The Institutional **Green Building Action Plan**

The following pages provide an in depth description of the context and direction of all eight component areas as well as the process improvements required. In each component area, goals, short term priority actions, targets and indicators are shown with an explanation of the context and key directions.

A complete list of UBC's short, medium and long term actions for the institutional action plan are shown in Appendix A.

Earth Sciences Building Shades & Overhang
ARCHITECT: PERKINS+WILL
PHOTOGRAPHER: PHILIP BERTOGG

Process

COMPONENT GOALS

01 UBC policies and processes will support the achievement of the GBAP component goals and targets.

02 GBAP component goals and targets and will be communicated and easily accessible to internal and external stakeholders.

03 UBC will integrate lessons learned from each project to improve building designs.

04 UBC buildings will be evaluated as opportunities for research, innovation and continuous improvement.

05 UBC will commit to monitoring and benchmarking building performance to encourage continuous improvement on campus and in relation to industry standards.

CONTEXT

Effective and efficient process is a foundational aspect of planning at UBC.

Key Directions

To ensure success of the GBAP, UBC commits to monitoring and benchmarking building performance to encourage continuous improvement in relation to industry standards.

- The GBAP will be achieved by ensuring effective and efficient processes are upheld. Green building requirements will be clearly accessible for stakeholders through a web page linking to relevant requirements.
- During project development, UBC has recognized (through review of the Major Capital Project Development Process) that increased emphasis on reducing the total cost of ownership for UBC's buildings, as well as on many other green building objectives, is an important approach that will benefit UBC in the long run.
- Following the success of Campus as a Living Lab and SEEDS, the idea of considering each building project as an opportunity for teaching, learning and research will help connect the necessity of physical facilities to the enhancement of UBC's academic mission.

AMS Student Nest
ARCHITECT: DIALOG AND BH ARCHITECTS
PHOTOGRAPHER: MARTIN DEE / UBC COMMUNICATIONS & MARKETING

FIVE-YEAR IMPLEMENTATION PLAN — SHORT-TERM PRIORITY ACTIONS

- Explore the implementation of a benchmarking platform for energy, emissions, water and waste reporting.
- Create a GBAP requirements web page that links to all relevant policies and tools for easy accessibility by stakeholders.
- Develop a more refined life cycle costing tool and/or approach to better understand the total cost of ownership for the university during the design process by exploring design options.
- Ensure the Major Capital Project Development Process achieves the process and sustainability objectives of the GBAP by improved integration of the current Sustainability Process.
- Relate level 3 research opportunities to GBAP component goals to increase alignment of research and operations by creating a list of potential opportunities.
- Develop a decision-making tool template for tier 1 and tier 3 projects to determine project priorities.
- Develop short-term and long-term strategic research opportunity plans to help connect the necessity of physical facilities to the enhancement of UBC's academic mission.
- Ensure that project design briefs (which describe UBC's project goals to consultants) are developed by an appropriate stakeholder group so that lessons learned by Building Operations are incorporated into building design.
- Align the UBC Technical Guidelines with GBAP requirements through an annual review and update process that fully engages stakeholders.
- Update UBC Advisory Urban Design Panel requirements to include sustainability objectives and targets.
- Develop a program to conduct post-occupancy surveys and introduce standard post-occupancy evaluation (in coordination with the Major Project Improvement Process) to better understand occupants' concerns.

TARGETS AND INDICATORS

Target: 100% of projects will conduct life cycle costing by 2025.

Energy

COMPONENT GOALS

01 UBC buildings will advance the campus towards net positive energy and greenhouse gas neutrality by reducing energy demand and focusing on site-specific passive design approaches.

02 UBC buildings will have indoor thermal environments that are comfortable and enhance health and wellbeing.

03 UBC will integrate lessons learned to improve building energy performance.

CONTEXT

Buildings are the greatest sources of energy use and greenhouse gas emissions (GHG) on campus. Reducing building energy use will lower costs for the University (energy costs and carbon offset costs) and reduce GHG emissions, aligning with UBC's Climate Action Plan (CAP).

The Academic District Energy System (ADES) is one of UBC's signature initiatives to substantively reduce greenhouse gas (GHG) emissions. The original aging steam heating system at this campus was replaced with a hot water–based system that will heat approximately 130 buildings. The Bioenergy Research and Demonstration Facility, built in 2012, houses the process of using renewable biomass to generate thermal energy for heating campus buildings. The Campus Energy Centre is the primary energy source for the hot water district energy system, producing thermal energy (hot water).

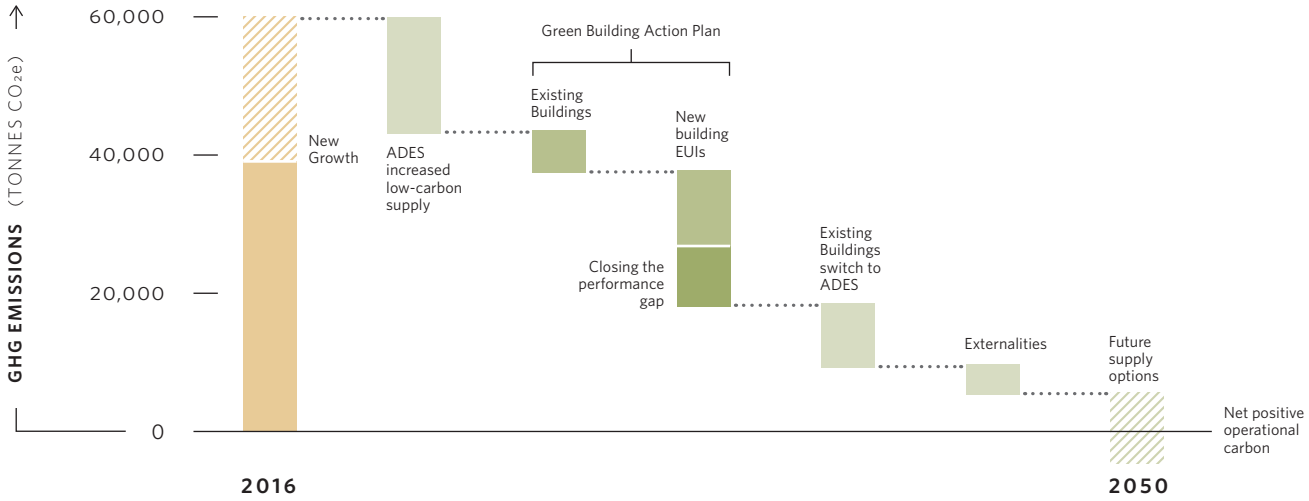


Figure 6. An illustrative graph of UBC's greenhouse gas (GHG) emissions in institutional developments and the role of the GBAP in reaching net positive operational carbon by 2050.

Through its evolving Climate Action Plan, UBC will continue to advance towards an ambitious greenhouse gas emission reduction target of 67% by 2020 and 100% by 2050. Reductions in building energy use and associated greenhouse gas emissions are a key aspect of the Green Building Action Plan, and the plan will be a leader in shifting the marketplace to low-carbon solutions.

Renewable biomass delivered to the Bioenergy Research Demonstration Facility generates thermal energy for the ADES
PHOTOGRAPHER: DON ERHARDT

Key Directions

UBC's new buildings and renewal projects (tier 1, 2 and 3a) will incrementally use less energy over time and achieve net positive GHG emissions by decreasing energy demand through passive design, increasing energy efficiency and meeting energy needs with renewable energy supply through the ADES. Energy targets for different building types and the anticipated incremental reduction over time is shown in Table 4.

Energy targets will be developed individually for each project to reflect the mixture of uses and refined during design development. Existing building retrofits (tiers 3b, 4 and 5) and ongoing operations will look to increasing energy efficiency and switching fuel to lower-carbon sources where possible.

UBC is committed to improving building performance by understanding occupant behavior and operator concerns and by increasing the stringency of compliance measures (such as requirements for airtightness testing and improved modelling of thermal bridging) to close the gap between predicted and actual energy use. UBC Energy and Water Services monitors building energy performance and works to identify actions (such as control upgrades) to improve performance and reduce the energy performance gap.

In addition to having ambitious energy targets, designing thermally comfortable indoor environments that are resilient to climate change is necessary to provide welcoming spaces that enhance the health and wellbeing of occupants.

INSTITUTIONAL ENERGY TARGETS

	STUDENT HOUSING			HIGH-INTENSITY SCIENCE BUILDING			LOW-INTENSITY SCIENCE BUILDING			OFFICE, CLASSROOM AND/OR LIBRARY		
	TEDI	DHW	EUI	TEDI	DHW	EUI	TEDI	DHW	EUI	TEDI	DHW	EUI
CURRENT	40	30	130	65	15	380	45	15	200	40	5	140
2020	30	30	120	55	15	370	35	15	190	30	5	130
2025	20	30	110	45	15	360	25	15	180	20	5	120
2030	15	30	95	35	15	350	15	15	170	15	5	115

Table 4. Energy targets for tier 1 and 3a institutional buildings.

FIVE-YEAR IMPLEMENTATION PLAN — SHORT-TERM PRIORITY ACTIONS

- Identify passive and mechanical design requirements for buildings of different uses and space criteria that achieve comfortable indoor environments under predicted future climate conditions.
- Develop cost-effective low-carbon cooling strategies (including consideration of district cooling) to address thermal comfort needs at UBC.
- Establish mandatory incremental energy use intensity (EUI), thermal energy demand intensity (TEDI), and consider development of thermal demand (W/m²) and GHG Intensity (kgCO2e/m²/yr) targets for tier 1 and tier 3a projects.
- Require whole-building airtightness testing in alignment with BC Energy Step Code.
- Develop and implement a Smart Building Strategy and revise Monitoring Based Commissioning and Commissioning Technical Guidelines with results from the Smart Commissioning pilot projects.
- Develop a strategy and implement policies and procedures during building design to improve operability and maintainability as well as reduce the cost of ownership of energy-related systems in new construction projects.

The Bioenergy Research & Demonstration Facility (BRDF) houses the process of producing renewable heat for the university

ARCHITECT: LARRY MCFARLAND ARCHITECTS
PHOTOGRAPHER: PHILIP BERTOGG

TARGETS AND INDICATORS

Target: New institutional buildings will meet incrementally reduced energy targets to be Net Positive Ready by 2030.

Target: Reduce average building thermal energy use intensity (TEDI plus DHW) for campus buildings by 50% to 75 kwh/m²/yr by 2050.

Target: Reduce the performance gap between modelled and metered energy use in new institutional buildings by 75% within three years of occupancy by 2020.

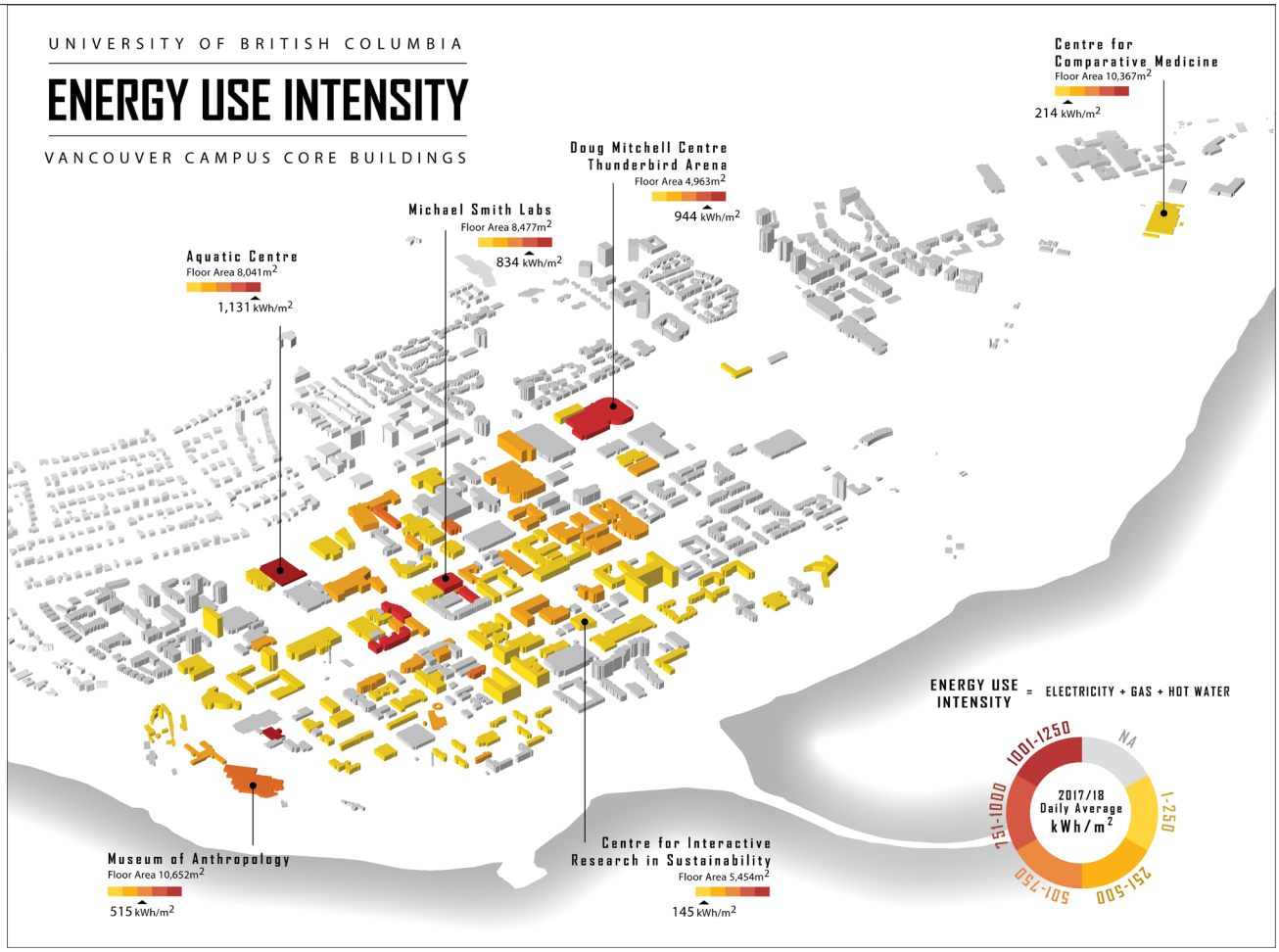


Figure 7. Current campus building energy use intensities (EUI's) illustrating how different uses effect energy use.

The Campus Energy Centre provides energy for the ADES serving 130 buildings **ARCHITECT:** DIALOG **PHOTOGRAPHER:** PHILIP BERTOGG

Water

COMPONENT GOALS

01 UBC will practise responsible water management and use at the building and site scale by advancing water conservation and efficiency, exploring alternative water supply and treatment solutions and building water supply resiliency.

02 UBC will use a low-impact development approach to rainwater management at the site scale to mitigate risk and respect the natural hydrology of the campus.

CONTEXT

In the Lower Mainland of BC there exists a relative abundance of water. However, there are still times when water supplies are low or deficient.

With the impacts of climate change, even more frequent periods of drought in future summer months as well as more frequent intense and severe rainfall in the winter are expected. UBC will be a leader in conserving water and will improve rainwater management by managing this valuable resource and supporting the regional water balance between water use and rainfall.

CIRS – Rainwater is collected from the roofs is measured, and then directed through a bioswale to a deep well without burdening the stormwater infrastructure

PHOTOGRAPHER: DON ERHARDT

Bioswale at the Beaty Biodiversity Centre improves the quality of rainwater runoff

PHOTOGRAPHER: PHILIP BERTOGG

Pathway to Net Positive

Although the University has made great strides in increasing water use efficiency, it is committed to continual improvements in monitoring and research to better understand how water is used, the potential for water reuse strategies, the role UBC should play in the greater region in the event of water emergencies, and how best to adapt to increased droughts brought on by climate change. The GBAP will align with and integrate building and landscape guidance called for in the Water Action Plan.

Rainwater management will be envisioned, designed and built as a holistic system of Low-impact development with green roofs and at-grade solutions combined for new building projects and, where possible, for renewals. Low-impact development (LID) recommendations for UBC include: reduced hard surfaces, thicker top soil, climate-adaptive landscapes, bioswales, French drains and rain gardens. On building sites more than 300 meters from the cliffs, the opportunity to use LID will be optimized; however, a more cautious approach is required closer to the cliffs to mitigate the risk of cliff erosion.

Key Directions

GBAP priority actions focus on the reduction of water use in buildings paired with metering and benchmarking of indoor and outdoor water use. Reductions in cooling tower water use, review of plumbing fixture efficiencies and landscape/irrigation guidelines will be undertaken. Alternate water supply sources best practices will be established.

Rainwater management priority actions include improving LID site rainwater management to help mitigate the risk of floods and cliff erosion on campus as well as developing criteria and guidelines for the use of green and blue roofs.

Rainwater Management Features on University Blvd.
PHOTOGRAPHER: DON ERHARDT
SOURCE: UBC BRAND & MARKETING

FIVE-YEAR IMPLEMENTATION PLAN – SHORT-TERM PRIORITY ACTIONS

- Investigate opportunities to reduce cooling tower water use in existing and new buildings.
- Develop criteria and guidelines for green roof and blue roof projects, based on rainwater management capacity, co-benefits, life cycle costs, and maintenance and operation considerations.
- Implement water metering requirements into (building) policy in alignment with the Water Action Plan.
- Review and update plumbing fixture efficiency requirements for new buildings and retrofits to current leading practice.
- Update landscape design standards and associated irrigation design standards.
- Develop guidelines for alternative water supply sources and systems in buildings (e.g., rainwater harvesting or water reuse systems) and on-site storage in buildings.
- Promote the use of seasonal rainwater features in policy which do not use potable water and consider life cycle costs.
- Require all tier 1, 2 and 3a projects to achieve the equivalent to LEED v4 Rainwater Management credit, Option 2.

TARGETS AND INDICATORS

Target: Reduce the water use intensity on campus by 16% in 2025 and 24% in 2030 (relative to a 2017 baseline), resulting in total water consumption remaining at or below 2017 levels despite growth.

Target: Meter and report on water consumption for individual UBC buildings to enhance our ability to make strategic decisions on water conservation by: 1) ensuring all new buildings include water metering, 2) maintaining or replacing existing meters as required, and 3) adding meters where economically viable, over the next five years.

Target: Maximize rainwater management using low-impact development on building sites that are more than 300 m from cliffs.

Indicator: Increase infiltration, retention and detention of rainwater on campus.

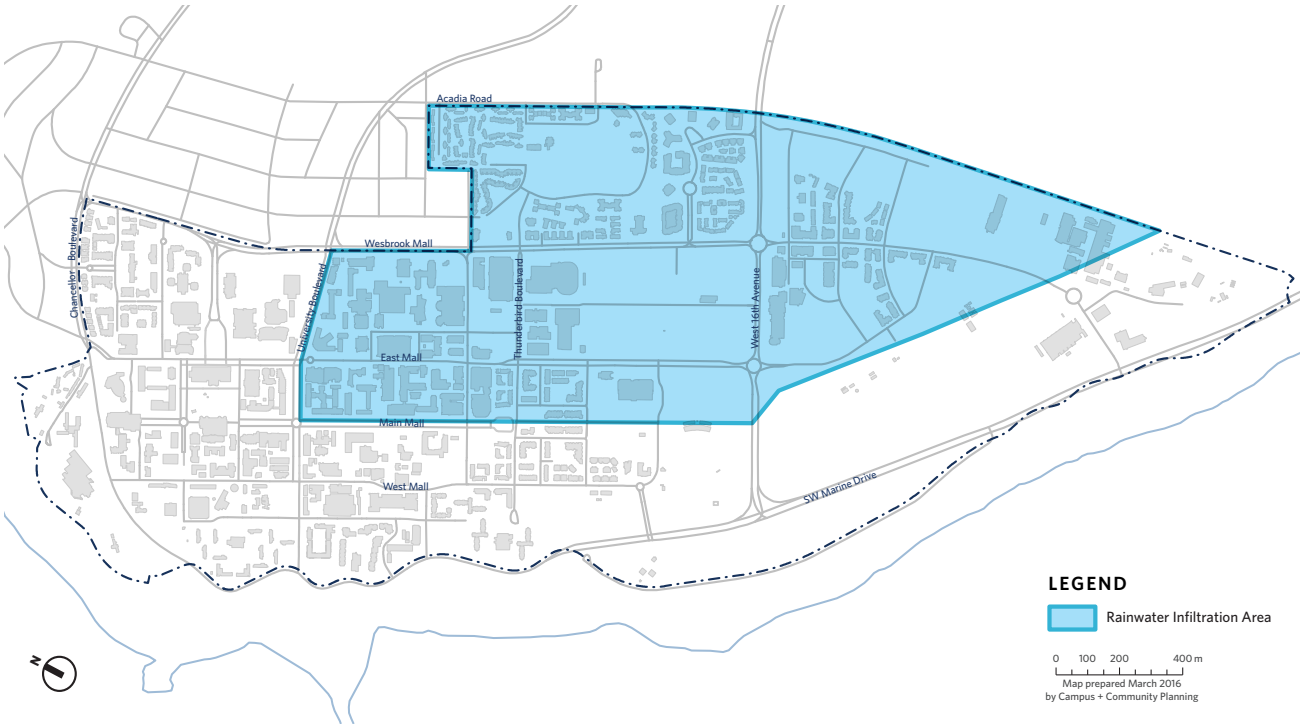


Figure 8. A plan of rainwater infiltration area across campus.
Source: UBC LEED Implementation Guide for Building Design and Construction v4 (2016).

Materials & Resources

COMPONENT GOALS

01 UBC will prioritize the use of building materials that have net positive environmental impacts.

02 UBC will support marketplace transformation by designing buildings with materials that are not harmful to human and ecological health.

03 UBC will support the development of the circular economy by promoting the adaptation, reuse and recycling of materials and products during a building's lifetime.

CONTEXT

UBC has policy in place to reduce the environmental footprint in its material choices, the handling of these materials and the waste products generated during construction and occupancy (UBC LEED Implementation Guide and UBC Technical Guidelines).

To work towards the materials and resources component area goals, policy will need to be implemented incrementally over the GBAP time frame to update to current practice and to reflect continuous improvement.

Pathway to Net Positive

Between 2004 and 2014, UBC had an average yearly expenditure of approximately $64 million worth of construction materials. By shifting material choices based on environmental and health impacts, UBC can continue to reduce the negative environmental and health impacts of the University's buildings and play a significant role in moving the marketplace towards net positive impacts.

Local wood products and low emitting seats are featured at the CIRS auditorium.

ARCHITECT: PERKINS+WILL
PHOTOGRAPHER: PHILIP BERTOGG

Key Directions

In the Materials and Resources component area UBC will incrementally reduce the environmental footprint of buildings through building material choices, construction techniques and diversion of waste from landfill during construction and occupancy. The GBAP will require material transparency through environmental product declarations as they become more available and will track and prioritize materials with low levels of embodied carbon. An approach to identifying and eliminating building materials considered harmful to health will be developed based on reviews of best practices and a market supply analysis. In the long term, an integrated approach to policy that balances environment impact and includes embodied carbon and healthy building material requirements based on a life cycle assessment approach will be developed.

At Ponderosa Commons the overhang protects students from the rain and has a warm wood soffit, the wall above is a durable precast concrete sandwich panel.

ARCHITECT: KPMG ARCHITECTS AND HCMA ARCHITECTURE + DESIGN

FIVE-YEAR IMPLEMENTATION PLAN — SHORT-TERM PRIORITY ACTIONS

- Review current operational waste recycling infrastructure guidelines to maximize adaptability over time and improve diversion rates (e.g., location, access, frequency, size, etc.).
- Review current metrics and benchmarks for construction waste in order to reduce total amount of waste produced. Consider project size, structure, and typology.
- Undertake staff and faculty engagement to develop a targeted and realistic approach to the use of life cycle assessments for new construction projects (based on experience gained with Brock Commons Tallwood House's full life cycle assessment and life cycle cost pilot).
- Develop guidelines for making building material choices through research (level 2) that are informed by health impacts based on a review of best practices, market supply, and stakeholder engagement (i.e., list commonly used building materials considered harmful to health in the sourcing, manufacturing, installation, occupancy or end-of-life phase).
- Develop guidelines for building design adaptability and deconstructability.
- Develop a process for piloting and monitoring innovative building products in design and construction practices that reduce life cycle impacts.
- Mandate the incremental reduction of environmental impact in building materials through pilots and best practice review.
- Implement policies for reduced embodied carbon in buildings, starting with a requirement to report embodied carbon, followed by incremental reductions.

TARGETS AND INDICATORS

Target: Eliminate 100% of UBC-identified building materials in new construction that are known to be detrimental to human and ecological health by 2035.

Target: Require all new buildings to be Zero Waste Ready[13] by 2020.

Target: Divert 100% of construction and demolition waste from landfill by 2035.

[13] *Buildings fully meet the most recent version of the Recycling Infrastructure Guidelines for UBC Buildings and the UBC Technical Guidelines related to waste and recycling requirements.*

Biodiversity

COMPONENT GOALS

01 UBC will develop highly functioning landscapes at the building and site scale to contribute to biodiversity and natural ecosystem processes.

02 UBC will engage campus teaching and research opportunities to enhance biodiversity management capacity.

Above-Left: Biosciences Building
PHOTOGRAPHER:
PHILIP BERTOGG

Above-Right: Nest Garden
PHOTOGRAPHER:
PHILIP BERTOGG

CONTEXT

Biodiversity is the richness of plant and animal species, their ecosystems, and the ecological processes that sustain them.

Enhancing biodiversity by nurturing natural systems provides for a range of ecological services: local and global climate regulation, water supply retention, erosion and sediment control, hazard mitigation, pollination, habitat functions, waste decomposition and treatment, human health and wellbeing, food and renewable non-food products, and cultural benefits. The natural systems of UBC are a critical component of the University's identity and support community health and wellbeing. Ecological processes cross scales, beyond the boundary of a building site.

Pathway to Net Positive

A net positive approach involves nurturing UBC's natural systems that provide for a range of important ecological services, which are typically undervalued. Biodiversity is an emergent component of the GBAP. Through the Campus Biodiversity Initiative: Research and Demonstration (CBIRD), UBC will conduct research and develop partnerships with regional organizations and will take essential steps to understanding biodiversity on a regional scale and UBC's potential role in the region.

Natural systems are a critical component of the University's identity and support the place and experience component area. The biodiversity that these systems support is part of community health and wellbeing and helps to sustain mental and physical health. The ability of natural systems to help UBC adapt to climate change is an additional co-benefit.

Key Directions

Priority actions for biodiversity focus on developing principals and providing guidance for landscapes and green roofs that consider the ability for the planted installations to support regional biodiversity priorities and provide other co-benefits. Building and landscape projects will need to address ecological assets identified in campus-scale site assessments, bird-friendly design guidelines will require improvement, and linkages to research initiatives will need to be strengthened.

FIVE-YEAR IMPLEMENTATION PLAN – SHORT-TERM PRIORITY ACTIONS

- Review and research national and international best practices, incorporate findings into guidance for current development projects, and use findings to provide background for policy development that guides metrics at a building and landscape scale. (Include a review of Canada's goals based on the Convention on Biological Diversity, Sustainable Sites Initiative (SSI) and Strategic Directions for Biodiversity Conservation in the Metro Vancouver Region[14]).
- Engage a consultant(s) to conduct site assessments to identify and assess the ecological assets, endangered and vulnerable species, and environmentally sensitive areas on a campus or neighbourhood scale. Site assessment reports will be used to inform individual project designs.
- Establish partnerships between research and operations through participation in CBIRD and related Level 1 and 2 SEEDS projects.
- Identify and monitor key biodiversity metrics at the site and building scale to determine baseline conditions and rates of change based on research studies and crowd-sourcing (e.g., YardMap, eBird, BirdVis, iTree, etc.).
- Develop a set of principles for landscapes and green roofs that consider the following: 1) ability to adapt to climate change, 2) ability to attract pollinators, 3) reduction of invasive species, 4) microclimate suitability (sun, shade, etc.), 5) ability to support passive solar strategies (e.g., provide shade, reduce wind), 6) campus character zones and irrigation zones (green or brown areas), and 7) regional biodiversity priorities.
- Determine site-specific biodiversity requirements for each development project based on the neighbourhood-wide site assessments and principles identified above.
- Reflect the CBIRD vision and values in policy development.
- Based on review of the Library Gardens SSI pilot project, investigate the adoption of the Sustainable Sites Initiative as the required rating system for significant landscape projects.

TARGETS AND INDICATORS

Target: Require 100% compliance to UBC Bird Friendly Design Guidelines for Buildings for new institutional buildings by 2020.

Indicator: Increase opportunities to provide habitat for birds, pollinators and other species.

Note that, based on foundational studies and data gathering identified in the GBAP actions, further targets and indicators will be integrated into future updates of the GBAP.

[14] *Working Together for the Georgia Basin. Strategic Directions for Biodiversity Conservation in the Metro Vancouver Region (2008).*

Health & Wellbeing

COMPONENT GOALS

01 UBC will enhance the mental, physical social dimensions of wellbeing by making them integral to building and landscape design decisions.

02 UBC researchers, community stakeholders and building occupants will be engaged in a meaningful and ongoing way to inform building and landscape design decisions around health and wellbeing.

03 UBC will become a leader in enhancing wellbeing through the built environment within the context of higher education in Canada.

CONTEXT

UBC's campus environments, both built and natural, play a vital role in the physical, mental and social wellbeing of all students, staff and faculty.

Well-designed spaces can: work to promote physical activity; enable social connections; improve productivity, learning, and overall health; foster equity and inclusion; and promote accessibility and ease of use. Since the Okanagan Charter[15] was adopted, UBC has committed to incorporating health and wellbeing into all aspects of campus culture and operations.

Pathway to Net Positive

Prioritizing health and wellbeing is foundational to the success of individuals and the overall community at UBC, and it is closely linked to biodiversity and place and experience component areas. A system-wide holistic and proactive approach that champions wellbeing is currently in development through UBC Wellbeing, a collaborative effort that aims to make the University a better place to live, work and learn.

Key Directions

The GBAP will provide guidance for how building and landscape design can nurture the mental, physical and social dimensions of well-being. Wellbeing principles, objectives and metrics that will inform site-specific building and landscape requirements will be integrated into the GBAP in full coordination with the development of the UBC Wellbeing Strategy.

Foundational work in this emerging component area will include review of best practices, particularly the WELL Building Standard (through a pilot study to identify specific WELL Building Standard guidance that is aligned with UBC priorities).

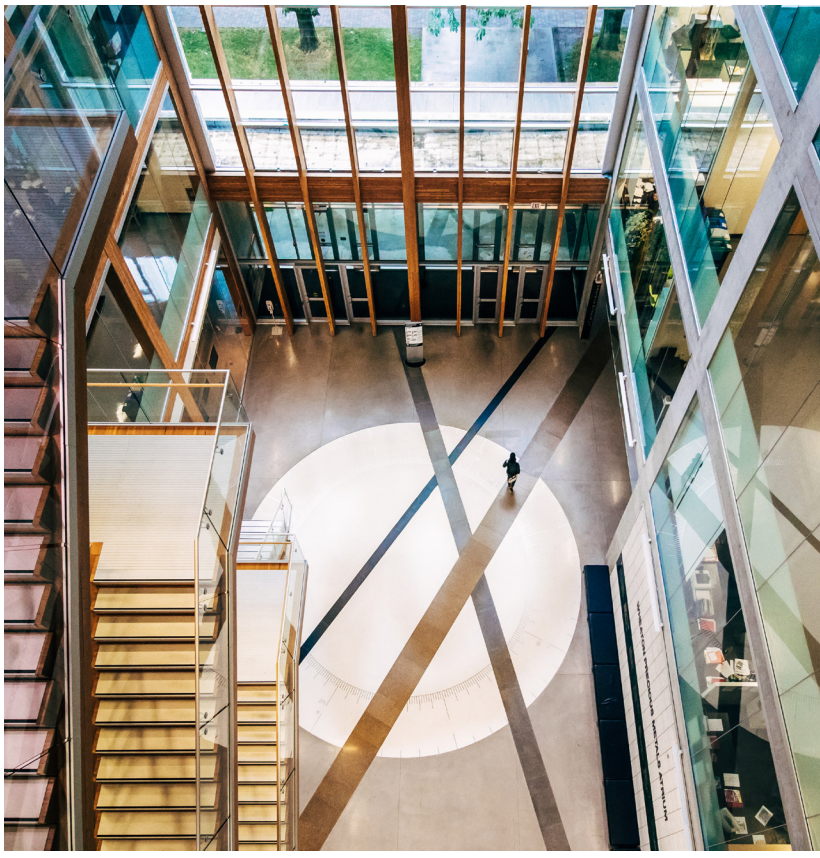
[15] *Okanagan Charter: An International Charter for Health Promoting Universities and Colleges (2015).*

FIVE-YEAR IMPLEMENTATION PLAN – SHORT-TERM PRIORITY ACTIONS

- Review research and best practices for physical, mental and social health and wellbeing in buildings.
- Develop health and wellbeing guiding principles for building design that promote physical, mental and social wellbeing (e.g., incorporating social or contemplative space, designing spaces that allow inclusion, incorporating universal design principles, promoting ease of use, incorporating ergonomic principles, developing daylighting requirements, considering acoustic requirements, etc.).
- Identify metrics for health and wellbeing (e.g., temperature, indoor air quality, daylight levels, acoustic levels, views to exterior, number of indoor plants, healthy working postures, etc.) and develop targets and performance measures.
- Develop a strategy for all projects to include considerations of ergonomics, universal access requirements, and how users of different sizes and abilities will interact with the environment (e.g., conduct table-top drawing simulations or mock-ups, analyze risks, and engage building occupants for feedback).
- Test the WELL Building Standard against existing buildings (e.g., Earth Sciences Building) in a pilot study and identify WELL Building Standard credits and best practices that are aligned with UBC priorities.
- Coordinate with UBC's Wellbeing Strategy in collaboration with UBC Wellbeing to guide how building and landscape design can nurture physical, mental and social dimensions of health and wellbeing.
- Incorporate health and wellbeing strategies into policies and design briefs for building and landscape projects.
- Establish relationships with off-campus partners to advance the connection between research and practice for health and wellbeing in buildings.

TARGETS AND INDICATORS

Targets and indicators will be developed based on foundational studies and data gathering identified in the GBAP.



Above: Move Stairs in CIRS encourage us inhabitants to take the stairs

PHOTOGRAPHER: PHILIP BERTOGG

Right: Cantilevered wood stairs at the Earth Sciences Building make taking the stairs pleasurable

PHOTOGRAPHER: PHILIP BERTOGG

Quality

COMPONENT GOALS

01 UBC buildings and landscapes will be durable, reliable and resilient.

CONTEXT

Quality is defined as that which makes a building reliable, durable, resilient, comfortable, dependable, and a contributor to the UBC brand.

UBC requirements for building quality are communicated through the UBC Technical Guidelines. UBC prioritizes durability for buildings and products that maximize life cycle and the total cost of ownership while meeting the functional requirements of building users.

Durable materials are preferred that minimize the need for new resources and their cost of operation and maintenance in the building's lifetime. Components, finishes, equipment and systems that require minimal maintenance and exhibit a high level of maintainability and long-term reliability are preferred.

Key Directions

To improve quality, UBC will analyze and strengthen existing processes. Increased compliance with project goals, UBC Technical Guidelines and UBC Sustainability Submission Requirements will be pursued.

To improve clarity particularly for renovations and retrofits, the green building requirements have been identified for each tier and are as follows:

TIER	DESCRIPTION	AREA/BUDGET	GREEN BUILDING REQUIREMENTS
TIER 1	New Buildings – Large	>1,000 m^2, >$5M	▪ Green building certification ▪ Energy target ▪ UBC Technical Guidelines ▪ Life Cycle costing focus ▪ Sustainability Process
TIER 2	New Buildings – Small	<1,000 m^2, >$5M	▪ Energy target ▪ UBC Technical Guidelines ▪ Life cycle costing focus ▪ Sustainability Process
TIER 3	Major Project Renovations a. Renewal (includes envelope and mechanical system upgrade)	>$5M	▪ Green Building Certification ▪ Energy target ▪ UBC Technical Guidelines ▪ Life cycle costing focus ▪ Sustainability Process
	b. Other (extensive interior upgrades)		▪ UBC Technical Guidelines ▪ Life cycle costing focus ▪ Meeting with Sustainability & Engineering
TIER 4	Partial Fit-outs	$1M – $5M	▪ UBC Technical Guidelines ▪ Life cycle costing focus ▪ Meeting with Sustainability & Engineering
TIER 5	System Upgrades (e.g., chiller replacement, controls)	n/a	▪ UBC Technical Guidelines ▪ Life cycle costing focus

Table 5. Tier system with green building requirements for institutional building projects.

In collaboration with UBC Project Services, Properties Trust, and Infrastructure Development, the GBAP clarifies performance targets and expectations for the renovation and retrofits of existing buildings. UBC prioritizes full renewal of aging buildings (tier 3a) rather than demolition and replacement, which can result in significant savings in construction costs, new materials, and environmental impact, and reduces UBC's deferred maintenance debt. Renewal can also preserve significant buildings while creating state-of-the-art facilities, helping to foster a sense of place and UBC's identity. Other major renovations (tier 3b) may involve only partial building renovation and upgrade, or renovations in support of significant changes to academic activities. Smaller renovations (tier 4) that support asset management or academic need have reduced requirements. System upgrades (tier 5) occur as needed during the service life or to specifically improve building performance and are typically geared to reduce UBC's deferred maintenance debt.

FIVE-YEAR IMPLEMENTATION PLAN — SHORT-TERM PRIORITY ACTIONS

- Review and investigate opportunities to apply international climate resilience standards, such as the RELi resilience standard, to projects.
- Undertake a Greenest City Scholars study of the RELi resilience standard to identify the credits and best practices that align with UBC priorities.
- Develop review process for Owners Project Requirements.
- Require LEED documentation to be submitted to UBC at design, construction, and final review stages.
- Develop a strategy to conduct a full review of the UBC Technical Guidelines to ensure clarity and eliminate redundancies.

TARGETS AND INDICATORS

Target: Major projects track and achieve their design brief sustainability goals by 2020 (subject to approved changes during design process).

Target: Achieve 100% compliance with UBC Technical Guidelines by 2025 (compliance allows for approved variances).

Target: Achieve 100% compliance with UBC sustainability submission requirements by 2025 (compliance allows for approved variances).

The new building tier structure will provide guidance for renovation projects such as the Biosciences Building

ARCHITECT (RENOVATION): DIAMOND SCHMIDT
PHOTOGRAPHER: PHILIP BERTOGG

Climate Adaptation

COMPONENT GOALS

01 UBC buildings and landscapes will have the resilience to respond to both anticipated and unpredictable changes in climate.

02 UBC will engage with researchers in a meaningful and ongoing way to inform building policy and guidelines around climate adaptability.

CONTEXT

Through historical evidence and future modelling we know that temperatures will continue to rise as a result of climate change.

For the Lower Mainland, modelling predictions indicate that there will be long-term warming, more extreme weather events, changing precipitation patterns and rising sea levels.[16] These changes mean an increased risk of flooding, damage from storms, and overheating during summer highs. Changes to the design, construction and renovation of buildings and landscapes will be required to adapt to these future impacts. Without action, UBC's livability and economic prosperity goals are at risk.

Climate adaptation could be achieved through a change in approach to different aspects of building design, including: building form and orientation, building envelope, roof design, shading and glazing design, internal layout, interior environment, service infrastructure, exterior spaces, and the relationship between indoor and outdoor space. A key change at UBC is it that buildings will need to be designed for human comfort in the higher temperatures expected in our region over the building's lifetime.

Pathway to Net Positive

The broader UBC Resiliency Initiative will develop principles, objectives and metrics to guide adaptation in buildings and landscapes and address policies and guidelines that respond to risk across different scales – building, neighbourhood, campus and region. UBC will partner with regional partners including Metro Vancouver and the City of Vancouver to coordinate strategies.

Climate adaptation actions can provide multiple or synergistic benefits. For example, improved building envelopes can have multiple benefits, including reduced thermal heat transfer, reduced energy costs, reduced GHG emissions and improved thermal comfort. However, this must be balanced with the potential for increased cooling needs in future warmer temperatures resulting from these tight building envelopes.

Adaptation actions intersect with other components, including water and energy. For example, water conservation is a climate adaptation strategy that helps to reduce impacts from hotter, drier weather in future summers. For buildings, design measures such as shading, orientation, glazing and ventilation help to reduce energy demands and provide thermal comfort in hotter, drier summers.

As we make investments in our buildings, it is imperative that our designs, retrofits, operations and maintenance respond to adaptation needs. The cost of no action, both from a future retrofit and public safety perspective, could be much higher than proactively planning infrastructure to be resilient to future climate change impacts.

[16] *Metro Vancouver. Climate Projections for Metro Vancouver (2016).*

Earth Sciences Building shades and overhang provide shading from the morning sun

ARCHITECT: PERKINS+WILL
PHOTOGRAPHER: PHILIP BERTOGG

Key Directions

UBC will ensure buildings and landscapes adapt to a changing climate by using the most up-to-date climate data to guide building design and retrofits. Priority actions focus on a review of best practice for adaptation and identifying and conducting vulnerability assessments of infrastructure, including buildings, landscapes and stormwater infrastructure. GBAP actions will be integrated with an emerging campus Resiliency Initiative, when available, which will develop principles, objectives and metrics to guide adaptation in buildings and landscapes. Additional guidance in the water and energy components sections address specific approaches to climate adaptation.

FIVE-YEAR IMPLEMENTATION PLAN — SHORT-TERM PRIORITY ACTIONS

- Review current research and best practices for climate adaptation strategies in buildings.
- Identify climate adaptation research opportunities for buildings and landscapes on a local, regional and global scale.
- Conduct vulnerability assessments of campus buildings, landscapes and infrastructure at periodic intervals.
- Integrate early guidance on climate adaptation measures into project design briefs.
- Coordinate with the campus-wide Resiliency Initiative and climate adaptation strategies, as they evolve based on vulnerability assessments, evaluations and best practice review, by implementing policies on a building and landscape scale that respond to key climate change impact areas (e.g., increased temperature, variable weather patterns, increased flood events, increased smoke, increased peak events, etc.).
- Incorporate aspects into building and landscape designs to serve campus-wide emergency response preparedness in coordination with key departments, including Infrastructure Development and Risk Management Services.
- Update GBAP once the Resiliency Initiative is adopted.

TARGETS AND INDICATORS

Targets and indicators will be developed based on foundational studies and data gathering identified in the GBAP.

Place & Experience

COMPONENT GOALS

01 UBC buildings and landscapes will provide opportunities for collaboration, innovation and community development to reflect the social and environmental sustainability aspirations of the University.

CONTEXT

The Campus Plan and the Public Realm Plan have played major roles in creating a sense of place on campus since their implementation.

Through these plans UBC already has ambitious and successful place-making policy and is looking for improvements and synergies with other green building component areas to carry through to new developments.

Buchanan Courtyard provides an outdoor gathering space for arts students with places for sitting , studying and eating.

PHOTOGRAPHER: PHILIP BERTOGG

Pathway to Net Positive

Place and experience is a component of the GBAP that specifically promotes architectural and landscape designs that outwardly express social and environmental sustainability aspirations of UBC.

This component is emerging in nature, examples might include:

- Celebrating natural systems (e.g., University Boulevard stormwater feature)
- Using locally appropriate materials (e.g., First Nation House of Learning use of locally selected timbers)
- Fostering social connection and cohesion through design of exterior and interior spaces (e.g., the exterior/interior knoll at the Nest)
- Building elements that tell a story and learning landscapes (e.g., rainwater leaders that show water collection at CIRS)
- Exposing building systems creatively (e.g., Campus Energy Centre boilers)

Indian Residential School History and Dialogue Centre provides a place for contemplation both inside and in the library gardens

PHOTOGRAPHER: PAUL JOSEPH / UBC COMMUNICATIONS & MARKETING

Key Directions

Design has a role to play in telling the sustainability story of the building and landscape and communicating their unique identities. Design can also express human and ecological wellbeing by teaching about the processes or systems within the building and by expressing their presence. Expression can also be more abstract and creative, which communicates sustainability in a less literal manner (e.g., through art installations or playful demonstrations). It is important that buildings and landscapes serve the larger aspiration of producing positive, memorable and personally relevant experience, especially given the potentially limited time students are in attendance.

FIVE-YEAR IMPLEMENTATION PLAN — SHORT-TERM PRIORITY ACTIONS

- Identify short-and long-term student-led initiatives that contribute meaning and memory associated with buildings and landscapes.
- Review the Public Realm Plan goals and guidelines for better coordination and compliance of building landscapes.
- Establish additional GBAP place and experience component goals, in coordination with Campus and Community Planning, to help express a project's social, environmental and economic sustainability goals.
- Integrate heritage considerations early in the design through mandatory "Statements of Significance" for existing buildings.
- Analyze and improve existing design and development processes for strengths and weaknesses in integrating the GBAP place and experience component goals in project design objectives.

TARGETS AND INDICATORS

Targets and indicators will be developed based on foundational studies and data gathering identified in the GBAP.