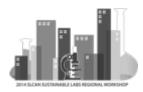
The Challenges of Conducting Innovative Research in Aging Infrastructure — The Need for Sustainability

Presented by: Mike Dymarski, PhD

Chief Administrative Officer Department of Chemistry University of Toronto







Presentation Outline

- > Financial Challenges Faced today by Universities
- > Innovation, Tradition and Sustainability
- **Examples of Successes**



The Role of Universities

Universities have a remarkable and unique role to play. They have the capacity to test and innovate in ways that cities and businesses cannot.

Melissa Goodall, Yale University (2014)



Issues with University Infrastructure

- Capital / Renovation Projects have a Huge Backlog
- Buildings are reaching breakdown thresholds of 25 and 50 yrs



Increase in Deferred Maintenance

Innovation and Sustainability Needs are greater than ever



The Dark Age

- Lack of Recognition for the Importance of Preventative Maintenance
- Reactive Run to Failure
- Competition for Funds: Cap vs Maintenand





The Enlightened Age

- Use of New Technology
- Predictive Maintenance Tools
- Asset Management Strategies



Innovation

ange in customs; something new contrary to established customs, ners, or rites.



Tradition

an inherited, established, or customa pattern of thought, action, or behavior





The Issues

Funding



Innovation/Vision

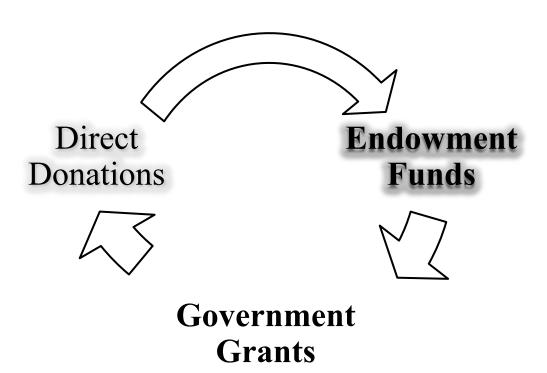


Sustainability

"Every organization needs one core competence: innovation" Peter Drucker



Funding Streams





Innovation In Research Labs



- Promote Collaboration
- Support Challenge/ Motivation
- Design Innovative Space to Support Res



University Vision



Who Drive Innovation?

Who Drive Sustainability?

Are the Goals Related in a Traditional Setting?



Path to Innovation



Similarities

Vision

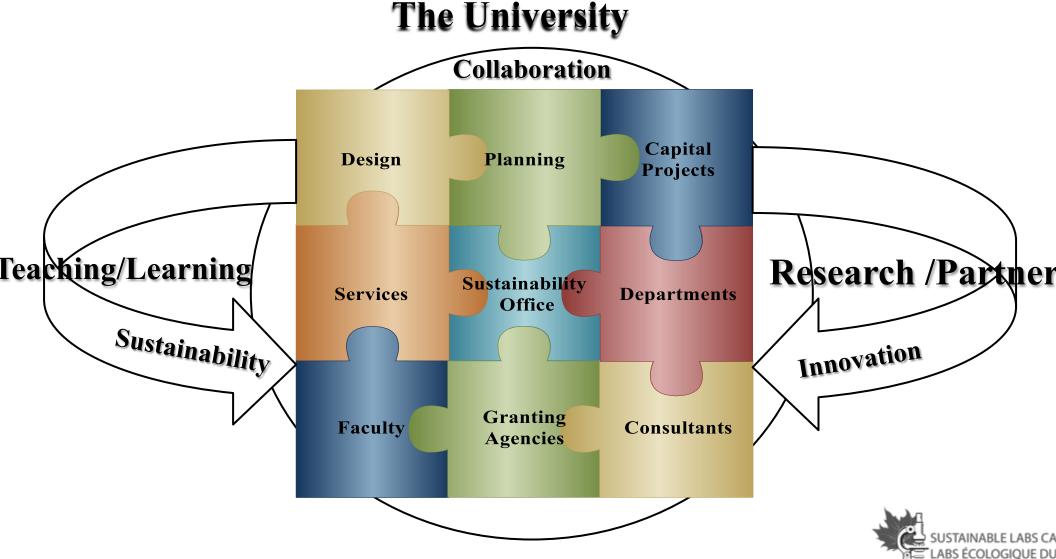
Goals

Action

Achievement

Path to Sustainability

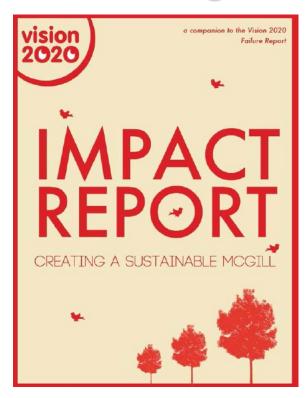


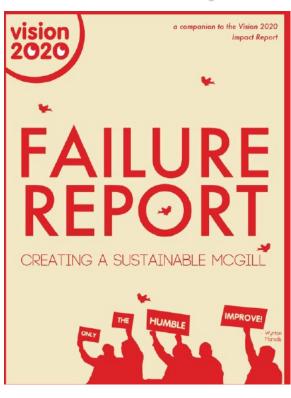














"Equating Excellence with perfection discourages risk-taking and stifles innovation and learning. In order to improve, you have to be willing to screw up"

Vision 2020 Failure Report

UBC Sustainability Initiative





The Initiative has four Contribute

- Central Office
- Teaching, Learning, Research
- Research and Partnerships
- Operational Management



Place and Promise: The UBC Plan



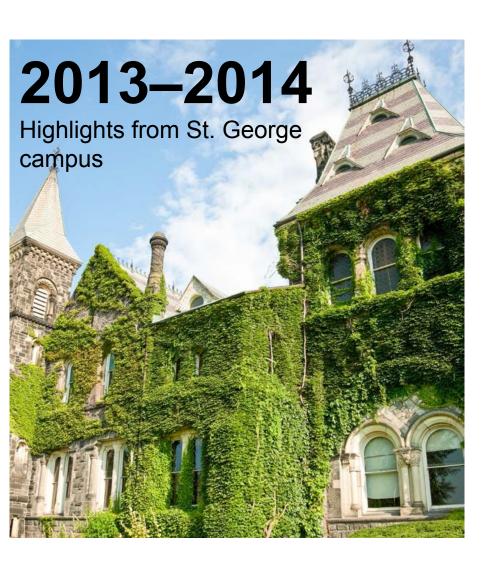
At UBC

Requirement that all new construction and major renovation achieve LEED Gold standard

Commitment to Sustainability at the Corporate Level Integration of operational and academic streams 19 Gold or Platinum certified Buildings









100 years of Running District Energy Sy

Waste Diversion is over 70%

More than 60 environmentally focused Student groups on campus.

More than 400 U of T researchers in the of environment and sustainability.

Administration Supported Projects



Importance of Benchmarking





Environmental Performance Criteria





UNIVERSITY OF TORONTO

COLLEGE SUSTAINABILITY REPORT CARD 2011



Administration	A	The University of Toronto is committed to sustainability through a formal plan and components of its master plan. Three committees, the sustainability office, and a several staff members address campus environmental issues. Green purchasing is encouraged whenever possible, and all desktop computers purchased for the campus are Energy Star certified. The school has an alumni green fund.
Climate Change & Energy	В	The university has reduced greenhouse gas emissions 23 percent from 1973 levels. Energy-efficient technologies on campus include a district energy system with cogeneration and flue gas heat recovery, and a large solar thermal array. Studies have been conducted regarding the implementation of photovoltaics and geothermal energy systems.
Food & Recycling	A	The school spends over half its food budget on local items and offers a wide variety of organic foods. U of T purchases some vegetarian-fed meat, some hormone- and antibiotic-free beef and dairy, and some seafood that meets usstainability guidelines. Food for a student-nur restaurant comes from a campus garden, and fair trade coffee is available in all dining locations. The school offers promotions for use of reusable containers. Pre- and postconsumer food scraps are composted at all meals.
Green Building	В	All buildings must comply with the Toronto Green Development Standard. One campus building is LEED Gold certified and another is LEED Silver. Water consumption has been reduced through the installation of dual-flush toilets, efficient laundry machines, and leak detection on some equipment.
Student involvement	A	The Victoria Environmental House accommodates eco-minded students. New students are introduced to sustainability on campus through skits, presentations, and an open house. The school employs 33 paid student interns and eight volunteer interns, as well as numerous eco-reps. Student groups, such as the Sustainability Commission and Students Against Climate Change, actively promote campus sustainability initiatives.
Transportation	В	The majority of the campus commutes using alternative transportation. U of T offers a discounted transit pass to all members of the campus community, and a free shuttle services local destinations. A bike-sharing program was started in 2007, and repairs are organized through a student-funded facility. U of T also partners with a car-sharing program. Some vehicles in the motor fleet are hybrid or run on natural gas.
Endowment Fransparency	A	The university makes a list of asset allocation, external managers, mutual funds, equity holdings, and fixed income holdings available to the public on the school website. A list of votes cast on proxy resolutions only by category is available to the general public upon request.
Investment Priorities	В	The university aims to optimize investment returns and is exploring, but not currently invested in, renewable energy funds. The university also uses investment managers who consider environmental and sustainability factors.
Shareholder	A	The university asks that its investment managers handle the details of proxy voting. A committee

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Factors in Facilitating Sustainability in University Infrastructure What does this all mean for Lab Buildings?

bs Buildings are Energy Intensive.

b Building are at the threshold of life expectancy

chnology continues to provide Innovation to reduce energy consum



What does this all mean for Labs?

Renovation will provide:

- **✓** A more sustainable building
- **✓** Potential increase in capacity
- ✓ Improved health and safety
- **✓** Reduced maintenance
- **✓** Attractive place to researchers



Factors in Facilitating Sustainability in University Infrastructure <u>Lash Miller Chemistry Laboratories</u>



100 % fresh air 8-10 air exchanges/hr

Total Supply Air: 380,000 CFM

~ 400 fume hoods
70 % CAV
30 % VAV
fumehood density: 6.8/5000
gross sq ft



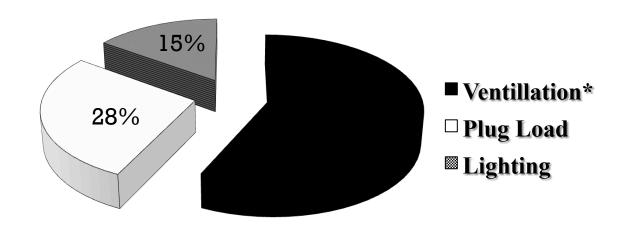
Lash Miller Chemistry Laboratories

- 2nd most energy intensive Building on Campus
- peak electrical load of 1.4 MW
- annual electrical consumption of 10-12 MW-hr
- total Utility Bill: (electrical, water, gas) is \$2.4M/y



Lash Miller Chemistry Laboratories

Energy Distribution



* Ventilation includes Heating/Cooling/Fan operations



Lash Miller Chemistry Laboratories

Sustainability Opportunities Completed

- > 50% Nightly Cutback of Ventilation in Teaching Wing
- Use of Reduced Velocity Fume hoods
- Use Cascading Air Supply Where Possible

Lash Miller Chemistry Laboratories

Sustainability Opportunities for the Future



- Replacement of 50 year old Ventilation System
- 20,000 sq. ft. Expansion of Research Lab space

Summary

- ➤ Importance of incorporating Sustainability in Innovation Lab Renovation
- Interdependent nature of University Decision making
- Success Stories in Canada that need to be Told

References

- ➤ The State of Facilities in Higher Education 2013: Benchmarks, Best Practices and Trends, Sightlines
- Labs 21 Environmental Performance Criteria 3.0, Nov 2010
- Sustainable Laboratory Design Daniel Watch and Deepa Tolat, Perkin Wills, 2012

Questions

