

5 FIVE YEAR

IMPLEMENTATION PLAN



The *Whole Systems Infrastructure Plan* presents a range of measures that contribute to the overall long-term sustainability performance goals of the University and can be rolled at various milestones between now and 2030, and will set up the University for sustained performance. This section focuses on the immediate measures and actions that are recommended for implementation within the next five years.

Implementation of these measures are broken into three streams: 1) energy and carbon, 2) water, and 3) biodiversity and stormwater. A self-financing approach to implementing the energy and water measures is used to prioritize these measures. In other words, the implementation plan identifies those measures that have a short payback, can be accomplished within 3-5 years, and that have a big impact in terms of water, energy or GHG savings. UBCO is then able to capture these savings in, for example, a revolving sustainability fund which can then be used to fund future conservation measures. Based on efforts already underway on campus, UBCO's Sustainability Office is able to build upon financial savings of \$180,000 realized from the Power of You energy engagement campaign to provide seed funding for some of the initial recommendations put forth in this study. Whereas, a stewardship approach is recommended for implementing and funding the biodiversity and stormwater measures. Opportunities for linking these measures to a donor campaign or research grant funding are considered as more likely funding mechanisms for these measures.

To support the successful implementation of the *Whole Systems Infrastructure Plan* and its performance goals, a number of key components need to be established within the first 5 years in order to ensure the long-term success of the plan. In addition, key resources, guidelines and plans will need to be updated, developed, and implemented by various UBCO departments (acronyms listed) identified with each strategy listed below and approved by the Board of Governors. These key components and resources include:

- 1. Form a Energy and Water Management Team:** Develop a energy and water management team to implement, monitor and track the *Infrastructure Plan* recommendations. This team should be made up of a minimum of two people with engineering and control system backgrounds capable of implementing the proposed water, energy and carbon measures. These positions could be funded through savings already realized from the Power of You energy engagement campaign (CORM).
- 2. Infrastructure Expansion and Optimization:** Expansion of the CHP, optimization of DES, and feasibility of biomass system are near and long-term components of optimizing campus performance and realizing long-term carbon savings (CORM).

- 3. Building Use Consolidation Analysis:** Immediate analysis of how the campus can consolidate building use during summer months will be an important step in achieving immediate energy savings.
- 4. Update UBCO Design Guidelines:** Update the campus *Design Guidelines (including Landscape Vision, Technical Guidelines, and LEED v4 Implementation Guide)* guided by staff in CP+D and C+CP to provide policy direction for energy, carbon, water, and ecosystem performance/landscape for new construction and major renovations.
- 5. Update the 2011 Stormwater Management Plan:** Update the stormwater management plan for the campus, and complete a Geotechnical Soils Analysis to inform infiltration strategies (CP+D).
- 6. Update the 2006 Wildfire Management Plan:** Update the Fire Management Plan to reflect changes in the Campus Plan and Whole Systems Infrastructure Plan (CP+D/CORM).
- 7. Develop Campus Wide Behaviour Change and Engagement Strategy:** Use this strategy to promote and support campus awareness for resource conservation and DSM strategies required for the Whole Systems Infrastructure Plan implementation (CP+D/OSO).
- 8. Establish and Deploy a Stewardship Plan/Public Benefits Plan:** In collaboration with UBC's Development and Alumni Engagement Office, develop a stewardship plan or a public benefits plan that identifies research, partnerships, and donor funding opportunities associated with the *Whole Systems Infrastructure Plan* and *2015 Campus Plan* (CP+D/C+CP).
- 9. Implement Whole Systems Plan:** Establish an implementation, monitoring, reporting and updating framework that will facilitate the long-term success of the Whole Systems Infrastructure Plan (CP+D/OSO).

Below is a summary of the measures to be implemented within the first 5 years of this *Plan*. Greater detail and discussion regarding each of these recommendations is presented in Part 2 of this study. Appendix D includes a summary of the recommendations presented in each of the performance areas.

TABLE 4: 5-YEAR IMPLEMENTATION PLAN SUMMARY

	YEAR 1-2	YEAR 3-5
ENERGY + CARBON		
Develop a dedicated 2 person Energy Team on campus to implement, monitor and report on campus energy and carbon performance.	●	
Establish a revolving fund to finance ongoing energy improvements. This fund could be established from savings gained from the implementation of electrical and demand-side savings measures.	●	●
Develop a campus-wide Behaviour Change and Engagement Strategy to promote and support campus awareness for resource conservation and DSM strategies required for whole systems plan implementation.	●	●
Energy Conservation Measures (ECMs) Existing Buildings: Implement ECMs 1,2,3,6, and 11 in year 1-2, and ECMs 1,2,3,5,6, and 11-12 in years 3-5 to realize large electrical demand and cost savings.	●	●
Engage UBCO Risk Management Services for lab air change rate reductions and other lab measures.	●	
Commission students to do background studies: summer/winter occupancy, lab energy reduction opportunities, electrical demand, night/weekend shut-downs.	●	●
Continue with re-commissioning efforts on campus to improved existing building operations.	●	●
Campus Scale Infrastructure: Perform a study to show the performance (energy and cost) of the DES and the building side heat pumps during summer winter and shoulder seasons. This study should also identify additional waste heat sources that could reject heat into the DES during the winter e.g. data centres and electrical rooms. Use this information to improve management of DES.		●
Campus Scale Infrastructure: Complete a detailed business case and feasibility study for CHP and biomass expansion system integration. As part of this study, evaluate the feasibility of using recovered heat from the flue gas as a heating source for the DES.		●
Campus Scale Infrastructure: Connect the DES loop south campus, add cooling towers for heat rejection.		●
Pilot solar ready buildings to determine incremental costs of implementing solar PV on new construction projects.		●
Update UBCO's <i>Design Guidelines</i> , <i>Technical Guidelines</i> , <i>UBC LEED v4 Implementation Guide</i> , and <i>Project Design Briefs</i> with guidance for energy performance of new construction and energy efficient systems.	●	
Set up the program and start research for development of strategic Embodied Carbon Framework and include recommendations in UBCO's <i>Design Guidelines</i> .		●
Consider off-site partnerships (Landfill/Fortis, adjacent Airport Development) to sell excess heat off-site to reach carbon neutrality by 2050.		●

YEAR 1-2 YEAR 3- 5

WATER

Establish a campus-wide monitoring strategy and water metering program (for each building, cooling and irrigation) to develop an accurate water use baseline for campus operations through the implementation of a water audit program and installation of water meters in all existing and new buildings.



Engage summer students to assist with establishing baseline water performance and audit of buildings.



Develop a long-term water management plan for the campus that establishes a policy for auditing, monitoring and tracking overall water performance, and for overcoming short-term focus on capital cost vs. long-term imperative to plan for water shortages.



Develop a campus wide Behaviour Change and Engagement Strategy to promote and support campus resource conservation and DSM strategies required for the whole systems plan implementation.



Update UBCO's *Design Guidelines*, *Technical Guidelines*, and *UBC LEED v4 Implementation Guide*, and *Project Design Briefs* for expected water performance of new construction and existing building upgrades.



WCM 1: Lower academic buildings pressures to 40 psi and Residence buildings to 60 psi.



WCM 2: Begin water efficient fixture replacement program of buildings as building upgrades are due (i.e., Monashee, Similkameen).



WCM 3: Continue to phase in planned drip irrigation program (FM 5-year plan); include recommendation for Xeriscaping in landscape vision.



WCM 4: Pilot purple pipe installation in a new construction and a retrofit project on campus to determine the incremental cost and viability of preparing the campus for an on-site water treatment facility.



WCM 4: Phase in purple pipe distribution as DES and CHP expansion occurs on campus in order to minimize site disturbance, maximize construction cost efficiency of infrastructure.



WCM 4: Monitor the key performance indicators for broader adoption of purple pipe ready buildings and campus wide infrastructure.



YEAR 1-2 YEAR 3- 5

ECOLOGICAL LANDSCAPE AND BIODIVERSITY

	YEAR 1-2	YEAR 3- 5
BM 1: Continue to densify and focus development in the campus core.	●	●
BM 1: Avoid incremental loss of natural areas including woodlands and indigenous grasslands during campus expansion.	●	●
BM 1+3: Update the 2011 <i>Stormwater Management Plan</i> to address rainfall capture and wetland creation, and consideration of changes in the 2015 Campus Plan.	●	
BM 2+4: Update UBCO <i>Design Guidelines</i> to include requirements for integrating natural systems into new construction and landscape projects.	●	
BM 2: Increase tree cover by 10 to 25% in the campus core.	●	●
BM 2: Implement the recommendations of the 2006 <i>Wild Fire Management Plan</i> .	●	
BM 2: Increase tree planting in and adjacent to parking area to provide summer shading.	●	●
BM 2: Develop staff training to support best practices including irrigation and soil management.	●	●
BM 2: Test best practices for expanding natural areas in order to determine costs of transitioning to this landscape typology.	●	
BM 3: Expand the number of and range of wetlands types associated with parking areas or other larger impermeable areas for biodiversity enhancement (open water, marshes, willow thicket, seasonally flooded areas) and stormwater management.		●
BM 4: Test native planting and maintenance strategies in order to increase the use of native species.	●	●
BM 4: Work with UBCO faculty to design landscape areas and develop planting strategies to benefit specific species or species groups such as native pollinators, butterflies, and birds which are compatible with developed areas.	●	●
BM 4: Showcase the use of the Okanagan landscape as part of the campus identity.		●
BM 5: Develop an education, awareness and outreach program that communicates the measures and benefits of the biodiversity plan.	●	●
BM 5: Expand opportunities and resources to use natural areas as part of the campus' research and learning program, and seek opportunities to align with UBCO's academic program.	●	●
BM 5: Identify student research projects that support the implementation and monitoring of the biodiversity measures in order to establish baseline metrics and goals for improvement.	●	●
BM 5: Test opportunities for an internal (faculty/staff) or external (broader community) garden or collaborative agriculture.		●
BM 5: Develop community volunteer programs to help support the long-term stewardship of the biodiversity-based programs (i.e., trail building & maintenance, community gardens, species monitoring etc.).	●	●
BM 5: As part of developing a Public Benefits and Stewardship Plan for UBCO, integrate biodiversity measures that place a priority on protection, restoration, and long-term management of the native landscape.	●	
General: Update <i>Project Design Brief</i> for new capital project to include performance requirements to use LID methods, maximize biodiversity in landscaping, consider on a project per project basis green-roof feasibility.	●	●

YEAR 1-2 YEAR 3-5

STORMWATER

SWM 1 +3: Update the 2011 *Stormwater Management Plan* to address rainfall capture, infiltration, and wetland creation, and potential integration of LID methods.



SWM 1: Expand the number of wetlands associated with parking areas or other larger impermeable areas.



SWM 1: Increase the range of wetland types for biodiversity enhancement (open water, marshes, willow thicket, seasonally flooded areas).



SWM 2: Complete a geotechnical soil investigation to better understand infiltration rates of different locations on campus and to the potential for infiltration opportunities. This would identify where LID techniques are most appropriate.



SWM 2: Test best practices for using LID methods in certain areas on campus.



SWM 2: Consider, as part of updating the UBCO's *Design Guidelines*, a recommendation on which buildings are best suited for a green roofing strategy, recognizing that green roofs may not be suitable for all building. Include recommendations for plant species selection for LID strategies in order to minimize maintenance costs, ability to sustain dry seasons, and maximize ecological value.



SWM 3: Update the 2011 *Stormwater Management Plan* (SWMP) to reflect the 2015 *Campus Plan* and measures SWM-1 and SWM-2. The SWMP will need to confirm size of expanded wetland complex.



General: Establish a program for monitoring and maintaining the performance of the campus stormwater system.



Expand opportunities and resources to use natural areas as part of the campus' research and learning program.



General: Develop a donor strategy or campaign to secure funding for biodiversity and stormwater measures.



General: Expand opportunities and resources to use natural areas as part of the campus' research and learning program.



General: Update *Project Design Brief* for new capital project to include performance requirements to use LID methods, maximize biodiversity in landscaping, consider on a project per project basis green-roof feasibility and permeable paving.



5.1 GOVERNANCE STRUCTURE AND MONITORING

Implementation of the *Whole Systems Infrastructure Plan* will require a collaborative and coordinated effort of many UBC constituents. The Emergent Governance Model (Figure 10) assigns responsibility for developing and implementing the Whole Systems Infrastructure Plan as a companion to the 2015 Campus Master Plan.

Phase I represents the development of the technical and supporting analysis for the *Whole Systems Infrastructure Plan*. Within this phase, governance oversight has been provided by a Steering Committee comprised of representatives from UBC leadership, staff and academics. A Project Management Team has directed the project's overall technical and project management and the engagement of a Technical Working Group responsible for informing the plan's development. The

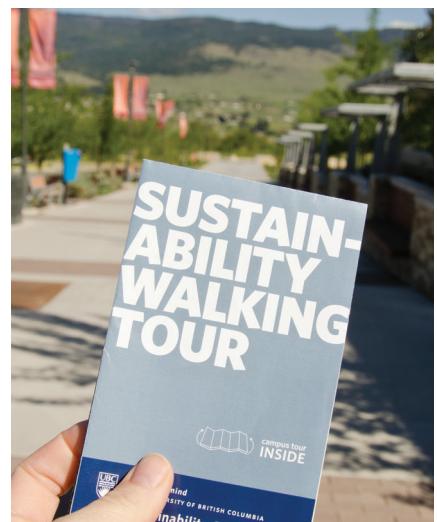
planning process has been led by Perkins Will, supported by an interdisciplinary consultant team, responsible for development of the Roadmap, Targets and 5-Year Implementation Plan. Expert peer review has been provided by Rocky Mountain Institute. Stakeholders involved in Phase I include representatives from UBC Campus and Community Planning, Campus Planning and Development, Energy and Water Services, Campus Operations and Risk Management, Facilities Management, Student Housing and Hospitality Services, IT Services, Infrastructure Development, UBC Properties Trust, Finance and Operations, Treasury, UBCO School of Engineering, UBC Centre for Interactive Research on Sustainability (CIRS), and UBC School of Architecture & Landscape Architecture. FortisBC and GEID were consulted by the interdisciplinary consultant team as part of the planning process.

Phase II represents the policy and program development stage, which will be led jointly by UBC Point Grey and UBC Okanagan and advised by UBC Point Grey Energy and Water Services. Informed by targets and recommendations in the *Plan*, these groups will be responsible for developing policy and programs to guide the implementation of the *Whole Systems Infrastructure Plan*. Future work will be informed by, but not be limited to developing:

- Detailed technical and financial feasibility studies for DES and CHP infrastructure expansion;
- Detailed technical and financial feasibility analysis for Biomass conversion;
- Amendments to the *Design Guidelines* for campus buildings and landscape;
- A detailed Infrastructure Servicing Plan to implement systems expansions proposed in the *Whole Systems Infrastructure Plan*;
- An updated *Stormwater Management Plan*;
- Behaviour Change and Demand-Side Management Programs to help meet resource conservation targets and waste reduction goals; and
- A Public Benefits Plan, in collaboration with UBC Development and Alumni Engagement, that establishes of an overall funding and stewardship approach with particularity attention to the Public Realm and related Biodiversity and Stormwater measures. This will include a detailed funding strategy that identifies sources of funding and the pursuit of industry partnerships, research and donor contributions.

Review and/or approval by UBC Executive and/or Board of Governors will occur at this stage as necessary.

Phase III represents the project approval and implementation phase. UBC Okanagan Campus Planning and Development (CP+D) and Campus Operations and Risk Management (CORM) will be responsible for project viability and



implementation. Campus Planning and Development (CP+D) and Campus and Community Planning (C+CP) will be responsible for project approvals in accordance with the *Whole Systems Infrastructure Plan* and established processes. Campus Operations and Risk Management will be responsible for implementing future infrastructure projects on campus, with oversight by Campus Planning and Development. A proposed UBC Energy and Water Services Advisory Board will provide critical peer review for technical and financial feasibility of large-scale infrastructure projects such as the biomass energy and wastewater treatment systems, prior to executive and/or Board of Governors approval, as applicable.

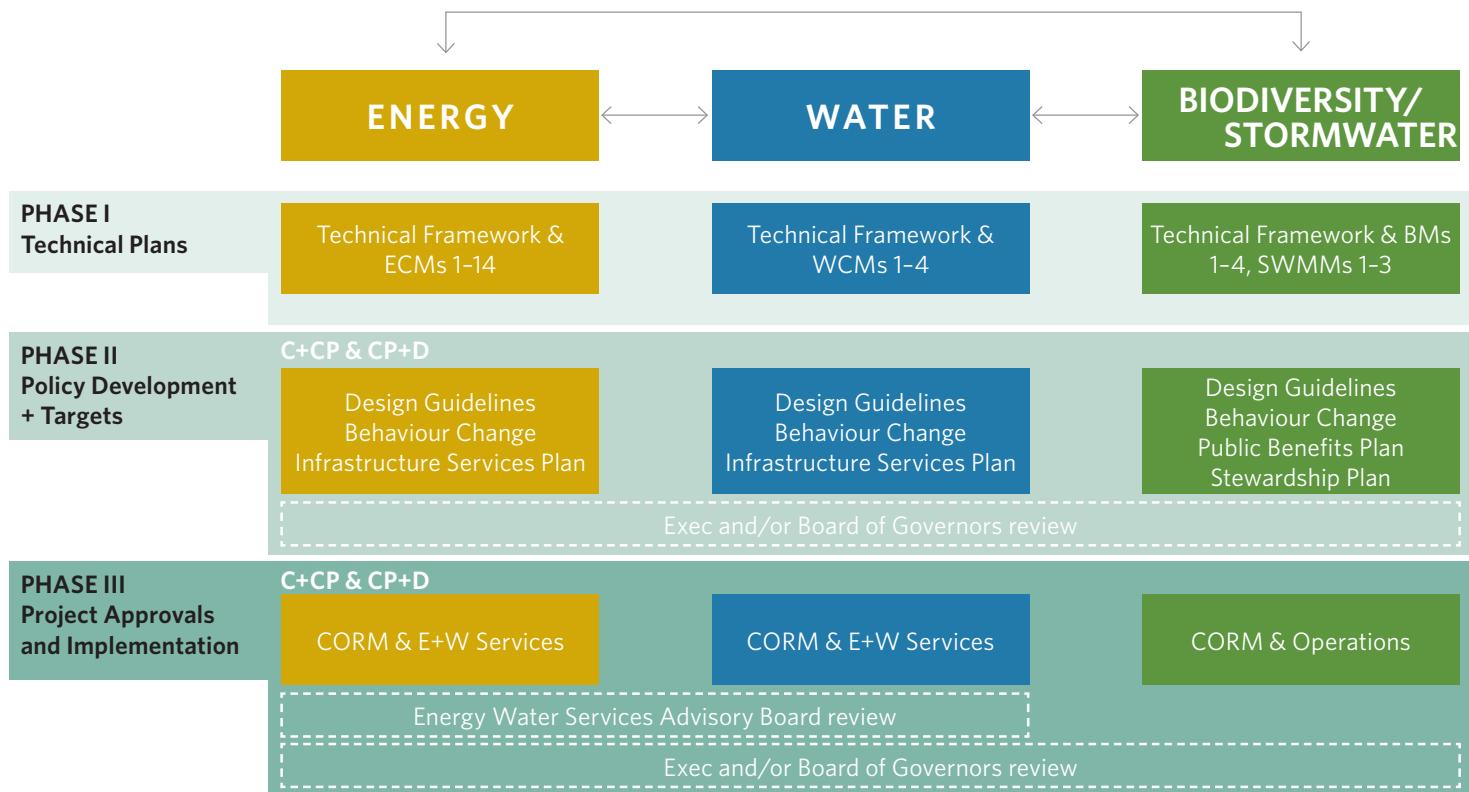


FIGURE 10: EMERGENT GOVERNANCE STRUCTURE

5.2 STAKEHOLDER ENGAGEMENT

Successful implementation and realization of the performance benefits derived from UBCO's *Whole Systems Infrastructure Plan* will require a shift in organizational thinking along with strong commitment and leadership from key UBCO decision-makers and engagement from multiple stakeholders including staff, faculty, and students. Often the gap between predicted and actual performance is a result of a change in predicted building occupancy, lack of leadership to advance performance improvements, under performance in building operations, lack of building commissioning, and limited occupant awareness of conservation measures.

A targeted campus-wide engagement and behaviour change strategy is needed to facilitate a fundamental shift in how campus stakeholders engage with and operate buildings and systems on campus. Investment in a such as a strategy supports UBC's broader mission for the UBCO Campus to be a 'Living Lab' environment, one in which can test, monitor, track and improve efforts overtime in each of the prescribed performance areas of this plan. Each member of the UBCO community will have an important role to play in realizing this vision.

A campus-wide engagement and behaviour change strategy could encompass some of the following stakeholder engagement opportunities:

- **Campus-wide Conservation Awareness Campaigns:** Continue with successful awareness programs regarding energy and water demand-side management strategies and other conservation measures. As part of a campus-wide campaign, consider implementing energy and water education programs across campus to communicate resource conservation measures and resulting savings.
- **University Sustainability Initiative Ambassador Program:** Initiate an Ambassador program, similar to UBC Point Grey Campus, to include an overview of the *Whole Systems Infrastructure Plan* goals and actions, specific resource conservation and stewardship measures. For example, use the Ambassadors to broaden the awareness of student, faculty, staff, and outside visitors to the campus and empower them to become stewards of the ecological landscape by engaging in programs associated with trail maintenance, community gardens or ongoing research.
- **Student Housing and Hospitality Services' Residence Life Program:** Update the Residence Life Program with information that encourages new students to become environmental stewards of their campus and adopt resource conservation-based behaviour. Communicate the trade-offs and benefits associated with conservation and demand-side management efforts, such as, turning off plug-loads, computers when not in use, lighting when not needed, and understanding occupant behaviour in relation to energy demands.

- **Academic Program:** Identify opportunities within the academic program to link academic learning objectives with outdoor learning activities and specific ecological landscape programmatic elements. Similarly, encourage staff and faculty to lead by example and become stewards of the landscape in adopting best practices and linking faculty research to the surrounding ecological landscape.
- **Research Program:** Identify opportunities for students to carry out research studies that can support the benchmarking and monitoring of the campus's energy, carbon, and water performance. The research program will support load reduction, and optimization of building performance. There is large opportunity to attract students to conduct research on larger scale systems, such as the biomass system or solar PV farm development. There is an opportunity to link the expertise found within academic departments with the needs of Facilities Management and UBCO Sustainability Office. Similarly, seek out opportunities for students to conduct research to support the long-term success, stewardship, and monitoring of the ecological landscape, biodiversity, and stormwater measures.

Anticipated outcomes resulting from a campus-wide Behaviour Change and Engagement Strategy will be that it:

- Establishes UBCO as thought leader on climate change, and on regional and global water scarcity;
- Demonstrates UBCO's adoption of energy, greenhouse gas, and water conservation best practices;
- Provides a strong underpinning and support for the long-term goal of enhancing and restoring the ecological landscape on campus;
- Empowers UBCO's community to become stewards of these natural landscape elements that not only offer stormwater functions, but are ecologically rich and provide a cultural, aesthetic, and recreational value to the community; and
- Enables campus stakeholders to apply whole system lessons and best practices in their day-to-day lives and become environmental stewards in the communities in which they reside.

5.3 SUMMARY

The *Whole Systems Infrastructure Plan* provides UBC Okanagan Campus with a long-term vision for deepening its sustainability performance and establishes a framework for future infrastructure development required to support the doubling of its campus by 2030 and beyond. Embedded within this *Plan* is a 5-Year Implementation Plan which proposes an approach for:

- optimizing the performance of existing infrastructure and buildings;
- deepening the performance of the next generation of buildings planned for the campus in the next five years;
- developing a long-range district scale and potential renewable solutions for energy, water and stormwater; and
- strengthening the protection, restoration, and management of the unique Okanagan ecology of the campus.

Part 2 of this *Infrastructure Plan* provides the detailed technical analysis that supports this vision for how UBCO will:

- Achieve a 64% potable water use reduction over baseline;
- Manage 100% of stormwater on-site;
- Use equal or less electricity;
- Use equal or less heating energy;
- Achieve 46% carbon reduction for campus operations compared to the 2007 baseline (79% compared to BAU), and within range of attaining carbon neutrality through off-site partnerships; and
- Provide an ecologically rich and diverse campus environment that provides cultural, aesthetic, and recreational value to the broader community.

Implementation of this vision is possible and requires a bold shift in organizational thinking along with a strong commitment and leadership from key UBCO decision-makers and engagement from multiple stakeholders including staff, faculty and students. The UBCO *Whole Systems Infrastructure Plan* establishes a platform for exemplifying UBC's vision for its Campus as a "Living Lab" and embeds principles of sustainability across its operations and infrastructure.