



Energy/Sustainability Enterprise System

Operations and Awareness

LAURIER
Sustainability Office



AGENDA

1. Campus Background
2. Energy Management Plan
3. Energy Management Systems
4. Operational and behavioural Change
5. Associated Projects
6. Questions





BACKGROUND - LAURIER

Profile

- Student population: over 15000 with 3000 + living on campus
- Waterloo campus has 30 individual buildings, also have a Kitchener and Brantford campus, all centrally located
- One of the fastest-growing universities in Canada - enrollment has doubled from 2000 to 2010

Consumption

- Spend over \$4.5 million annually in utility costs (natural gas, electricity, and water)
- Average energy intensity is 262 ekwh/m² of floor space





ENERGY MANAGEMENT PLAN

Approach:

1. Optimized Payback

2. Goal Oriented

Sustainability Action Plan –
25% reduction in GHG
over 5 years



Research & Academic Centre





ENERGY MANAGEMENT PLAN

Process:

1. Benchmarking
2. Utility Monitoring & Awareness
3. Documentation & Assessments
4. Project Implementation

Elements:

- **Administration**
- **Climate Change and Energy**
- Food & Recycling
- **Green Building**
- **Student Involvement**
- Transportation
- Endowment Transparency
- Investment Priorities
- Shareholder Engagement



ENERGY MANAGEMENT PLAN

Benchmarking:

- **Past:**
Laurier has full natural gas, electricity, and water billing data from mid-2006 to present
- **Ongoing:**
ION Energy Management System to track, analyze, and report on utility information



Electrical submeters



MONITORING & AWARENESS

Electricity, Natural Gas, Water: 5-6 year payback

Benefits:

- Accurately predict future energy bills – model, forecast, benchmark, baseline
- Set energy cost savings goals
- Prioritize sites for energy retrofits
- Find billing errors – sort, filter, compare, etc.
- Profitably manage electrical peak loads campus-wide
- Budget more accurately
- GHG Reporting
- Motivate and educate staff and students to manage energy costs



MONITORING & AWARENESS

Electricity, Natural Gas, Water: 5-6 year payback

Benefits:

- Centralized Data Logging
- Data Reporting (automatic, customized monthly report generation)
- Non-utility grade Sub-Metering Reports (automatic monthly report generation)
- Instantaneous Data Monitoring & Display (individual buildings and aggregate)
- Electrical Load Shedding
- Early Detection and Troubleshooting of Problems (immediate notification if monitored systems deviate from usual patterns)



MONITORING & AWARENESS

Business & Facilities Operations

- Develop a long term utility budget plan
- Provide data for strategic planning in terms of the Campus Master Plan
- Identify areas to conserve energy
- Provide an accounting tool for sub-billing internal departments
- Provide a centralized software to store prior benchmarking consumption data





MONITORING & AWARENESS

Business & Facilities Operations

- A tool for engineering & maintenance for troubleshooting & alert when problems arise
- Generate conservation awareness to the University to change cultures & behaviours
- Provide data for reports to senior management & governments for funding
- Helps us comply with legislative requirements such as the Green Act, etc





MONITORING & AWARENESS

GHG Inventory

- Aggregate CO2 output
- Annual CO2 output vs. baseline year
- Multi-meter comparison of CO2 output vs. target for multiple utility types

Emission Sources:

Scope 1 – Direct emissions from owned sources, ie. Boiler, fleet vehicle fuel use

Scope 2 - Indirect emissions associated with electricity/HVAC use

Scope 3 – Indirect and embodied (life-cycle) emissions, ie. Work travel, deliveries



MONITORING & AWARENESS

Laurier Energy Dashboard

<http://buildingdashboard.net/wilfrid/#/wilfrid>

Programming

- Sustainability Reps
- Orientation and Training
- Engagement & Partnerships



Quad



DOCUMENTATION & ASSESSMENTS

Continuous Improvement

- Document & assess building systems and operating conditions
- Descriptions of building operating practices and procedures, including:
 - design features
 - components
 - set points
 - operational sequences
 - preventative maintenance





DOCUMENTATION & ASSESSMENTS

Requirement	Typical for Building	Office Set A (AHU-1)	Office Set B (AHU-2)	Lobby	Computer or Data Storage	Other: Cafe	Notes
Air temperature requirements for cooling and heating seasons	Occupied: 72°F +/- 2°F Unoccupied summer: 78-80°F Unoccupied winter: 70°F	Same		Same 70°F	67°F at all times		
Humidity	No direct humidity control by building systems; possible of tenant systems				50%		
Dehumidification	None				50%		
Pressure relationship	(+) 0.04 difference in pressure between building interior and outside environment					(-) 0.02 difference in pressure between print shop and corridor	
Filtration	2" 30% pleated prefilter — changed as needed 20" 90-95% bag — changed annually						
Ventilation	25% outdoor air	Same		Same	Same	Separate MUA system	
Outside air	Meet ASHRAE 62.1-2007						
Sound and noise level	N/A	N/A		N/A	N/A		

PROJECTS

- Design & Operations Standards
- Recommissioning
- Retrofits and Replacements
- Harvesting – rainwater, solar
- Awareness Programs
- Incentives & Investment





QUESTIONS?

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