



A BUSINESS CASE TO RETROFIT FACULTY AND STAFF HOUSING AT UBC

**THE COSTS & BENEFITS TO MONITORING AND MANAGING ENERGY
CONSUMPTION**

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The experience and expertise of the individuals below helped to shape and solidify this report

Stakeholder	Title	Department
Kim Choiniere	Property Manager	UBC Properties Trust
George Poliusuk	Property Manager	UBC Properties Trust
Carmen Raiche De Araujo	Administrative Assistant	Sustainability and Engineering / Community Development
Vivian Luk	Data Clerk	Community Development Campus and Community Planning
Kam Tsui	Support Analyst	Desktop Support Team
Kathy Barr	Director of Property Management	UBC Properties Trust
Jamee DeSimone	Climate Action Planner	Sustainability and Engineering

1. EXECUTIVE SUMMARY

STRATEGY OBJECTIVES & PRINCIPLES:

UBC Properties Trust (UBCPT) owns and operates multiunit residential rental buildings on the UBC campus. Currently, there is not a systematized process to understand building energy performance. This lack of information has created an opportunity for UBC's Sustainability and Engineering department to support, discover and learn from possible cost and energy saving measures for UBCPT (University of British Columbia Properties Trust, 2017)¹.

THE FOUR MAIN OBJECTIVES OF THIS REPORT ARE:

1. To analyze a portfolio of buildings current utility consumption and costs
2. To demonstrate the true cost of rising utility consumption costs in BC
3. To provide cost saving solutions that could minimize current utility costs through 2 case studies
4. To demonstrate the cost of inaction should no energy management strategies be implemented

ANALYSIS:

The goal of this report is to give UBCPT an understanding of energy related costs and the rising costs associated with utility consumption in B.C. utilizing a portfolio of buildings currently under the management of Village gate and Westbrook properties. This information will help UBCPT to make informed decisions around energy consumption and future retrofits to realize energy cost savings and help UBC meet its greenhouse gas (GHGs) emissions goals. The analysis included research from current political tax policy (Government of British Columbia, 2008), the rising costs of utilities (RDH Building Science Inc., Prism Engineering & FRESCo Building Efficiency) and UBC's goals in sustainability leadership (UBC Campus and Community Planning, 2016). The information provided in this report will give a bench mark of the portfolios current performance in entirety. The analysis demonstrates the discrepancy in efficiency among buildings that are similar in age and size as well as compares them on a per unit basis. The report then utilized the bench mark analysis to demonstrate how increases in utility costs and carbon tax will change utility costs in the year 2022. Two case studies were conducted to evaluate to cost savings opportunities to reduce energy costs for the portfolio.

Utility Costs:

Total utility costs, carbon taxes and public sector offset costs for the seven portfolio buildings exceeded \$300,000 annually and per unit costs ranged from \$455 - \$730 annually. Anticipated increases in energy costs and carbon taxes could result in 17% increase in energy costs over the next five years. The range of energy costs on a per unit basis, and anticipated energy cost increases suggest that investments in energy saving measures are worth exploring, especially in older, higher cost buildings.

Case Studies:

Two case studies are conducted to demonstrate how incremental changes to energy management can affect the operations cost of first the buildings in focus, followed by the extrapolation of the case study results on to the entire portfolio. The first case study looks at the rising cost of BC Hydro electricity here in B.C. from 2016 to the year 2022. After conducting research and taking into account recent large capital investments from B.C. Hydro a 3.5% increase in hydro costs were factored into the analysis. (Dreessen, 2017) The Make Up Air case study demonstrate potential savings of turning down the temperature by 3°C and 5°C in the common areas of the building under analysis. The results of the 2 case studies are demonstrated below.

MAKE UP AIR CASE STUDY RETURNS

- Turning down the temperature by **3°C resulted in a savings of \$52.61/unit**. The savings of one unit in 2016 multiplied by all the units in the building resulted in a **one year savings of \$3,735.13**.
- Turning down the temperature by **5°C resulted in a savings of \$80.03/unit**. The savings of one unit in 2016 multiplied by all the units in the building resulted in a **one year savings of \$5682.26**.

NVP at 3°C	\$21,783.32	IRR of 3°C	8301%
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NVP at 5 °C	\$33,317.41	IRR of 5°C	12629%
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NPV Analysis 3°C			
year	Cash Flow	PV	
2016	0 \$(45.00)	\$(45.00)	
2017	0 \$3,735.13	\$3,735.13	
2018	2 \$3,770.89	\$3,659.54	
2019	3 \$3,806.65	\$3,639.29	
2020	4 \$3,842.41	\$3,618.83	
2021	5 \$3,878.17	\$3,598.18	
2022	6 \$3,913.93	\$3,577.34	

NPV Analysis 5°C			
year	Cash Flow	PV	
2016	0 \$(45.00)	\$(45.00)	
2017	1 \$5,682.26	\$5,597.74	
2018	2 \$5,753.78	\$5,583.88	
2019	3 \$5,825.30	\$5,569.19	
2020	4 \$5,896.82	\$5,553.71	
2021	5 \$5,968.34	\$5,537.45	
2022	6 \$6,039.86	\$5,520.45	

LED CASE STUDY RETURNS

Net Present Value Results of LED Case Study Building J			
rf rate		0.0151	
NPV of project		\$23,885.80	
IRR of project		107%	
year	time period	Cash flows over time	PV
2016	0	\$(4,312.58)	\$(4,312.58)
2017	1	\$4,542.18	\$4,474.61
2018	2	\$4,701.16	\$4,562.33
2019	3	\$4,865.70	\$4,651.77
2020	4	\$5,036.00	\$4,742.97
2021	5	\$5,212.26	\$4,835.95
2022	6	\$5,394.68	\$4,930.75



WHY NOW:

The cost savings in this report are small relative to overall operations costs of UBCPT, yet this report demonstrates that through incremental adjustments and minor capital investments high positive returns on investments can be generated from minimal effort. The cost of inaction is high and the sooner action is taken the sooner financial savings can be realized. The savings in this report demonstrate that collectively if both case studies were implemented total portfolio savings could be over \$35,000 in 2016 see figure 4.1

FIGURE 4.1

Total Portfolio Savings Resulting from LED & Make Up Air Case Studies			
Year	MUA at 3°c	LED	NET SAVINGS
2016	\$13,761.38	\$22,385.01	\$36,146.39
2022	\$16,777.68	\$29,587.06	\$46,364.73

There are always tradeoffs when making changes to operations. Issues regarding capacity for change in the case of the property management firm, as well as the impacts to their budget, need to be considered. An assessment of the property managers time and key performance indicators helps to bring light to why and how the cost savings in this report and other opportunities have not yet been realized to date.

The case studies in this report represent a fractional amount of the savings that could be realized should a more thorough analysis be done to the buildings managed on campus. Reducing the carbon footprint emitted by the buildings on campus is an essential step towards to reaching UBCs climate action goals (UBC Campus and Community Planning, 2016). By demonstrating the financial impact of the 2 case studies in this report in Figure 4.3 as well as statements made by PMs (Chinoire, 2017), a professional energy advisor could be the next step towards realizing more savings for the property management firm. Utility companies such as Fortis (Fortis BC, 2017) and BC Hydro (BC Hydro, 2017) often supplement the salaries of such advisors. A professional would have the time, capacity and expertise to better adjust and recommend retrofits for UBCPT’s entire portfolio and as this report demonstrates, by taking a closer look at energy management greater savings can be achieved.