

## University of Prince Edward Island Retrofit Projects: 2004 – 2005

As part of the University's Energy Awareness Program and in an effort to reduce energy costs, UPEI recently undertook a number of building system retrofit projects. Retrofitting included replacing existing bulbs and ballast in light fixtures with more efficient ones and various ventilation systems were modified to operate more efficiently during unoccupied hours. This work began in early August and continued throughout the fall and winter. For the University, the results of these changes will bring about more efficient buildings and a greener, more environmentally friendly campus.

The following tables summarize the energy retrofit projects that were completed from August 2004 to February 2005 and include work done on the following: Lighting and Electrical Improvements, Energy Management Systems and Climate Controls, Ventilation Motors, Water Heating, and Heating, Ventilation and Air Conditioning Systems. In addition, information is provided on the Estimated Utility Data (Baseline Year - 2003) and the Estimated Project Cost Summary. Of note is the Estimated Tonnes of Greenhouse Gases Saved by these retrofit projects. If you have any questions about the UPEI Retrofit Projects, e-mail us at [energy@upe.ca](mailto:energy@upe.ca).

Lighting and Electrical Improvements		
<b>Description</b> 1. Replace linear tube lamps with 28-watt T-8 lamp and electronic ballasts. 2. Replace incandescent fixtures with compact fluorescent, ranging from 13 watts to 39 watts. 3. Replace incandescent exit signs with LED type exit signs.  <b>Buildings affected:</b> Atlantic Veterinary College, Chaplaincy Centre, Memorial Hall, Bernadine Hall, Central Utility Building, Young Sports Centre, Main Building, Robertson Library, W.A. Murphy Student Centre and the Wanda Wyatt Dining Hall	Estimated area affected by the measures (m <sup>2</sup> )	57,195
	Estimated cost of all lighting measures	\$401,363
	Estimated dollar savings	\$84,798
	Estimated energy savings (GJ *)	3,825
	<b>Estimated tonnes of Greenhouse Gases saved **</b>	<b>698</b>
	kg of CO <sup>2</sup> /\$ invested	1.74

\* Giga joules

\*\* Savings per year

Energy Management Systems and Climate Controls		
<p><b>Description</b></p> <ol style="list-style-type: none"> <li>1. Install several new Direct Digital Control (DDC) points and/or software to shutdown Air Handling Units (AHUs) based on a combination of outside air temperature and space scheduling + associated programming.</li> <li>2. Place Hot Water System (HWS) loop temperature controller on Building Maintenance System (BMS).</li> <li>3. Place existing Domestic Hot Water (DHW) re-circulation pumps on BMS for scheduled shutdown.</li> </ol> <p><b>Buildings affected:</b> Atlantic Veterinary College, Cass Science Hall, Memorial Hall, Bernadine Hall, Blanchard Hall, K.C. Irving Chemistry, Marian Hall, Robertson Library and Steel Building</p>	Estimated area affected by the measures (m <sup>2</sup> )	51,657
	Estimated cost of all control measures	\$50,600
	Estimated dollar savings	\$12,366
	Estimated energy savings (GJ)	853
	<b>Estimated tonnes of Greenhouse Gases saved</b>	<b>156</b>
	kg of CO <sup>2</sup> /\$ invested	3.07

Ventilation Motors		
<p><b>Description</b></p> <ol style="list-style-type: none"> <li>1. Install variable frequency drives on both the supply fans and exhaust fans for multiple AHUs.</li> <li>2. Install new high efficiency motors.</li> </ol> <p><b>Buildings affected:</b> Atlantic Veterinary College, Steel Building, K.C. Irving Chemistry Centre and Main Building</p>	Estimated area affected by the measures (m <sup>2</sup> )	31,483
	Estimated cost of all motor measures	\$172,369
	Estimated dollar savings	\$56,664
	Estimated energy savings (GJ)	5,510
	<b>Estimated tonnes of Greenhouse Gases saved</b>	<b>1,005</b>
	kg of CO <sup>2</sup> /\$ invested	5.83

Water Heating		
<b>Description</b> 1. Replace existing electric hot water heater with new commercial high efficiency electric domestic hot water storage tank.  <b>Buildings affected:</b> Kelley and Robertson Library	Estimated area affected by the measures (m <sup>2</sup> )	12,931
	Estimated cost of all water heating measures	\$15,500
	Estimated dollar savings	\$2,550
	Estimated energy savings (GJ)	64
	<b>Estimated tonnes of Greenhouse Gases saved</b>	<b>12</b>
	kg of CO <sup>2</sup> /\$ invested	0.75

Heating, Ventilation and Air Conditioning Systems		
<b>Description</b> 1. Convert system units and corresponding selected areas from constant volume to variable air volume.  <b>Buildings affected:</b> Robertson Library	Estimated area affected by the measures (m <sup>2</sup> )	10,429
	Estimated cost of all motor measures	\$70,700
	Estimated dollar savings	\$19,405
	Estimated energy savings (GJ)	1,105
	<b>Estimated tonnes of Greenhouse Gases saved</b>	<b>202</b>
	kg of CO <sup>2</sup> /\$ invested	2.85

## Estimated Utility Data (Baseline year - 2003)

Item	Total in the Retrofit Project
<b>Basic Information</b>	
Number of buildings	17
Total area of buildings (m <sup>2</sup> )	71,100
<b>Pre-Retrofit (Baseline) Utility Data</b>	
Electricity (GJ)	46,111
Other (GJ) - high temperature hot water	63,319
Total energy consumption	109,430
Total energy cost (\$)	\$2,365,000
<b>Post-Retrofit Utility Data</b>	
Electricity (GJ)	39,777
Other (GJ) - high temperature hot water	58,305
Total energy consumption	98,082
Total energy cost (\$)	\$2,162,217
<b>Expected Energy Savings (annually starting in 2005-2006)</b>	
Electricity (GJ)	6,334
Other (GJ) - high temperature hot water	5,014
Total expected energy savings	11,348
Total expected energy cost savings(\$)	\$175,783
<b>Estimated tonnes of Greenhouse Gases saved</b>	<b>2071</b>
<b>kg of CO<sup>2</sup>/\$ invested</b>	<b>2.92</b>

## Estimated Project Cost Summary

Project Item	Estimated Cost
<b>Project Implementation Costs</b>	
• Lighting system	\$401,353
• Energy management systems and climate controls	\$50,600
• Ventilation motors	\$172,379
• Water Heating	\$4,700
• Heating, ventilation and air conditioning systems	\$70,700
<b>TOTAL</b>	<b>\$699,732</b>
<b>Average Payback Period for all Measures (yrs)</b>	<b>4</b>