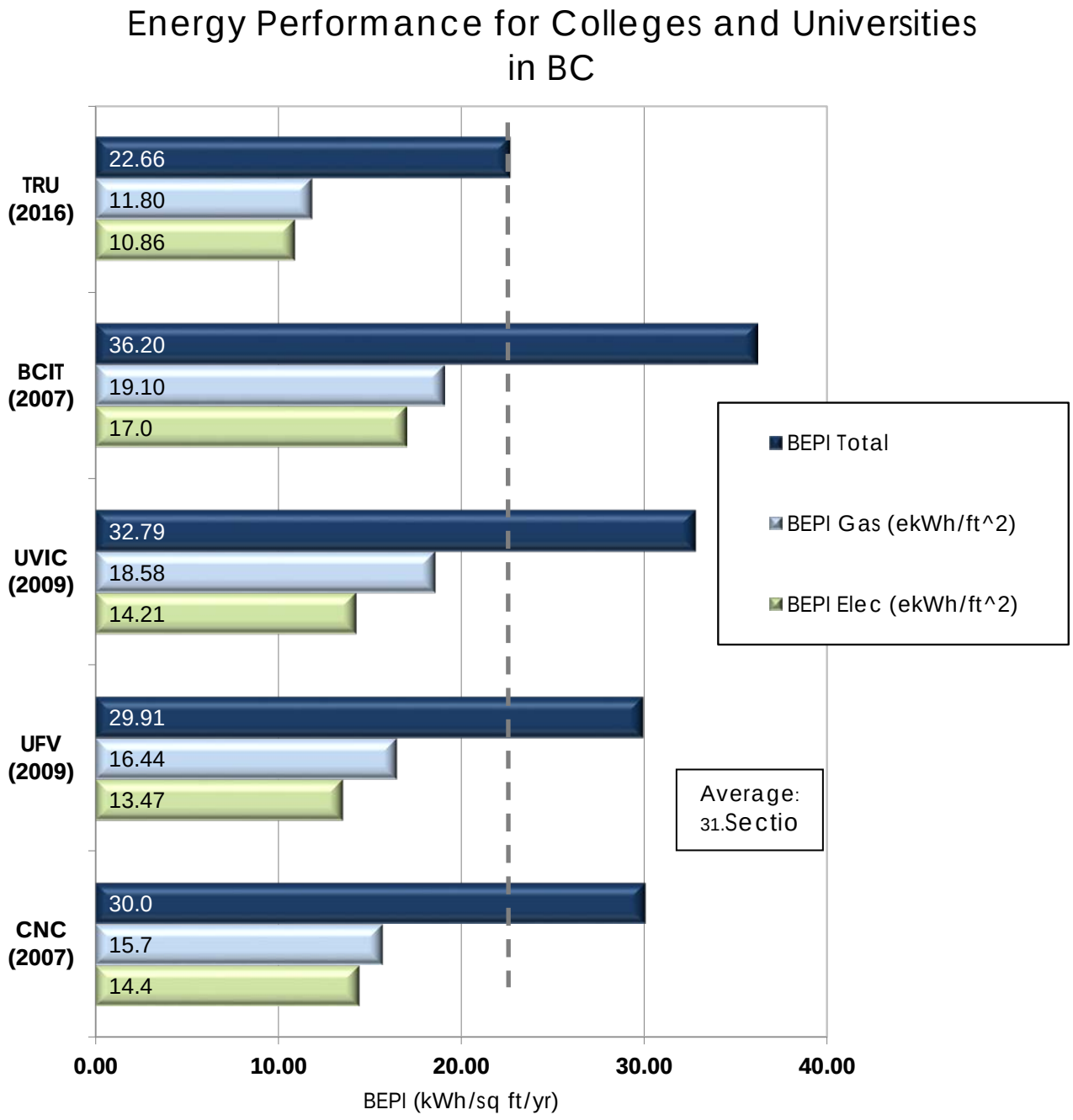


Figure 3. Energy Performance for Colleges and Universities in BC

3.2 Greenhouse Gas Information

Annual Greenhouse Gas Emissions								
Year	Electrical			Fuel			Total	
	kWh	e kWh	GHG (tonnes)	GJ	e kWh	GHG (tonnes)	e kWh	GHG (Tonnes)
2007	15,104,403	15,104,403	347.4	69,384	19,273,195	3,459.8	34,377,598	3,807.2
2008	15,283,229	15,283,229	427.9	71,706	19,918,306	3,575.6	35,201,535	4,003.5
2009	15,367,200	15,367,200	430.3	68,832	19,120,111	3,432.3	34,487,312	3,862.6
2010	16,058,604	16,058,604	400.43	67,140	18,650,108	3377.17	34,708,712	3,777.6
2011	15,026,400	15,026,400	370.17	66,497	18,471,388	3,335.49	33,497,788	3,706
2012	15,254,565	15,254,565	378.93	61,028	16,952,222	3,061.16	32,206,787	3,440
2013	15,194,536	15,194,536	377.44	61,094	16,970,555	3,054.7	32,165,091	3,432.14
2014	14,916,000	14,916,000	372.9	64,075.5	17,798,750	3,203.78	32,705,750	3,576.68
2015	14,450,400	14,450,400	361.26	55,390.6	15,386,278	2769.53	29,836,678	3,130.79
2016	13,766,400	13,766,400	357.93	56,021.1*	15,561,416.7	2,544.12	29,327,816.7	2,709.31
2017	13,696,800	13,696,800	356.12	59,623.6*	16,562,124	2,731.15	30,258,924	3,087.27
2018	13,490,400	13,490,400	350.75	58,445.40	16,234,846	2,672.27	29,725,246	3,023.02
2019	14,663,109	14,663,109	156.46	59325.2	16,201,444	2,966.26	30,864,553	3,122.72

Table 10. Summary of Annual Greenhouse gas Emissions. (*including 5,000 RNG)

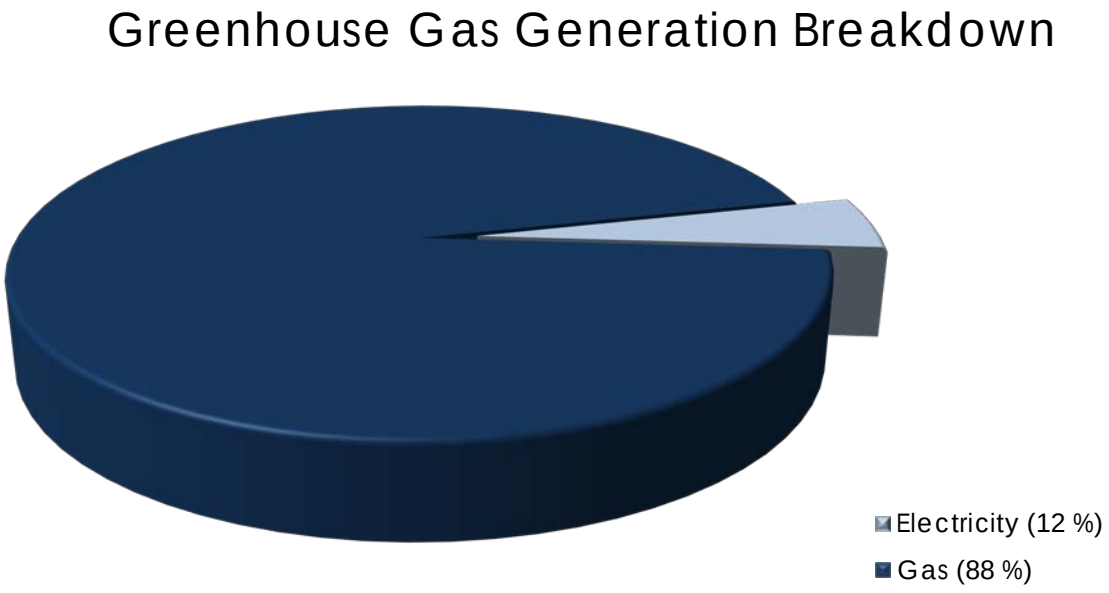


Figure 4.Breakdown of the Institute's Greenhouse Gas Generation

Section 4

Energy Management Projects and Actions

Section 4: Energy Management Projects and Actions

4.1Past and Current Projects and Actions

4.1.1 Completed Energy Conservation Projects (2015-2020)

ECM	Demand Savings (kW)	Electrical Savings (kWh)	Electrical Savings ($)	Fuel Savings (GJ)	Fuel Savings ($)	Total Cost Savings ($)	Incentive Savings ($)	Budget Retrofit Costs	Simple Payback (yrs)
2015									
HOL lighting retrofit		184,000	$ 15,640			$ 15,640	$ 28,027	$ 58,548	2
retrofit		165,000	$ 14,025			$ 14,025	$ 39,747	$ 105,888	4.7
Behaviour program		301,498	$ 25,627	22	215	$ 25,842		$ 2,000	
Science building Boiler upgrade				788	$ 7,880	$ 7,880	$ 14,436	$ 113,450	12
OM boiler upgrade				939	$ 9,390	$ 9,390	$ 17,316	$ 115,542	10
T8 to LED lighting retrofit						$ 97,000		$ 614,000	
TOTAL 2015		1,490,176	$ 126,665	1,727	$ 17,270	$ 143,935	$ 299,526	$1,009,428	7
2016									
BCCOL lighting retrofit	24.7	107,872				$ 10,787	TBD	$ 57,670	5.3
WL lighting retrofit	40.06	104,407				$ 10,683	TBD	$ 94,728	7.8
OM Boiler upgrade				74		$ 740	$ 10,107	$ 35,109	15
COP (WL)		37921/5848	$ 10,901	880	$ 6,252	$ 17,153	TBD	$ 30,800	1.8
COP (OM)	1219	350,000	$ 27,020	3,000	$ 30,000	$ 57,020	TBD	$ 294,600	5.2
Total 2016	1283.76	584,800	$ 37,921	3,954	$ 18,126	$ 96,383	$ 10,107	$ 512,907	7.02
2017									
AHT boiler upgrade				187	$ 1,870	$ 1,870	$ 5,300		
McGill Housing DHW upgrade				270	$ 2,700	$ 2,700	$ 8,996	$ 84,620	28
OM, GYM, AHT, CATC DHW upgrade				293	$ 2,930	$ 2,930	$ 10,225		
Residence Energy upgrades		298,763	$ 23,901	2,405	$ 24,050	$ 47,951			
Fortis Custom design program		106,916	$ 8,254	2,646	$ 26,460	$ 34,714	$ 48,249		
Total 2017	0	405,679	$ 32,155	5,801	$ 58,010	$ 90,165	$ 72,770	$ 84,620	

ECM	Demand Savings (kW)	Electrical Savings (kWh)	Electrical Savings ($)	Fuel Savings (GJ)	Fuel Savings ($)	Total Cost Savings ($)	Incentive Savings ($)	Budget Retrofit Costs	Simple Payback (yrs)
2018									
Upper College Heights lighting and heating plant retrofits		65,000	$ 5,532	1,274	$ 14,613	$ 20,144	$ 85,000	$ 400,000	16
Campus wallpacks/warehouse lighting retrofits		85,000	$ 7,234		$ -	$ 7,234		$ 103,991	14
DDC scheduling optimization		340,443	$ 28,972		$ -	$ 28,972		$ 69,310	2
UCH low flow water fixtures installation			$ -	830	$ 9,520	$ 9,520	$ 13,800	$ -	0
CAC kitchen oven upgrade			$ -	100	$ 1,147	$ 1,147	$ 4,000		0
Total 2018		490,443	$ 41,737	2,204	$ 25,280	$ 67,017	$ 102,800	$ 573,301	
2019									
Old Bandstra building upgrade		20,000	TBD		TBD			$ 40,000	
Campus DDC optimization		150,000	TBD	2,250	TBD	$ 40,000		$ 100,000	
New Rez heating plant upgrades			TBD	1,500	TBD	TBD	$ 42,500	$ 434,000	
New Nursing building new construction program		270,000	TBD		TBD				
curtains installation			TBD	890	TBD		$ 2,300	TBD	
Total 2019		440,000		4,640					
2020									
C.Op round 2BCCOL		100,000	$ 8,590	150	$ 1,650				
DDC optimization		145,000	$ 12,456	3,000	$ 33,000		TBD	TBD	
C.Op round 2 A&E		82,000	$ 7,044						
C.Op round 2 IB		77,000	$ 6,614						
C.Op Round 2 HOL		165,000	$ 14,174	TBD					
total 2020		569,000	$ 48,877	3,150	$ 34,650				

Table 11. Completed Energy Conservation Projects (2015-2020)

4.1.2 Completed Renewable Energy Projects

Section	Measure	Electrical Savings (kWh)	Electrical Savings ($)	Fuel Savings (GJ)	Fuel Savings ($)	Total Cost Savings ($)	Incentive Savings ($)	Budget Retrofit Costs ($)	Simple Payback

	**Solar DHW- OM			800				72,000	0
	**Solar DHW- CAC			600				108,000	0
	**Solar DHW- CATC			465				82,000	0
	Solar PV - TRUSU	10,000						54,452	20
	Solar PV-Trades	10,000							
	Solar Compass	5000							
	Solar sidewalk	1,312							
	Solar PV-NPH	60,000							
	Solar PV-WL	110000							

Table 11. Summary of Renewable Energy projects

4.1.3. Low Carbon Electrification projects

The BC Government has amended the Clean Energy Act to enable BC Hydro to begin offering incentives to its customers to electrify equipment. In the meantime, the government launched EfficiencyBC program, which offers 7 million dollars inventive over 2 years for commercial, institution and Multi-family buildings, 50% of the incentives will be given to electrification projects. TRU is working closely with BC Hydro on low carbon electrification projects. (Appendix D)

4.2 Proposed Projects (2020-2022)

Project List									
FY20 Projects									
Project Name	**BC HydroProject Type**	**Elec Savings kWh/year**	**BC Hydro Claimed Savings kWh/year**	**Total Project Cost**	**BC Hydro incentive $**	**Simple Pay Back**	**Start Date**	**% Completed**	**Est completion date**
C.Op Round 2 HOL		165000	165000				Aug-20	5	Mar-21
C.Op Round 2 IB		77000	77000				Aug-20	80	Mar-21
UCH LCE	LCE						Aug-20		Mar-21
C.Op Round 2 A&E		82,000	82,000		$ 23,000		Aug-20		Mar-21
Campus DDC optimization		145000	145000				Aug-20		Mar-20
C.Op Round 2 BCCOL		100,000	100,000				Aug-20		Mar-21
Total		569000	569000						
BC Hydro Target in Energy Manager Agreement (kWh)		400000							

Future Projects add year							Est Start Date		Est completion date
Kamloops campus wide	LCE								
C.Op Round 2 OM, T&T, Science	C-Ops	TBD					Aug-21		Mar-22
Campus DDC optimization		150000	150000	$200,000			Aug-21		Mar-22
total									

Table 12. Proposed projects

4.3 Training, Communication and Awareness Programs

A successful training, communication and awareness program is an integral part of TRU`s energy management plan. The following is a description of ongoing and future strategies:

Training

- The TRU Sustainability Ambassadors program (pilot phase in 2015-2016 with three staff ambassadors; full program in 2016-2017; updated program in 2020-2021) provides training to other staff/faculty members with the Energy Conservation Toolkit (see Appendix C for details) which focuses on three different areas of conservation: Plug Load, Lighting, and Heating & Cooling. The program also engages members in every-day sustainability issues, like waste/recycling/composting, transportation and health and wellness.

- Staff training for all new energy related equipment (smart bars, space heaters, multi-function copiers, etc.)

Communication and Awareness

- Maintain and update website and social media sites (Facebook, Twitter, Instagram, blog) to inform and engage entire TRU community in energy, sustainability and environmental related projects and initiatives

- Develop comprehensive media campaigns for most campaigns and outreach opportunities, including the use of social and traditional media (closed-circuit TV ads, emailing, posters/handbills/banners, booths at events, radio/TV interviews, etc.)

- Engage in campus activities by informing students, faculty and staff of ongoing green projects and initiatives through participation at kiosks, coffee/lunch meetings, regular club/office meetings, video meetings, conference calls, etc..

Energy Wise Network Program

- The TRU Sustainability Office is part of the Energy Wise Network Program (EWN). The program is funded by BC Hydro and FortisBC and provides support for BC organizations to design and deliver energy conservation engagement programs that encourages staff and student action to establish a lasting culture of conservation and spirit of sustainability within the organization. The program provides a strategic framework and ongoing support to increase conservation knowledge and awareness and inspire the action and leadership that is required to realize energy savings. TRU joined the program in 2016, and has run multiple campaigns about energy conservation pledges, lighting, monitors, plug-load and temperature settings. https://www.bchydro.com/powersmart/business/programs/workplace-conservation.html?WT.mc_id=rd_worksmart
    - National Sweater Day (Feb 4, 2021) – This natural gas-conservation event has been popular at TRU for almost a decade. This year's version will engage students, staff and faculty in a covid-safe version and focus on energy saving measures that can be taken on campus and at home.
    - BC Cool Campus Challenge (natural gas conservation event)
        - 2019-2020 – TRU is co-chairing the 2nd annual event.
        - 2018-2019 - In reaction to the threat of certain BC residents having their natural gas cut off during the winter due to a gas-line rupture in October 2018, six BC universities and colleges (TRU, UBC, UBCO, SFU,BCIT, Selkirk) banded together to try and do their part to conserve natural gas by doing two things during the event (January 7 to February 28, 2019):
            - reducing their natural gas use by lowering set-points 1 to 3 degrees in most campus buildings where possible, and
            - launching a challenge amongst themselves which asked members of their respective communities to take a pledge to reduce their gas usage by doing 1 or all of 4 things:
                - lower thermostats by 1 to 3 degrees;
                - wash laundry in cold water;
                - take shorter showers; and
                - layer up with extra clothing.

        The winning institution—Selkirk--had the highest percentage of community members sign the pledge.

    Fortis was very supportive of the campaign from the beginning

Other Key Energy Saving Initiatives

- The TRU Sustainability Office will, for the sixth year, host *TRU Casual Shirt Fridays*. This event will save electricity on campus and is the 'polar' opposite of Sweater Day: to reduce TRU's energy consumption the air conditioning in most campus buildings will be turned down by 1-2 degrees for 10 summer Fridays (June 25 to Aug 27, 2021). Changing the temperature by one degree can save 5% of our electrical energy used for cooling, so by simply dressing for warmer weather, the TRU community demonstrates that small actions can make a big difference in saving energy and reducing the impacts of climate change.

TRU Campus Strategic Sustainability Plan (CSSP)

2020-2024

- In 2012, a TRU student and staff survey revealed a surprisingly low score regarding the TRU community's awareness of sustainability-related activities and initiatives on campus, or even

that there is a Sustainability Office. This knowledge helped establish the need for a formal plan to help change the sustainability culture on campus.

In 2013, TRU established "increasing sustainability" as one of its five strategic priorities for 2014-2019. The first Campus Strategic Sustainability Plan (CSSP) (2015-2019 became aligned with the university's strategic plan, and provided a focus for TRU's efforts toward sustainability.

The new CSSP, launched in December 2019, is even more comprehensive in nature than the fist plan, and includes more than 130 recommended strategies across four key focus areas: **Operations & Planning**, **Advocacy & Engagement**, **Learning**, and **Administration**. The CSSP is intended to provide a framework for each TRU department and operational unit to incorporate sustainability initiatives into their own planning processes.

The CSSP is a five-year plan. The majority of the strategies are recommended for implementation over the short term (1-3 years) and medium term (3-5 years); however, the plan includes several strategies for consideration over the longer term (5+ years). These have been included to provide points of reference for longer term planning and resource allocation.

Unlike some strategic documents, the plan takes a comprehensive approach of documenting strategies over the next 5 years. These strategies are not all the responsibility of one department or office, but rather are shared among many. This comprehensive approach will allow each office or department to see where and how it can play a role in TRU's sustainability journey

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Program	Anticipated Savings (KWH)	Target Audience	Estimated Reach (# people)	Start/End Date
TRU Sweater Day 2021	Anticipated Natural Gas savings = 500 gigajoules (GJ); equivalent to approximately 130,000 kWh,	Students, staff and faculty	2500	Feb 4, 2021 (although, the event may go for longer)
TRU Staff/Faculty Sustainability Ambassadors	TBD	Staff & Faculty	600	Jan 2021 - ongoing
Earth Day	TBD	Students, Staff and Faculty	2500	Annual (April 22)
Casual Shirt Fridays (x10 Fridays in 2020)	Anticipated electricity savings 14,500 kWh	Students, Staff and Faculty	3500	Annual (June, July, August)

Table 13. Sustainability Initiatives (2015/2016 school year and ongoing)

Appendix A

TRU Campus Map

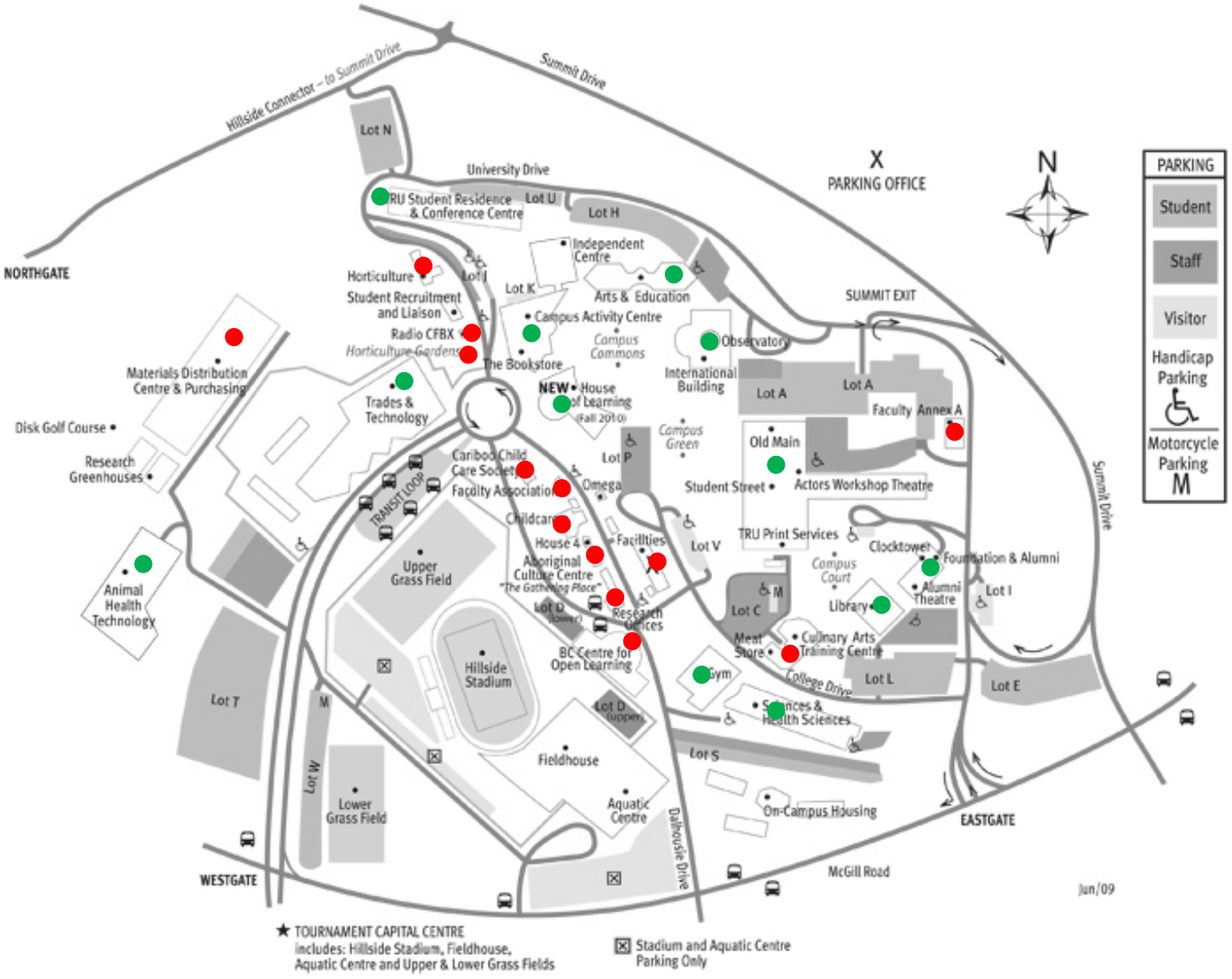

Figure 5. TRU Campus Map

- Primary Buildings
- Secondary Buildings

Appendix B

TRU Sustainability Policy

POLICY

Thompson Rivers University (TRU) is committed to being the 'University of Choice for Environmental Sustainability' as set out in the Strategic Plan 2007-2012.

The University is a signatory to the Taillores Declaration and the University and College Presidents' Climate Statement of Action for Canada.

The University has a significant role to play in preserving the local and global environments. TRU seeks to be the University of Choice for students concerned about environmental sustainability and to be recognized for its leadership and stewardship in responding to environmental challenges. This policy will assist members of the University community to understand and fulfill their responsibilities with respect to environmental sustainability.

DEFINITIONS

1. Sustainability: Meeting present needs without compromising the needs of future generations.
2. Environment: Surrounding conditions, forces, or influences which affect the natural, built, or human systems.
3. University Community: All individuals who design, deliver, participate in and support the programmes which the university delivers.

REGULATIONS

1. Purpose

a. To facilitate and support the University's mission with respect to Environment and Sustainability as set out in the Strategic Plan.
b. To establish the process and responsibilities for monitoring sustainability initiatives at the University.
c. To outline the principles through which the environmental and sustainability objectives can be achieved.
d. To outline the roles and responsibilities for implementing Sustainability Action Plans.

2. Principles

a. Leadership in Sustainable Operations

i. The University will increase energy efficiency, use of renewable resources and the use of carbon reduction technology.

ii. The University will decrease water consumption, waste generation and the use of toxic substances in campus operations. Where substitution, reuse, or recycling cannot be implemented, best practices will be pursued in the disposal of waste.

iii. The University's procurement processes will consider social, ethical, and economic factors in the purchasing process through the use of such tools as life cycle costing or similar analysis.

iv. The University will consider biodiversity when deciding about the use and development of campus lands.

b. Leadership in Evaluating Success

i. The University will continually measure and monitor the impacts of its activities against the principles of sustainability, setting objectives, targets and measuring results in the form of a Campus Sustainability Action Plan that will be updated every three years.

c. Leadership in Community Sustainability

i. The University will foster and encourage the development of sustainable practices and activities by the University community on and off campus.
ii. The University will work cooperatively in support of sustainability programmes and actions in the broader community.
iii. The University will work with other universities, government departments, and organizations to further the objectives of sustainability.

d. Leadership in Managing Environmental Risks

i. The University, through the Office of Environment and Sustainability, will establish and administer an environmental management plan that sets targets, indicators and measures environmental performance and reports progress.
ii. The University commits to a process of continual environmental improvement and best practices.
iii. The University will disseminate knowledge regarding sustainability to the community at large.

3. Responsibilities for Implementation

a. The Vice-President Administration and Finance is responsible for reviewing the Campus Environmental and Sustainability Action Plan and for approving actions, schedules, and funding for its implementation. Information from the Plans will be compiled and published in one of the Environmental Advisory Committee's bi-annual reports to the TRU Board of Governors and Senate.
b. The Director of the Office of Environment and Sustainability, reporting the Vice President Administration and Finance, is responsible for co-ordination, advocacy, and communication of the sustainability principles, objectives, targets, and activities on campus. The Director will also support TRU's sustainability actions within the broader community, government departments and other organizations and universities.
c. The Director of the Office of Environment and Sustainability is responsible for regulatory reporting.

Appendix C

Zero Waste Toolkit:
http://www.tru.ca/__shared/assets/TRU_Zero_Waste_June_2035279.pdf

Energy Conservation Toolkit:
https://www.tru.ca/__shared/assets/Energy_Conservation_Toolkit_201537948.pdf

Appendix D

Description of Measure	Standard LCE Measure name (Use drop down)	New or Retrofit	Electrical Consumption (kWh/y)		Average Monthly Demand (kW)			Nat Gas Consumption (GJ/yr)		GHG Reduction	Annual Cost Saving $						Total Capital Cost	Incremental relative to Baseline	Non Energy Benefits	Measured Life/Persistence	Payback
			Current	Incremental (+/-)	Current	Incremental (+/-)	Months	Current	Incremental (+/-)	Tonnes CO2e/yr	Electric	Demand	Gas	Maintenance or others savings (annual)	GHG Offsetting Costs	TOTAL	$	$	(eg thermal comfort, noise reduction, air quality etc.	In years	In years
Electric Boilers at ITTC	HVAC Elect	New								-	-	-	-		-	$ -		$ -		20	-
LCE Study at UCH	HVAC Air S	Retrofit		200,000						2	$ 11,120	-	-		-	$ 11,120		$ -		18	0.0
LCE Study at UCH	DHW Air-to	Retrofit		42,176						0	$ 2,345	-	-		-	$ 2,345		$ -		15	0.0
LCE Study Kamloops campus	HVAC Elect	Retrofit		10000000						107	########	-	-		-	########		$ -		20	0.0
Electric Boilers at NPH	HVAC Elect	New								-	-	-	-		-	$ -		$ -		20	-
LCE at UCH (replace furnaces)	HVAC Air-t	Retrofit		170,067		45			-2065	-101	$ 9,456	$ -	-$ 15,343		-$ 2,529	-$ 8,416		$ -		18	0.0
LCE at UCH (install heat pump)	HVAC Air-t	Retrofit		105522		24			-1176	-58	$ 5,867	$ -	-$ 8,738		-$ 1,438	-$ 4,309		$ -		15	0.0
LCE at UCH (install DHW heat pump)	DHW Air-to	Retrofit		127660		25			-2142	-105	$ 7,098	$ -	-$ 15,915		-$ 2,636	-$ 11,454		$ -		15	0.0