



UBC AS A LIVING LAB: BRITISH COLUMBIA'S HUB FOR **SUSTAINABLE** INNOVATION



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Place and Promise

As one of the world's leading universities, The University of British Columbia creates an exceptional learning environment that fosters global citizenship, advances a civil and sustainable society, and supports outstanding research to serve the people of British Columbia, Canada and the world.



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Becoming a **Living Laboratory**

UBC will be the world's leader in **developing** and **demonstrating energy savings** and **clean technology** initiatives by combining the talent of our researchers and students, the expertise of our operators and the entrepreneurship of our industrial and community partners to make UBC, both in Vancouver and in the Okanagan, **the most sustainable and innovative campus on Earth.**



UBC Living Lab “enablers”

**Teaching, Research,
Industrialization excellence**



**Independent Municipality,
Own Utility**



**Track-record in
sustainability**



**Favorable Provincial
policies**



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Teaching, Research, Industrialization

- **Academic Leader**

- 30th - 36th in the world
- 18 faculties, 5 affiliated hospitals, 6,500 faculty members
- 40,000 undergrads and 8,000 graduate students
- 60% of BC's Graduate students

- **Research Leader:**

- Top 2 in Canada
- Annual external research funding of \$540m/year

- **Industrialization Leader**



Michael Smith Laboratories

Utown@UBC



2001 Population: $\approx 10,000$

- 7,000 Students
- 700 Faculty/Staff Rental
- 1,700 Family



2010 Population: $\approx 15,000$

- 9,500 Students
- 1,000 Faculty/Staff Rental
- 5,000 Family/Co-Development

2025 Population: $\approx 30,000$

- 14,000 Students
- 3,300 Faculty/Staff Rental
- 12,800 Housing/Co-Development



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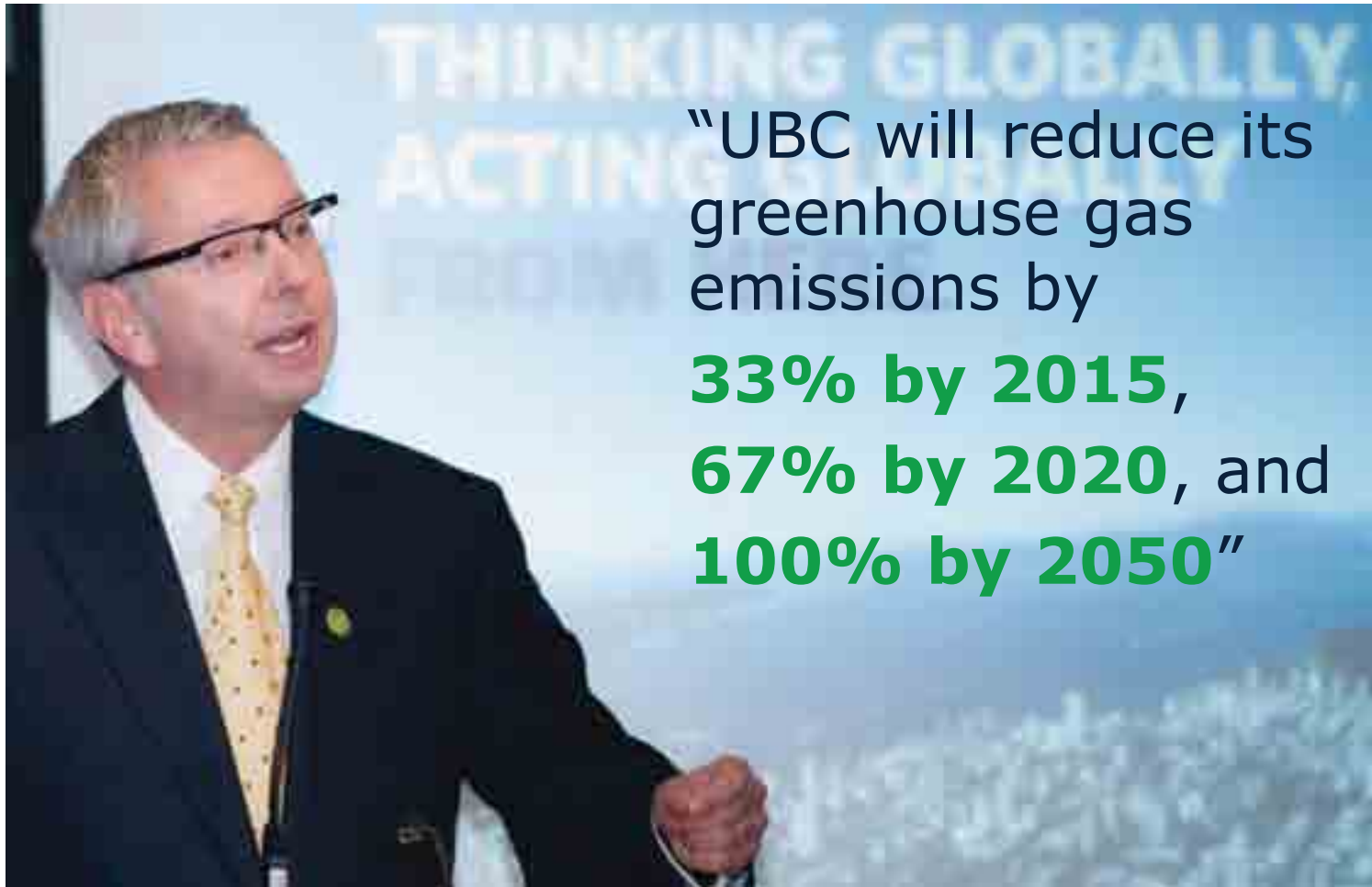
UBC sustainability track record

- **Kyoto targets** achieved in 2007 in a context of 30% growth
- Innovator on **demand reduction**
- Innovator on **energy, water & waste**
- Leader in **transportation**
- Focus on **community engagement**



Okanagan campus 95% geothermal

The promise



"UBC will reduce its greenhouse gas emissions by
33% by 2015,
67% by 2020, and
100% by 2050"



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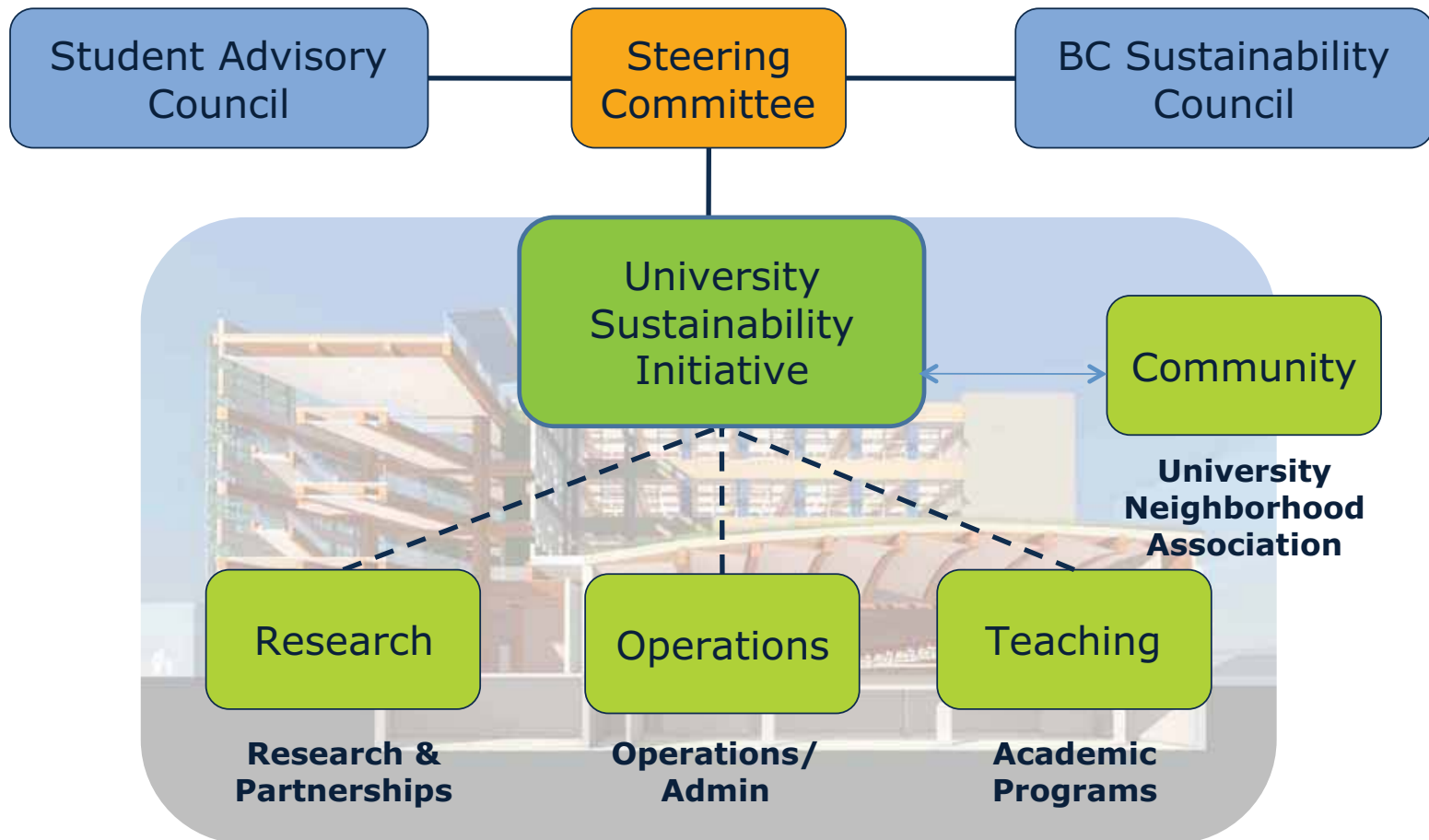
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The concept

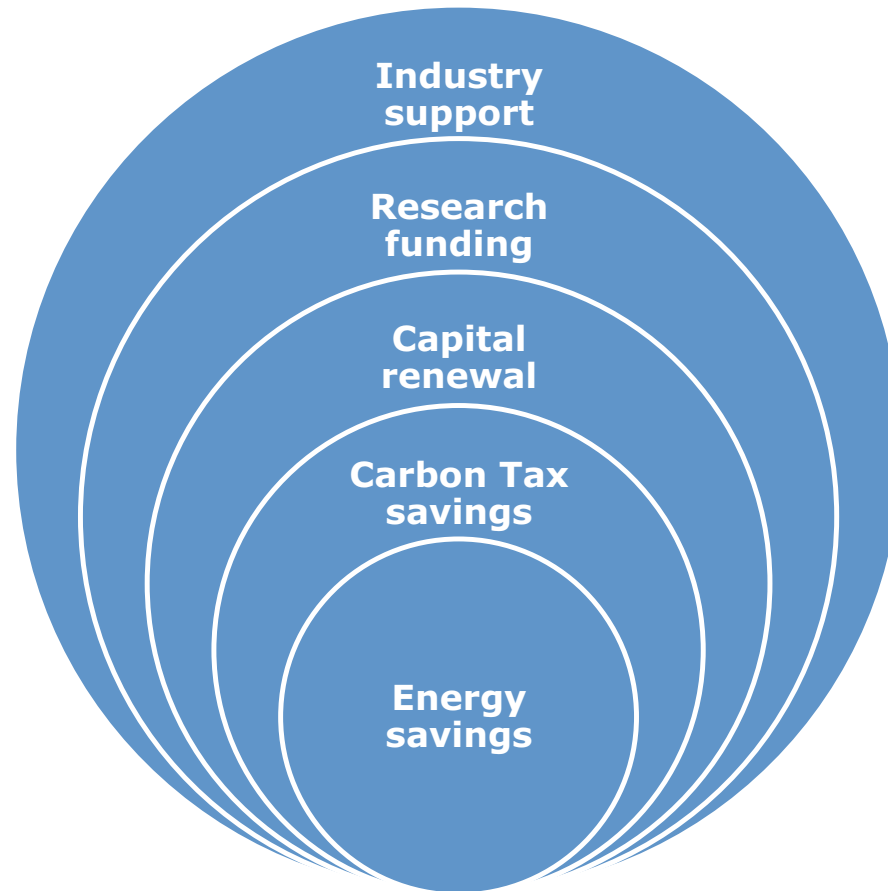
| Well Established | The New Paradigm | Well Established |
|---|--|---|
| <p>Research</p> <ul style="list-style-type: none"> • Industry Sponsor Research • Contracts • Grants-in-Aid • Exclusivity • University-Industry Liaison Office • Tri-Council Funding | <p>The Living Lab</p> <p><i>A Hybrid Blending of: Operations Research, Teaching and Procurement</i></p> <p>We believe in significant synergies to be realized</p> | <p>Procurement</p> <ul style="list-style-type: none"> • UBC Purchasing • Competitive bidding • Design Specifications |



Integrating research and operations



Fund through **innovation**



Living Lab Roadmap

33% GHG Reduction

Supply:

Biomass demonstration:
Nexterra/GE pilot (9%)

Demand:

Steam to Hot water
conversion (17%)

**Building Retrofits: BC
Hydro, Pulse Energy**
(7%)

New Buildings: **CIRS** as
"footprint" positive pilot
with **Honeywell,**
Haworth, BC Hydro

67% GHG Reduction

8.5MW Clean Energy:
TBD (23%)

Steam to Hot water
conversion (5%)

**Continuous Optimization:
Smart Energy System**
(7%)

New Buildings: Low
temperature; energy
neutral

**Electric Car
demonstration**

100% GHG Reduction

New clean energy sources:
Ocean, Waste, Aquifer?

Extend District Heating
to all campus buildings

Continuous Optimization

New Buildings: Energy
neutral

Transport changes



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Biomass demonstration

- All funding in place
- Receiving tenders
- Breaking ground this month
- Working with BC Hydro on electricity rate



First CLT Building in America



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Steam to Hot Water conversion

- Largest Hot Water conversion in North America - \$80-90m
- 24% Energy and 22% GHG savings
- Replaces aging infrastructure with high operational and deferred maintenance costs
- Increases fuel source flexibility
- Initial feedback from the Property & Planning Committee
- Project Financing being worked on



Building Retrofit

- Optimization (audits and re-commissioning); Monitoring, Targeting and Reporting; Sustainable Behaviors
- 10% reduction in energy consumption and GHG emissions
- Partnerships with Pulse Energy and BC Hydro



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CIRS: Pushing the envelope

- Centre for Interactive Research on Sustainability
- Most sustainable building in North America
- Drive adoption of sustainable building and urban development practices
- Net positive on energy, water and structural carbon

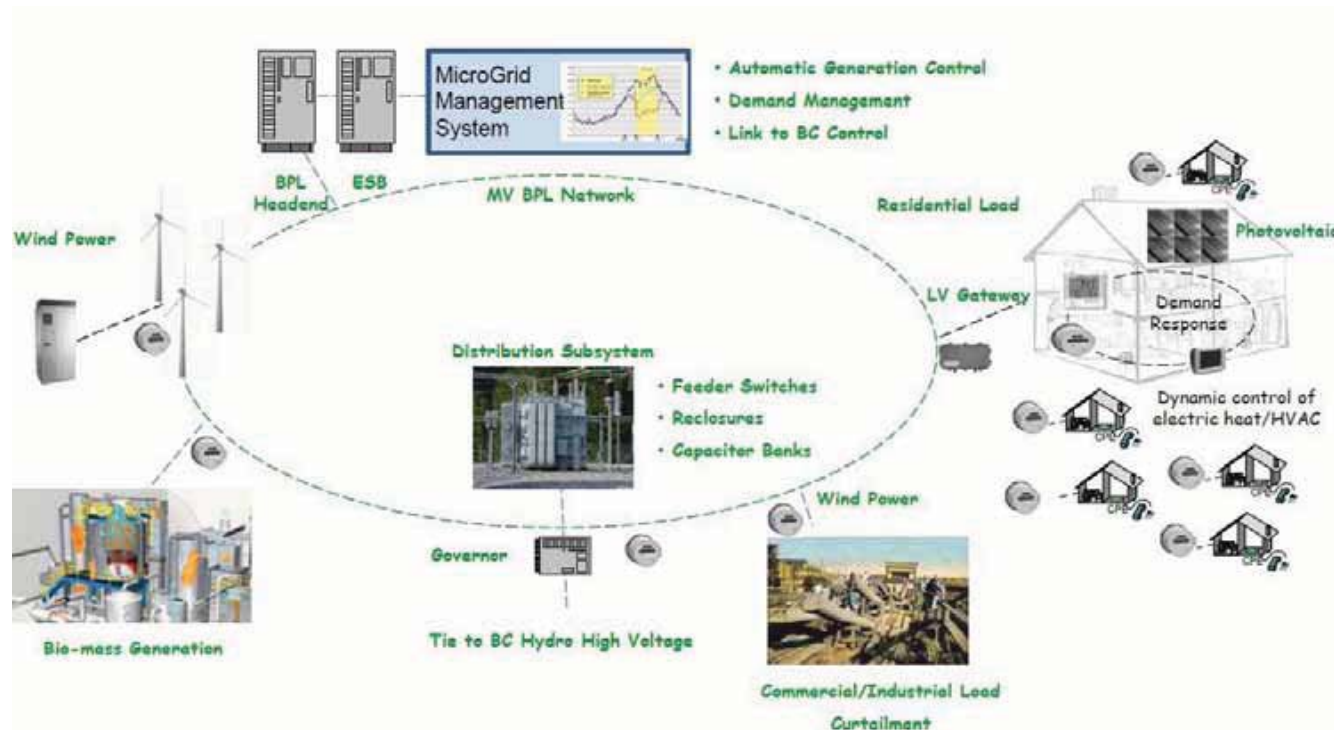


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Smart Energy System

In partnership with one or more companies, UBC seeks to develop an innovative smart energy micro-grid



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Living Lab Partnerships



Honeywell

Interface



NRC-CNRC



Jenbacher



 **nexterra**



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UNA Partnership

- UNA representation at the Regional Sustainability Council
- UNA representation at the Smart Energy System Steering Committee
- Joint research initiatives:
 - Campus Waste Audit
 - Park Redesign for native species
- Community Energy Manager (MoU pending):
 - UTown Climate Action Plan
 - South Campus District Energy Feasibility Study
- UNA Sustainability Working Group (CSO, USI/CIRS, UBCPT, TREK, etc.)



City of Vancouver MoU

- **Mayors' Fellows Program:** 10 students per year developing implementation plans for the Green City Action Plan.
- **Clean Energy Research and Demonstration:** Implement clean energy innovations at UBC and in the City of Vancouver
- **Campus and City as Living Labs:** Communicate UBC's and the City's successes and advance these through "Smart Precincts" pilots
- **Bilateral Learning:** Share knowledge regarding topics such as energy/water retrofits and neighbourhood energy utilities
- **Community Outreach:** Work together with the Centre for Interactive Research on Sustainability (CIRS) to engage residents



BC Hydro MoU

- **Conservation/Optimization:** Continuously optimize core academic buildings and assess peak electrical demand management
- **Integrated Planning:** Develop and implement community energy plans for family and student housing neighbourhoods, pilot “Smart Precincts ” and resolve transmission line capacity issues
- **Green Building Performance and Alternative Energy Systems:** Implement research initiatives with CIRS, consider a broad range of alternative energy sources and develop pricing for green electricity
- **Research and Development:** Implement smart grid technologies and develop a research cluster for CIRS on the behavioural dimension of electricity efficiency and conservation
- **Student Engagement:** Extend UBC’s SEEDS program to BC Hydro, partnering a UBC student and faculty member with a BC Hydro staff member to develop solutions to BC Hydro challenges



Strategic Global Partners

- **Partners** bring leading edge product and services they would like to test, and technological or social challenges they would like to solve
- **UBC** brings research excellence, a large scale community that is both institutional and residential, a commitment to make industrial partners successful and a practical, fast-paced, business friendly culture
- **Together**, we are reinventing the University's role in the local and global community
- **Discussions** underway with GE, Honeywell, Siemens



Next steps and priorities

- Finalize BC Hydro deal on green electricity rate
- Finalize and implement steam to hot water conversion
- Take UNA partnership to the next level (zero waste)
- Complete district energy feasibility study for the remaining areas of Wesbrook Place
- Continue to expand City of Vancouver breadth and depth
- Refine bilateral agenda with international and local partners
- Explore opportunities for Provincial support for such an agenda
- Integrate Okanagan research agenda into partnership opportunities





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