

Integration of Operational and Academic Efforts in Sustainability at the University of British Columbia

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Abstract Sustainability is a growing priority for higher education institutions around the world. Many universities are responding to global imperatives by committing to strong operational sustainability goals and targets. Similarly, many universities are realigning their resources and redefining their academic priorities to respond to the need to prepare students to understand and address sustainability challenges. Yet few post-secondary institutions have identified the need to deeply integrate academic and operational sustainability as a prerequisite for permanent positive change toward sustainability on campuses and beyond. At the University

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of British Columbia (UBC), the integration of operational and academic sustainability has catalyzed the development of an aggressive portfolio of programs and activities that aim to transform the University into a test-bed for sustainability and an agent of change in the wider community. However, while the specific actions and projects described herein represent a tangible manifestation of UBC's intent, the most important change taking place at UBC lies at the level of institutional culture around sustainability. From this perspective, the cross-fertilization of academic and operational cultures becomes an indispensable armature on which the more specific actions rest. This chapter reviews the UBC Sustainability Academic Strategy (SAS) process that led to the creation of the UBC Sustainability Initiative (USI), with a mandate to integrate academic and operational sustainability campus-wide and to act as a clearinghouse for sustainability programs and activities. Special emphasis is placed on a critical review of the USI's most ambitious sustainability implementation strategies deployed and the resulting challenges. Potential solutions to these challenges are hypothesized before concluding remarks concerning the process of institutionalizing deep and lasting transformative change. The general intent is that this synthesis be of value to higher education institutions considering how they might deepen their commitment to sustainability.

Sustainability and the Role of the University

At UBC, sustainability is viewed as a societal imperative and a topic of growing interest to students, faculty, staff, and partners in the community. UBC has adopted a view of sustainability that sees it not as a prescribed set of outcomes but, rather, as the emergent property of a societal conversation about what kind of world people want to live in, informed by some understanding of the ecological, social, and economic consequences of different courses of action. It is thus a highly normative and political concept, though deeply informed by scholarship on, and scientific understanding of, the interaction of human societies and the environment around them.

Universities can be a major locus for discussion and debate on all aspects of sustainability (Cortese 2003), including resource conservation, habitat preservation, climate change, social equity and justice, livelihoods and community, and economic viability, and resiliency. Universities are also strongly connected locally and globally to civil society, business, and government and can thus become brokers for sustainability within and beyond the communities to which they belong (Lozano et al. 2013; Thomas 2009).

Sustainability Academic Strategy Context

Over the past 15 years, four significant factors have been critical for UBC to build the stock of authoritative and material resources that support the idea of pursuing sustainability practices at the campus scale, thus setting the groundwork for advancing UBC's discourse on both academic and operational sustainability.

The first factor is UBC's track record in both operational and academic sustainability. In 1997, UBC was the first university in Canada to adopt a sustainable development policy and, a year later, to open a campus sustainability office. UBC was also a pioneer in the development of green buildings, starting with the Choi Center in 1996, and most recently in 2011, the Center for Interactive Research on Sustainability. In 2003, UBC completed EcoTREK, the largest energy and water retrofit program on a Canadian university campus. Through EcoTREK, UBC achieved a 27 % reduction of non-renewable energy consumption in institutional buildings from 2000 levels, and a 48 % reduction in potable water use. In the mid-1990s, UBC developed a teaching-based Greening the Campus program that linked students, faculty, and staff on sustainability projects and in 2008, UBC implemented an external review of its core research and teaching programs which concluded that sustainability research and teaching is a major area of strength and key academic priority for UBC. Reflecting this operational and academic track record, in August 2011, UBC received a gold rating through STARS (Sustainability Tracking, Assessment, and Rating System), a sustainability evaluation tool developed by the Association for the Advancement of Sustainability in Higher Education (AASHE).

The second critical factor is the provincial policy context. In 2008, the Province of British Columbia became the first North American jurisdiction to enact comprehensive climate action legislation. In addition to an escalating carbon tax regime (currently valued at \$30 Canadian dollars per ton of CO₂ emitted), the Province mandated that all publicly funded institutions in the province must become carbon neutral by 2010, and required that all scope 1 and 2 emissions must be offset by buying offsets from the province at \$25 ton⁻¹. To that effect it founded the Pacific Carbon Trust, designed to collect funds generated through these mandatory carbon offsets with the purpose of reinvesting them in green projects and initiatives in BC. As a public institution in BC, UBC is required to maintain an inventory of its greenhouse gas (GHG) emissions, pay the carbon tax, demonstrate how emissions are being reduced, and offset any remaining GHG emissions. UBC's Vancouver campus is responsible for roughly 60,000 tons of CO₂ per year (scope 1 and 2 emissions), 90 % of which come from UBC's district energy system based on medium-pressure steam generated by natural-gas-fired boilers. UBC's annual carbon tax and mandatory offset liabilities amount to \$3 million Canadian dollars per year, a strong financial incentive to wean UBC off fossil fuels and invest in greener and more efficient technologies.

The third critical factor is leadership. In 2009, UBC developed a new strategic plan, entitled Place and Promise, which expresses a commitment to create "an

exceptional learning environment” that “advances a civil and sustainable society” (University of British Columbia 2009). Place and Promise has nine mid-level strategies of which sustainability is one. UBC’s current President, Professor Stephen Toope, and his executive team are fully invested in sustainability, to the point that it is now a consideration in every key campus infrastructure and operational decision made on campus.

The fourth and final contextual factor is the existence of a strong societal and cultural interest in sustainability in British Columbia. For example, over the past decade, UBC recruiters testify that prospective students spontaneously mention sustainability when asked what they are interested in studying at UBC. These four factors contributed to creating an institutional climate supportive of strong action on sustainability and cemented the credibility UBC needed to develop a comprehensive Sustainability Academic Strategy (SAS), which is described in detail below.

An Academic Strategy for Sustainability at UBC

In the fall of 2009 and in support of UBC’s new strategic plan, Place, and Promise, UBC launched a comprehensive process to develop an academic strategy for sustainability. The Sustainability Academic Strategy (SAS) process provided a framework to guide planning and decision-making for sustainability and created a consultation and engagement process through which the UBC community could demonstrate its shared interest in working toward a sustainable future. A working group charged with leading the SAS process was established under the President’s Advisory Council—Sustainability. The group was chaired by Professor John Robinson and included members representing staff, faculty, students, and external community partners.

Given sustainability is both a critically important topic for ongoing research and teaching, and a practical imperative for society, the SAS process focused on two overarching principles for UBC. The first principle: That UBC should *explore* the various dimensions of sustainability through research, teaching, and learning. The challenges of sustainability range across disciplines and fields in the humanities, social sciences, natural and applied science, and the medical and health fields, and thus the exploration of sustainability transcends traditional academic boundaries. Society needs to contribute in disparate ways to the ongoing conversation about why it cares about sustainability, what the constraints and options are, and how best to achieve more sustainable practices at many scales and in many contexts. The second principle: That UBC should *exemplify* sustainability in its operations and related activities both on and off campus. As an institution, UBC should demonstrate best practices in achieving operational sustainability.

These two principles reflect, respectively, the academic and operational dimensions of sustainability at UBC. An explicit part of the SAS mandate was to consider ways to better integrate academic and operational efforts in sustainability.

To that end, two cross-cutting goals were established that bring together teaching and learning, research and partnerships, and operational and administrative activities and functions. The first goal is to transform the UBC campus into a living laboratory for sustainability so as to demonstrate—at a scale that is useful for replication beyond the campus boundaries—sustainable practices and technologies that engage faculty, students, staff and community partners and leverage operational innovations. The second goal is to cement UBC's role as an agent of change for sustainability beyond its campus. In this role, UBC facilitates dialogue and fosters partnerships between UBC, government, industry and civil society in a search for sustainability ideas and solutions that are instrumental in reinforcing the fabric of global society.

SAS Recommendations

The SAS process resulted in a series of recommendations organized in three activity areas: teaching and learning; research and partnerships; and operations and administration. In order to implement the SAS recommendations, in January 2010, UBC President Stephen Toope announced the establishment of the UBC Sustainability Initiative (USI). The goal of the USI is to integrate operational and academic sustainability deeply across UBC and make the UBC campus available as a kind of societal test-bed, where UBC can work with partners from the private, public, and non-governmental organization (NGO) sectors to prove out the technical, economic, and behavioral aspects of sustainability in the simpler institutional environment of a single campus.

The USI consists of a central management group; a teaching and learning team; a research and partnerships team; and an operational management group composed of representatives from operational units on campus including, Infrastructure Development, Building Operations, Campus and Community Planning, Student Housing and Hospitality Services, and UBC Properties Trust. The USI reports to a steering committee composed of three UBC vice presidents (VP Academic and Provost; VP Research and International; and VP Finance, Resources and Operations), two Deans (currently Arts and Science, with the intention that this rotates among faculties), the Associate Provost for Interdisciplinarity and Special Projects, and a student representative.

The USI is neither an operational nor an academic unit. It does not have direct teaching or research responsibilities, nor does it manage any campus operational activities (a separate campus sustainability office delivers many operational programs and reports to a member of the USI operational management group). The USI is a horizontal entity that cuts across the vertical UBC functional structures—faculties, departments, and operating units—that occupy the institutional landscape of UBC. It is essentially a voice, a clearinghouse, and an enabler for sustainability at UBC. USI's long-term success depends on the degree to which it can support, facilitate and mobilize activities within UBC's various structures.

The following sections present the most significant SAS recommendations being implemented, the main challenges that have emerged and some potential solutions to these challenges. A final section provides general observations on how UBC might maintain momentum toward transformative change in both operational and academic terms beyond the current, positive situation in which the University's leadership and community are highly supportive of efforts. Deep and lasting change is the goal.

Teaching and Learning

Teaching and learning is a key focus area for the USI. The mandate of the Teaching and Learning Office is to coordinate, support, and enhance undergraduate and graduate level sustainability education at UBC. It acts as an integrator and provides a focus for UBC's sustainability education resources and activities and communicates this information to UBC and the wider community. The office provides a point of contact for external groups and works with existing sustainability engagement and outreach initiatives, aspiring to fill gaps where needed.

A major activity of the Teaching and Learning Office was the creation of Teaching and Learning Fellows. These six fellows are UBC faculty members who are selected to work with the office in developing strategies around curriculum reform and working to articulate and implement these strategies. Fellows receive a stipend (which cannot be used for course buy-outs) for 1–2 years of involvement with the Teaching and Learning Office.

The main SAS recommendation pertaining to teaching and learning involves improved access to sustainability learning opportunities for every student who desires them. This process includes the development of concept papers around pathways that propose that UBC provide every student, regardless of their degree program, with the option to study sustainability via a learning pathway (up to a minor). A pathway implies meaningfully connected courses and learning experiences that provide a progression of learning due to thoughtful curriculum design.

To facilitate the delivery of pathways, the office worked with the Teaching and Learning Fellows to develop the document, "Transforming Sustainability Education at UBC: Desired Student Attributes and Pathways for Implementation" (University of British Columbia 2011). The document's student-centric framework expresses four high-level sustainability attributes, or skills and knowledge, that students who complete a sustainability pathway should be able to demonstrate:

- (1) Holistic systems thinking;
- (2) Sustainability knowledge;
- (3) Awareness and integration; and
- (4) Acting for positive change.

The document is intentionally high-level as it targets all curriculum developers across campus, and is designed to aid them in developing program-level learning outcomes for existing and new sustainability learning pathways. It is expected that the attributes will be interpreted and applied differently by different disciplines, as the relevance and meaning of the sustainability attributes will vary with disciplinary perspectives. The document proposes flexible models for building sustainability learning pathways, advocating that students begin their pathway with an introductory sustainability course or experience, and complete their pathway with an interdisciplinary leadership and/or capstone course. Students may tailor the rest of their pathway toward their personal sustainability interests, which may be discipline-specific, theme-based, or focused on an immersive experience beyond the classroom.

In addition, since the creation of the USI, the Teaching and Learning Office has developed a suite of programs to support their mission. Highlights include:

- Development of a framework to categorize sustainability courses offered at all levels at UBC and an inventory of sustainability-oriented courses and programs at UBC. The original inventory included more than 300 courses. The list is updated each year with courses that instructors identify for inclusion; at this writing (June 2013) the list sits at 580 courses. Most of these are upper level courses distributed within and across programs without explicit connections (exceptions exist, e.g., in the Faculties of Land and Food Systems and Forestry) and without a shared understanding of what sustainability curricula means.
- Management of the fellowship program in which cohorts of respected faculty leaders in sustainability teaching and learning are brought together to work collectively on sustainability curriculum issues and provide an interdisciplinary forum for development and promotion of sustainability across academia. The first cohort of fellows developed the “Transforming Sustainability Education” document described above.
- Development of innovative curriculum including piloting an introductory sustainability course for first-year students. This course was open to all first-year students of any discipline and built on the significant benefits of an interdisciplinary teaching team, diversity in student backgrounds and action-oriented, hands-on learning. Subsequent work has focused on the development of an introductory course at the second-year level in two faculties.

The development of sustainability pathways across UBC is a strategic priority. The main challenges to implementing this recommendation revolve around institutional philosophies, processes, and procedures that favor the status quo. This will require UBC to address the notion of an institutional home for such courses, working with UBC faculties to coordinate institutional support in the form of, for example, course evaluation, academic discipline, and teaching assistance funding. Also important in the future will be an emphasis on integrating teaching with the operational sustainability activities at UBC. Although there have been some successes in integrating teaching with operational sustainability at UBC—for

example UBC's SEEDS program which connects students to staff directly and an innovative course that focused on the Campus as Living Laboratory concept—a more focused approach will be necessary to increase the frequency of these connections.

Additionally, the USI needs to embark on a much more consultative and collaborative process with the different faculties and think through the questions of how the new academic sustainability programming would be embedded in existing institutional structures and what changes to those structures would be needed for this to work. For example, achieving the transformational changes required to embed sustainability deeply in the curriculum means that change must be pervasive and occur in all corners of UBC. In effect, each teaching unit at UBC must see the value of such changes if the changes are to be successfully implemented in those teaching units.

Research and Partnerships

The main SAS recommendation regarding research and partnerships involves the development and coordination of interdisciplinary research initiatives that support the technological, behavioral, economic, and social sustainability dimensions of UBC's operational projects. In parallel with teaching and learning, the USI has created a Research and Partnerships Office and created Research and Partnerships Fellows (three at present) who work with the office in articulating and implementing its mandate.

To respond to the need for better integration of operational activity, partnerships interests and research, UBC has developed the Campus as Living Laboratory for Sustainability (CLL) initiative. Through this process UBC aims to develop interdisciplinary research projects that leverage operational requirements and that, in addition to leading to substantive partnership opportunities with industry and other community partners, provide teaching, learning and research opportunities for students, faculty, and staff.

Under the CLL initiative, the whole 400-ha, 400-building campus (containing about 1.5 million square meters of floor-space) is seen as a living laboratory for sustainability, a test-bed in which to demonstrate at scale and in partnership with other organizations, operational innovations that catalyze the development of new knowledge and new applications, systems and technologies, for the purpose of advancing the sustainability goals of UBC and its partners.

Many universities have characteristics similar to UBC that make them uniquely qualified to serve society in this role:

- They are single decision-makers (and often owner-occupiers) with respect to a significant capital stock, consisting of multiple buildings and energy, water and waste systems;

- They are public institutions, or have a public mandate, that can be more forgiving on pay-backs, and long-sighted on returns;
- They educate; and
- They conduct research.

UBC assembled a CLL Steering Committee and a CLL Working Group to meet regularly to discuss and review current and future CLL opportunities. These groups are composed of representatives from Building Operations, Infrastructure Development, Campus and Community Planning, the UBC Sustainability Initiative, Information Technology, faculty, students, the University Neighborhoods Association, and BC Hydro.

As part of the SAS process and as a direct result of the positive response to the CLL idea by industry and other community partners, the CLL group implemented a pipeline process to provide certainty and a fair and predictable evaluative process for solicited and unsolicited proposals from industry and other community partners. A series of strategic partnerships with industry resulted in several research projects, including:

- The Center for Interactive Research on Sustainability (CIRS), designed to be North America's most sustainable building and a demonstration of the concept of "regenerative" sustainability that seeks to achieve net-positive performance in both environmental integrity and human well-being terms (Reed 2007).
- A Bioenergy Research and Demonstration Facility that provides power and heat to the campus and hosts research projects associated with biomass gasification and cogeneration intended to leverage federal and provincial research funding for the benefit of undergraduate and graduate UBC students.
- A smart electromechanical systems demonstration project, intended to pilot and evaluate opportunities to create an interconnected, smart electromechanical grid on the UBC campus.
- An electrochemical energy storage system that will reduce UBC's reliance on diesel backup generators and conventional UPS technologies. Researchers from Electrical Engineering, the Clean Energy Research Center and Materials Engineering have full access to the technologies deployed to study their performance and energy savings as well as financial and environmental impact implications.

Led by the strong interest in the CLL process exhibited by current and potential private sector partners, UBC moved this component of the USI Research and Partnerships Office into a separate campus-wide Strategic Partnerships Office. This office has responsibility for developing living lab partnerships. All projects, sustainability-focused or not, must meet minimum sustainability goals and standards.

Because of UBC's aggressive GHG emission reduction commitments (33 % below 2007 levels by 2015, 67 % by 2020, and 100 % by 2050), one of the key challenges of the CLL initiative has been to counter a natural tendency to gravitate toward energy and emissions projects and to have an almost singular focus on

engineering and technology. These areas do not fully cover the spectrum of sustainability challenges and opportunities on campus. Social sustainability, as represented by social justice, equity, and intercultural understanding imperatives, among others, needs to be equally represented and addressed (Vallance et al. 2011). To that end, USI is currently consulting with a number of relevant groups on campus to articulate a coherent conception of social sustainability that will serve as the basis for strategic programming in this area.

Another significant challenge associated with the CLL initiative is how to evaluate the net sustainability benefits and potential trade-offs of CLL projects. At present, minimum sustainability standards for CLL projects do not exist at UBC; the evaluation of proposed projects is based on alternative but incomplete analyses such as those supported by lifecycle assessment and lifecycle costing methodologies. These types of assessments leave out critical social and community sustainability issues and do not explicitly incorporate externalities (Curran 2013).

As part of a process of refining and expanding its successful CLL program, UBC is working to implement a sustainability assessment framework or “lens” to support UBC’s infrastructure and campus development decision-making process. The development of a sustainability evaluative framework for CLL projects, building projects, and campus infrastructure initiatives is intended to support UBC’s efforts to assess the environmental and social impacts of the projects it undertakes.

In support of all of these activities, UBC has implemented strategic alliance partnerships with BC Hydro, the City of Vancouver and the University Neighborhoods Association. These organizations share UBC’s sustainability vision and are committed to working on the living lab projects and taking the lessons learned off campus in order to accelerate the adoption of more sustainable practices across their entire portfolios.

It is intended that through the CLL process UBC is able to treat its whole campus as a kind of societal test-bed for sustainability where private, public, and NGO sector partners can work with UBC to test solutions at an urban neighborhood scale, and then take those ideas out to the world.

Operations and Administration

The main SAS recommendation regarding operations and administration was to foster the integration of sustainability decision-making and practices into all aspects of campus life and business. The intent was for this effort to be guided by a comprehensive UBC Campus Sustainability Plan that, underpinned by a campus-wide behavioral and organizational change program, would set targets that meet or exceed the highest level of external standards and benchmarks. The initial focus of this effort was on climate change-related goals and targets that involved the active participation of students and faculty through research and teaching activities.

The main challenge associated with this strategy, as was the case with the previous UBC Campus Sustainability Plan, Inspirations, and Aspirations, was that, by necessity, it focused on tracking UBC's commitment to the integration of sustainability values into the University's operations and programs and on celebrating the important contributions of individuals and units across campus. While this resulted in general engagement by the campus community and brought stakeholders together across campus to create ambitious targets and track sustainability performance over time, it did not address the issue of sustainability performance and reporting ownership and accountability.

The willingness of leadership in UBC's operational units to engage with the CLL initiative appears to be critical to its early successes. This engagement has included welcoming academic representation on operational committees and being open to meeting operational needs (for example, for new energy sources) through innovative, research-driven projects such as the Bioenergy Research and Demonstration Facility.

As UBC continues the development and refinement of its campus sustainability strategies, such as the Climate Action Plan, the Water Action Plan, the Waste Action Plan, and the Engagement and Social Marketing Strategy to foster a culture of sustainability and resource conservation on campus, it needs to ensure that:

- Operational sustainability targets are embedded into operational and academic unit work plans;
- Enough resources are allocated to sustaining ongoing monitoring and communication with UBC departments and units;
- Tracking and quality management systems are in place to manage and report performance data consistently over time; and
- Frequent and regular contact with units is maintained to be updated about staffing changes or changes in unit strategic direction.

Discussion and Conclusion

Looking forward, UBC must maintain and build agency and momentum. Like other large academic institutions, UBC is subject to a myriad of internal and external pressures, a number of which are highlighted below.

One of the key challenges across the University as a whole is timing cycles. Course development and the delivery of programming to students is inherently a long-term process, with curriculum developed by individual faculty members approved within their corresponding faculty and then provided to Senate and other university-wide units for approval. Course curriculum is then prepared and delivered to students with changes occurring slowly. As a result, curriculum is a slow moving target. In contrast, research and partnerships within a university are often much more dynamic, with grants and research projects extending from 1 to

5 years resulting in marked graduate student and staff turnover. Operational projects are a mix of timescales with some units at the university working at a fast pace implementing logistical decisions weekly, making a myriad of campus-wide decisions on real-time economic and social imperatives. Others, however, within the operational portfolio involve longer term planning such as transportation and residential and building construction that operate within extended time cycles. This range of timing cycles presents challenges for integrating sustainability within a living laboratory concept across all aspects of UBC. It can be difficult to develop curriculum which links directly into ongoing research projects, and likewise for research projects to be developed and implemented that address real-time operational needs.

Solutions to these challenges exist. For example, UBC has the SEEDS program, which is an operation-driven program of small research projects that bring together an operations staff member, a faculty member, and small group of undergraduate students to address pressing needs over a semester. At a higher level, it is crucial to develop forums through which operations staff can present current and future plans and encourage input from sustainability-oriented faculty and staff. The CLL groups described above are an example of this approach.

From a teaching and learning perspective, the modularization of curriculum, with a move toward shorter, more intensive online flexible learning course components is an attractive option, especially when dealing with topics such as sustainability. For example, a first-year module based on the connections between chemistry and sustainability could be developed in which the production, distribution, and use of key chemicals (for example, sulfuric acid, phosphorous) could be discussed and debated. This module could then be used by a variety of courses across UBC, including first-year chemistry, but more interestingly could also form a component of applied science, agriculture and resource-based economics. Initial experience at UBC suggests that these modules can be more easily developed, fine-tuned, and packaged to provide more flexible and responsive courses that respond to students' needs for sustainability curriculum. However, despite the potential relief from the traditional lengthy processes of course development offered through this approach in the short term, the longer term goal of developing sustainability pathways is still crucial, particularly to safeguard against an inclination for sustainability to be taught superficially and repetitively.

Another issue associated with integrating sustainability across the curriculum is full engagement of faculty members into the operations and research sustainability structure at UBC. As is well known, faculty promotion and tenure is heavily weighed to the production of high quality, peer reviewed output, the successful attraction of research grants, and education of graduate-level students. The faculty members' peers, often at other national or international universities or academic institutions, then assess these indicators. As a result, there is often no clear benefit within the tenure and promotion system for faculty members to become involved in university-focused sustainability initiatives. This is especially the case for new and young faculty, who feel significant pressure to meet the conventional indicators of scientific and teaching excellence.

The issue of changing university requirements for promotion and tenure to allow these types of locally focused sustainability engagement priorities to be recognized is vexed and will not be completely solved in any academic institution for years to come. Some of the easier solutions in the shorter term could include mentoring of young new faculty by established faculty around sustainability-related projects. Likewise UBC could provide internal incentives for faculty to become involved in sustainability projects through competitive small research or curriculum grants, or specific initiatives focused on campus-wide activities, for example a funding program offering support for sustainability-focused flexible learning projects.

Collaboration across structures and a shared commitment to sustainability is also crucial. At UBC, the USI and associated activities cut horizontally across the strongly vertical governance structure of UBC, which presents both a challenge and one of the keys to the USI's future success. The authors contend that such a non-traditional and unanchored approach to sustainability governance—one that does not rely solely on authoritative power or resource allocation capability—can mobilize existing activities in new and exciting ways. Only by enlisting the ongoing support and involvement of the staff, faculty and students already engaged in sustainability operations, research, teaching, and learning can UBC build on those activities in order to meet its sustainability goals.

UBC is beginning to see a level of engagement between operational staff, faculty, and students that is unprecedented and that has led to many unexpected outcomes. For example, treating the physical campus of UBC as part of its academic agenda (instead of just required services and infrastructure), changes the nature of operational decisions and the role of operational staff. Similarly, involving students and faculty in such operational activities not only provides a rich new field for teaching and research, but also changes the way all players see their roles and their campus.

UBC and many other post-secondary education institutions possess the characteristics required to be at the forefront of the sustainability transition; to practice sustainability operationally at a scale of great interest to cities; to do research on the technical, economic, social, and institutional challenges involved in achieving operational sustainability; and to provide students with sustainability skills they can take out into the world.

On this quest, UBC will inevitably encounter roadblocks and experience failures. But that is one of the reasons why universities are natural homes for such experiments. There exists a significant opportunity for the post-secondary sector to act on the opportunity to become a societal test-bed for sustainability, and in that way contribute directly to the significant transitions required to reach a sustainable future.

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