THE UNIVERSITY OF BRITISH COLUMBIA

BOARD OF GOVERNORS

SUBJECT	Climate Action Plan 2030 and Zero Waste - Implementation Updates
SUBMITTED TO	Sustainability and Climate Action Committee
MEETING DATE	November 17, 2022
SESSION CLASSIFICATION	Recommended session criteria from Board Meetings Policy: OPEN
REQUEST	For information only - No action requested
LEAD EXECUTIVE	Robin Ciceri, Vice-President External Relations
SUPPORTED BY	Gail Murphy, Vice-President Research & Innovation Gage Averill, Provost & VP Academic, *pro tem* Michael White, AVP of Campus & Community Planning John Metras, Interim VP, Operations Yale Loh, Interim VP, Finance Linda Nowlan, Senior Director, Sustainability Hub John Madden, Director of Sustainability & Engineering, Campus & Community Planning

PRIOR SUBMISSIONS

The subject matter of this submission has been considered previously by the Sustainability and Climate Action Committee on the following occasions:

1. Nov 22, 2021 (OPEN SESSION): UBC Climate Action Plan 2030

The following Executive Summary assumes familiarity with the prior submissions and provides a status update from the most recent submission.

EXECUTIVE SUMMARY

The UBC Vancouver Climate Action Plan 2030 (CAP 2030) was endorsed by the Board of Governors in late 2021. This followed UBC's Climate Emergency Declaration, which committed UBC to develop a collective response that embeds climate justice throughout its activities and priorities and to address the climate emergency as a community. This report presents two substantive updates to the CAP 2030 implementation: a pathway to decarbonize the campus district energy supply to advance toward the 85% GHG emission reduction target by 2030 and an update to the Zero Waste Action Plan that aligns to the 50% waste reduction target established as part of the CAP 2030.

CAP 2030 supports a number of elements within UBC's Strategic Plan (including People and Places), and will help mitigate a number of key institutional risks, including financial risk associated with future carbon liability, reputational risk associated with UBC's leadership in sustainability, and operational risks regarding future-proofing of buildings for increased resiliency during climate events (i.e. wildfire smoke, heat waves, flooding, etc.). Implementation of multiple CAP 2030 themes are progressing through collaborations with UBC staff, faculty, and students – recent achievements include:

- Academic District Energy System: completed decarbonization study and internal evaluation, resulting in recommendation of an energy solution pathway for detailed development next fiscal year.
- Existing Buildings: consultant studies completed on 3 high emission buildings to identify deep energy and GHG reduction retrofit projects for decarbonization.

- New Buildings: development of embodied carbon lifecycle assessment and implementation of GHG intensity targets to reduce carbon in new buildings.
- Zero Waste: initiated a furniture re-use program; the program has already begun to repurpose surplus furniture and generate departmental savings.
- Climate Engagement: enhancement of Green Labs and Workplace Sustainability programs respectively, enabling and supporting decentralized climate action by UBC staff, faculty and students.
- Climate Friendly Food: completed applied student research and interdisciplinary partnerships with SEEDS to advance climate action and Teaching-Learning-Research opportunities, including a climate friendly food labeling pilot with Food Services and food waste assessment in kitchens.
- Sustainable Business Air Travel: developing the new Sustainable Travel Program to reduce air travel emissions and costs; developed web content & tools, and built partnerships with staff and faculty groups to support program rollout.
- Community Energy & Emissions Plan (CEEP): initiated the development of a neighbourhood climate action plan and consultant studies to recommend a low carbon neighbourhood district energy system.

ACADEMIC DISTRICT ENERGY SYSTEM DECARBONIZATION PATHWAY

A consulting study was completed that developed a number of pathways for decarbonization of UBC's Academic District Energy System (ADES) to advance toward the CAP 2030 GHG emission reduction target of 85% (below 2007 baseline). This study screened over 30 different technologies for viability, leading to development of 5 decarbonization pathways. These pathways were then evaluated internally against multi-account criteria developed as part of the CAP 2030 Major Project Review and Selection Process that addresses key risks, including financial, operational, climate justice, and reputational (see Appendix A).

The outcome of this process was a recommendation to proceed with detailed feasibility studies to develop the selected electrification pathway, encompassing multiple technologies:

1. Heat recovery: capture and utilize waste heat energy from the Bioenergy Research & Demonstration Facility
2. Electric boilers: minimize capital costs and provide a reliable technology for this critical infrastructure
3. Thermal energy storage: minimize peak thermal demand to reduce infrastructure and energy costs
4. A limited amount of Renewable Natural gas (RNG): to reduce new infrastructure capacity needs while minimizing growth in fossil fuel combustion

Detailed feasibility studies will commence in early 2023 that will enable refinement of budget estimates for phasing of capital project upgrades, including low carbon energy systems and supporting electrical infrastructure for the recommended ADES pathway. Planning for these energy system upgrades is being considered within the overall Campus Vision 2050 planning process and will be further defined once the detailed feasibility studies are completed.

ZERO WASTE ACTION PLAN UPDATE

UBC's first Zero Waste Action Plan was adopted in 2014, setting in place a long term vision to transform UBC's Vancouver campus into a zero-waste community, supported by waste diversion targets and a wide range of actions. Since launching the plan, many of the actions have been completed, resulting in significant successes, including rollout of multi-stream recycling stations across campus, expansion of food scraps composting, expanded recycling programs, launching the Sort it Out engagement and outreach program with excellent community uptake, including the student volunteer Zero Waste Squad program, and recently the addition of a Return-it Express & Go beverage container recycling depot. Despite these successes, waste diversion levels have fallen short of plan targets, due to a variety of issues.

In 2021, CAP 2030 set out a new target to reduce UBC's waste 50% by 2030 as part of aligning with the Paris climate agreement target - along with other "extended emissions" areas such as business air travel, food and

others – and applying a circular economy lens. Converting our current linear economy ("take-make-dispose") to a circular economy could significantly reduce waste related emissions, gradually decoupling economic activity from consumption of resources by designing waste out of the system.

The new Zero Waste Action Plan 2030 update, which is nearing completion, will identify new and updated actions needed to achieve the CAP2030 targets, address Sustainable Development Goal 12: Ensure Sustainable Consumption and Production Patterns, as well as align with recent updates to regional, provincial and federal government policies, and aims to address barriers encountered in previous implementation efforts. The Zero Waste Action Plan updated actions are defined across 9 theme areas: Goods and Services, Waste Operations, Student Housing, Food, Labs, Engagement and Outreach, Construction Waste, Performance Monitoring, and Circular Economy and Research.

Informed by staff, faculty, student and community consultation, the draft Zero Waste Action plan targets and actions (see Appendix B) have been developed over the last 18 months via working groups for each theme, with input from the Zero Waste Committee, and vetting through the Operational Sustainability Steering Committee and Sustainability Strategy Steering Committee.

RESOURCING & BUDGETING

Budgeting requests to support implementation of the CAP2030 and Zero Waste Action Plan updates are being submitted in parallel through the FY23/24 budgetary review process. Major pieces include climate adaptation planning (including Integrated Stormwater Management Plan - ISMP), an update to UBC's Zero Waste Action Plan, and the development of a Neighbourhood Climate Action Plan.

NEXT STEPS

As part of the ADES Decarbonization Study to advance toward CAP 2030 targets, staff will:

- Manage and oversee the ADES Decarbonization Feasibility Analysis with anticipated phasing, timing and updated costing estimates to report back to Board in 2024.
- Continue to consult with key stakeholders including Project Services, Building Operations and the campus community to collect feedback on the ADES Decarbonization Pathway technologies.
- Report to Executive in 2024 seeking approval to move forward through the Capital Project Development process with the recommended ADES Decarbonization Pathway.

As part of the Zero Waste Action Plan Update, staff will:

- Finalize the plan and launch it early in 2023
- Begin implementation across the 9 thematic areas

APPENDICES

Appendix A: CAP 2030 Major Project Review & Selection Process - ADES Decarbonization Pathway

Appendix B: Zero Waste Action Plan 2030 Summary

PRESENTATION

UBCV CAP 2030 Updates to Board NOV 2020

APPENDIX A - CAP 2030 MAJOR PROJECT REVIEW & SELECTION PROCESS: ADES DECARBONIZATION PATHWAY

1 CONTEXT – CAP 2030 MAJOR PROJECT REVIEW & SELECTION PROCESS

UBC's Climate Action Plan 2030 (CAP 2030) included a Resourcing Strategy (see 2021 CAP 2030 Submission, Appendix A) to enable implementation by providing an overall strategy and approach for resourcing the many projects and programs identified in the Plan.

A key element within the CAP 2030 Resourcing Strategy was the development of the Major Project Review and Selection Process to support decarbonization project evaluation. The goal of the process was to ensure that potential decarbonization projects meet UBC's overall CAP 2030 objectives: reduce financial and technology risk, achieve GHG targets, maintain UBC's sustainability reputation, and apply climate justice and resilience lens to these key decision making processes.

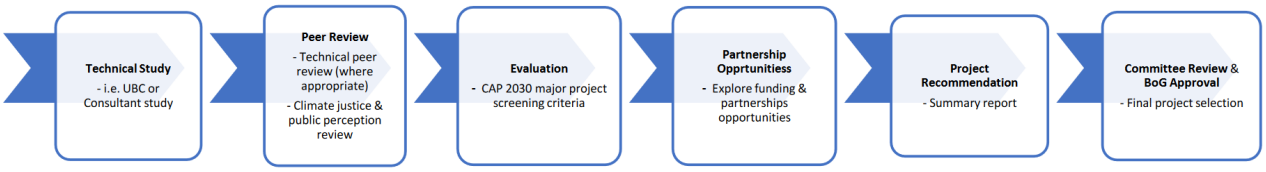


Figure 1 – CAP 2030 Major Project Review & Selection Process

2 ACADEMIC DISTRICT ENERGY SYSTEM - PATHWAY EVALUATION

UBC's Academic District Energy System (ADES) has undergone significant decarbonization to date, including the steam to hot water conversion and the Bio-Energy Research and Demonstration Facility (BRDF). Once the BRDF expansion is fully commissioned, operational GHG savings for the Vancouver campus will be close to 60% from the 2007 baseline year. Further decarbonization is needed to support projected campus growth and achieve the CAP 2030 target of 85% GHG reduction by 2030.

A consulting study was completed in July 2022 that developed a number of pathways for decarbonization of UBC's Academic District Energy System (ADES) to achieve the CAP 2030 GHG goals. This study screened over 30 technologies for viability (Figure 2), leading to development of 5 decarbonization pathways.

Figure 2 – Initial Technology Screening

Five pathways, and two optimizations (3a and 4a) were developed, each comprising a mix of technologies:

1: 100% RNG
100% Renewable Natural Gas (RNG) pathway with natural gas boiler in the Campus Energy Centre

2: BRDF Economizer + 73% RNG
Heat recovery from the Bio-Energy Research & Demonstration Facility (BRDF) using a condensing economizer, plus a component of RNG

3: ASHP + Economizer + 31% RNG
Air Source Heat Pump (ASHP), plus heat recovery from BRDF using a condensing economizer, plus a component of RNG

3a: ASHP + TS + Economizer + 28% RNG
Air Source Heat Pump (ASHP), plus Thermal Storage (TS), plus heat recovery from BRDF using a condensing economizer, plus a component of RNG

4: Electric Boiler + Economizer + 27% RNG
Electric Boiler, plus heat recovery from BRDF using a condensing economizer, plus a component of RNG

4a: Electric Boiler + TS + Economizer + 27% RNG
Electric Boiler, plus Thermal Storage (TS), plus heat recovery from BRDF using a condensing economizer, plus a component of RNG

5: TRIUMF heat recovery w/Geo + 27% RNG
Heat recovery from the TRIUMF physics facility on South Campus with a geothermal energy field, plus a component of RNG

3 SCREENING CRITERIA

A number of project Screening Criteria were developed to evaluate potential projects against the CAP 2030 objectives:

3.1 Financial (Capital & operational)
Initial capital costs and operational costs during the project lifecycle (inc. maintenance and energy costs).

3.2 GHG Emission Reduction
GHG emissions reductions to achieve the CAP 2030 targets.

3.3 Environmental Impacts
Impacts to local and global environment (communities & biodiversity).

3.4 Social License & Climate Justice
Climate justice (i.e. disproportionate gender, racialized, wealth inequity impacts), duty to global emissions accountability, public perception, UBC's reputation and associated benefits.

3.5 Ease of Implementation

Minimal regulatory barriers for infrastructure development, high level of UBC Control, low level of implementation complexity.

3.6 Reliability, maturity and maintainability of technology

Technology readiness level - i.e. operational risks associated with mature versus cutting edge technology.

3.7 Reliability of energy supply & market

Security and stability of energy supply, level of UBC Control.

3.8 Site Integration

Site footprint, including impacts on surrounding buildings and areas (i.e. noise and vibration).

3.9 Minimal Policy and Legislative Risk

Ease of regulatory approvals, political/governance acceptability, risk of changing emissions factors and biogenic accounting (i.e. RNG, bio-energy, carbon capture).

3.10 Co-benefits & Synergies

Integration with other campus infrastructure developments, system efficiency, innovation, and partnership opportunities.

3.11 Adaptation & Resiliency Benefits

Energy diversity (i.e. multiple energy sources), future integration with resiliency/adaptation considerations, and continuity of UBC operations given an external event (i.e. power cut, gas cut, etc.).

4 EVALUATION RESULTS

Each pathway was evaluated by the internal UBC Review Committee, comprising staff members from Energy & Water Services, Sustainability & Engineering, and the Climate Hub, providing broad expertise across the evaluation criteria. Results of the Internal Evaluation are presented in in Figure 3.

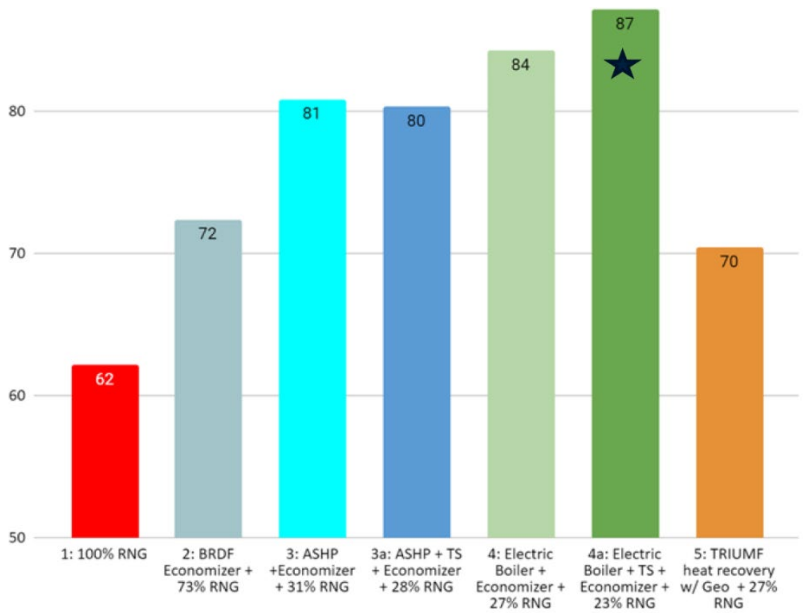


Figure 3 – Internal Evaluation Results (pathway score)

5 PATHWAY RECOMMENDATION

The outcome of this process was a recommendation to proceed with detailed feasibility studies to develop the selected electrification pathway, encompassing multiple technologies:

1. **Heat recovery**: use waste energy from the Bioenergy Research & Demonstration Facility
2. **Electric boilers**: minimize capital costs and provide a reliable technology for this critical infrastructure
3. **Thermal Energy Storage**: minimize peak thermal demand to reduce costs
4. A limited amount of **Renewable Natural Gas** (RNG): to reduce new infrastructure capacity needs while minimizing growth in fuel combustion

6 KEY CONSIDERATIONS

Key considerations that emerged during this process included:

- Fuel combustion leading to air pollution for our campus community.
    a. Recent research from UBC's School of Population and Public Health notes that 'even low levels of air pollution contribute to increased health risk' (including cardiovascular disease, heart disease, diabetes, pneumonia, respiratory disease).

- Climate justice and environmental issues
    a. Climate justice and environmental issues were noted for technologies that rely on fossil fuel infrastructure, such as RNG as it relies on the same infrastructure as natural gas. Fossil fuel infrastructure, including pipelines, continue to have negative impacts on vulnerable BIPOC (black, indigenous, and people of colour) communities and the environment.

7 TECHNOLOGY NOTES

Technology notes that emerged during this process included:

- **Renewable Natural Gas** (RNG)
    a. Lowest capital cost but highly sensitive to price uncertainty
    b. Supply risk and potential for curtailment
    c. Issues associated with fuel combustion -local air pollution, noise, fossil fuel infrastructure (environmental & social impacts linked to climate justice)
- **Air Source Heat Pumps** (ASHP)
    a. Most efficient option (i.e., efficient use of electricity)
    b. Noise, site selection, and complexity of operation/maintenance are risks
    c. Low level of maintenance support in our region
    d. Availability challenges with large ASHP to address capacity needs
- **Electric Boiler (with Thermal Storage optimization potential)**
    a. Less efficient and innovative compared to heat pumps
    b. Reliable proven technology
    c. Can be combined with thermal storage to delay peak electrical upgrades

8 ADAPTATION & RESILIENCY: SECURITY OF ENERGY SUPPLY

The ADES currently utilizes two types of thermal energy sources: gas (natural gas and RNG) and biomass (waste wood chips). Adding electricity as a third thermal energy source will reduce energy supply risk, thereby making the campus more resilient to fuel supply disruptions (previous disruptions have occurred in recent years with natural gas and wood-chip supply).

By creating additional energy system redundancy in the ADES, UBC will also increase its capacity to withstand sudden climate shocks that may create steep peak demands stemming from sudden or prolonged cold snaps.

9 NEXT STEPS

Detailed feasibility studies are due to start in early 2023 and will enable mature budgetary forecasting for phasing of capital project upgrades, including energy systems and supporting electrical infrastructure for the recommended ADES pathway. Space planning for these energy system upgrades is being considered within the overall Campus Vision 2050 process and will be further defined once the detailed feasibility studies are completed.

10 FUTURE TECHNOLOGY REVALUATION

Future technology projects and opportunities needed to address the 2035 net-zero goal and longer term campus growth will be evaluated using the CAP 2030 Major Project Review and Selection Process.

APPENDIX B
ZERO WASTE PLAN 2030 ANNOTATED OUTLINE

1 CONTEXT
1.1 Existing plan accomplishments, limitations and success factors

- As of January 2022, the original ZWAP (2014) status of action implementation is:
    - 44% of actions implemented, 39% of actions partially implemented, and 17% of actions not implemented
- Successes include:
    - Rollout of new multi-stream recycling stations across campus buildings and public realm, providing access to recycling and composting everywhere
    - Doubling of food scraps composting volume
    - Expansion of specialty recycling programs and pilots including Styrofoam, soft plastics, single use gloves and amber lab glass
    - The UBC community has embraced zero waste goals and the Sort it Out program
    - Major construction projects have achieved high levels of waste diversion, most certified under the LEED green building rating system
    - A Return-it Express & Go beverage container recycling depot was installed on campus
    - Revamping the UBC Reuse-it online exchange platform, increasing use by a factor of four in the first year
- The target of 80% overall waste (combined operational and construction) diverted by 2020 was not met: diversion rates have varied 47-64% annually over the last four years
    - These limited diversion rates are driven by operational waste, at diversion rates of 44-46%
    - Construction waste quantity and diversion rates for large capital projects vary significantly each year; the rolling average 2017-2019 was 88% diversion
- Limitations and factors in the existing plan implementation and performance metrics include:
    - A high growth rate combined with lower diversion rates in the student residences
    - Undocumented sources of waste disposal falling outside the Sort it Out recycling stations and other recycling initiatives, for example waste from labs, businesses, and surplus furniture
    - Incorrect waste sorting by the campus community, due to complex factors including infrastructure systems, behaviours, and packaging materials, some of which are largely outside of UBC's control
    - Lack of waste generation and diversion data at a building scale, which is needed to inform actions needed to reduce waste and achieve targets
    - Lack of human and financial resources needed to execute some high impact actions, such as enhanced data collection, addressing composting facility issues, development of sustainable procurement programs, and waste reduction strategies in student housing

2 Goals and objectives
2.1 UBC climate and sustainability priorities

- UBC's Declaration on the Climate Emergency in late 2019
- Endorsement of the Climate Action Plan 2030 in December 2021, which for the first time included targets for reducing Extended Impact GHG emissions, including emissions associated with waste and materials; this strengthens the importance of GHG emissions in the new ZWAP
- Sustainable Development Goal 12, Ensure Sustainable Consumption and Production Patterns, one of UBC's priority SDGs that aligns closely with the ZWAP scope

2.2 Operational changes

- Gaps in regional organic waste processing options, given the UBC in-vessel composting facility ceased operation in 2021, with organics processing shifted to an off-campus service provider.

2.3 TLR and other co-benefits

- Engaging with academic researchers to help identify, test and advance innovation opportunities in circular economy and meeting targets, including Campus as a Living Lab projects
- Continue the effective collaboration with students via SEEDS research and student organizations such Common Energy, Engineers for a Sustainable World and others, as well as engagement via the Zero Waste Squad and Catalyst program
- Incorporate Equity, Diversity and Inclusion and Indigenous Strategic Plan priorities into plan actions wherever possible

2.4 Government policies and industry trends

- Emergence of federal and provincial government policies to address the global issue of plastic waste pollution, and provincial and local government policies to address single use item waste
- Government initiatives and industry groups launched to advance circular economy models and businesses
- There is a need for UBC to ensure alignment with regional waste management bylaws, bans and guidelines, some of which have been updated in recent years

2.5 Zero waste plan vision and targets

- The 2014 ZWAP Vision: UBC's Vancouver campus will be transformed into a zero waste community by advancing innovative solutions to conserve, reuse, recycle, and redesign materials and resources. This Vision is still applicable today.
- The CAP2030 has set a new waste GHG target and overall direction: by 2030, UBC will apply a circular economy lens to enable a 50% reduction in waste, progressing toward a zero-waste community.
    - This target uses an absolute reduction in waste, relative to a 2019 (pre-pandemic) baseline, rather than a diversion rate target as in the original plan. This target applies to all of UBC's operational waste.
    - The target is aligned with the extended emissions reduction targets in CAP2030, which align with the Paris agreement to limit global temperature rise to 1.5 C.

- For construction waste, a target of 90% waste diversion is set. A diversion rate target will continue to be used due to the high variability of construction projects from year to year. However data will also be collected to develop waste intensity metrics (I.e., amount of waste generated based on project size), for use in future targets.

3 ACTIONS

Plan actions are organized into the following 9 theme areas.

3.1 Goods and Services

- Scale up UBC's reuse program across multiple goods categories and expand the user base to continually increase the reuse of UBC assets.
- Scope and develop a sustainable/circular purchasing strategy and program that could include vendor and product sustainability criteria, packaging requirements, updated procurement guidelines and processes, and integration with Workday and other procurement processes.

Actions led by C&CP, Financial Ops, SHCS, and Facilities, and supported by the SEEDS program (C&CP)

3.2 Waste Operations

- Fund, develop and implement the Waste Operations Strategy, which will provide critical waste management infrastructure and business process updates needed to reach our zero waste goals.
- Replace the now inactive in-vessel composting facility to integrate multiple waste streams including food, compostable food packaging and green waste to support an increased range of acceptable materials.
- Assess impact and feasibility of aligning bin and signage colours with regional standards, in order to improve user waste sorting.
- Investigate end-to-end waste and recycling collection processes and infrastructure to increase operational efficiencies with an ergonomic lens.

Actions led primarily by Facilities and supported by C&CP.

3.3 Student Housing

- Reduce waste disposal from residences by 50% by 2030. Given the complexity of this portfolio, this is an aspirational target that will require additional future solutions to be developed, tested, funded and implemented.
- Update residence recycling infrastructure and waste collection processes to provide convenience, consistency and ease of use for residents to achieve high waste diversion rates.
- Develop and implement new, effective outreach and engagement initiatives for staff, residents and volunteers to support achievement of the waste disposal target and provide value to participants, and build a culture of everyday sustainability.
- Expand residential reuse processes and programming to all applicable residences to create a circular economy for move in and move cycles, reduce waste generation and provide low-cost items to incoming residents.

- Establish metrics, auditing and data collection processes to assess performance seasonally and annually, to inform waste reduction and diversion actions.

Actions led primarily by SHCS in collaboration with C&CP and support from Facilities.

3.4 Food

- UBC and AMS food outlets and catering operations to achieve full alignment with UBC food ware procurement guidelines and implement cup and container share programs by end 2023, reduce food waste 50%, and coffee cups 80% by 2030 (relative to 2019 or 2023 baseline depending on data availability).
- Develop a Food Waste Prevention, Reduction and Recovery Strategy for campus food outlets and operations.
- Develop and implement practical and cost-effective food waste metrics and measurement tools that support and inform food waste reduction actions in campus food operations.
- Continue to update and roll out the Zero Waste Food Ware Strategy, facilitating and supporting the transition to a reusables-based food service model across campus.
- Review and update waste recycling infrastructure and bins in food service locations across campus to support high waste diversion rates.

Actions led by C&CP (including SEEDS program) and SHCS, in collaboration with AMS, Athletics and Wesbrook Properties.

3.5 Labs

- Develop prioritized sustainable purchasing and reuse strategies for research laboratory equipment, consumables, and chemicals at both the university level and a product/service level.
- Develop engagement strategies for research labs as part of the overarching Zero Waste communications and engagement strategy.
- Identify and implement strategies to reduce, eliminate and/or recycle specialized lab waste streams.
- Prioritize continuous improvement and innovation to achieve Zero Waste goals in research labs by exploring emerging technologies and supporting innovative projects.

Actions led primarily by C&CP, with collaboration and support from Financial Operations, Facilities, SRS and others.

3.6 Engagement and Outreach

- Review and where appropriate expand, revise or simplify the existing campus-wide Zero Waste Communications and Engagement strategy and programs to support community action and systems change.
- Integrate emerging and established waste, materials and circular economy data collection streams and repositories into community feedback loops to support and reinforce zero waste-related climate action.

- Investigate price signals and incentivization of GHG reduction behaviors relevant to waste, materials and circular economy.

Actions led primarily by C&CP, with collaboration and support from many units including SHCS, AMS, Facilities and others.

3.7 Construction Waste

- Divert 90% of construction, demolition and renovation waste by 2030.
- Track and report waste from all applicable construction, renovation and demolition projects on campus above a minimum project size and develop waste intensity metrics and targets.
- Use waste tracking data, other tools and stakeholder engagement, and in concert with the Green Building Action Plan, identify and implement opportunities to reduce waste and increase diversion including reuse.
- Develop a policy and processes to ensure construction waste collection and processing complies with regional disposal/landfill bans.

Actions led primarily by C&CP in collaboration with Facilities and UBCPT.

3.8 Performance Monitoring

- Implement strategic waste audits to characterize waste at specific locations, to better identify waste reduction and diversion opportunities.
- Develop a more fine-grained waste data collection, management and reporting system to better inform waste reduction and diversion opportunities and engage the campus community.
- Develop and enhance tools to identify and analyse waste related GHG emissions and reduction opportunities.

Actions led by C&CP and Facilities (Waste Management), with support and collaboration from SHCS and AMS.

3.9 Circular Economy and Research

- Create a UBC Circular Economy Interdisciplinary Research Cluster that advances Circular Economy policies, plans and practices.
- Research and develop circular economy objectives, criteria and other elements for integration within a new sustainable purchasing strategy.
- Facilitate development of circular economy on campus by developing and integrating CE elements into other campus plans, policies, guidelines and strategies.

Actions are led by C&CP (primarily the SEEDS program), with support and collaboration from a range of units including SHCS, AMS, Facilities and a number of academic units.

4 IMPLEMENTATION

4.1 Unit level implementation, monitoring and reporting

- Continue the strong level of zero waste engagement across UBC units. Similar to CAP2030, the ZWAP team will facilitate implementation with a wide range of units via a decentralized implementation model.
- The Zero Waste Committee, with representation of a wide range of units, will continue to provide updates, feedback and guidance on implementation.
- Progress will be monitored and reported out, including key sustainability metrics that are incorporated in the Annual Sustainability Report.

4.2 Resourcing strategy

- Build on the substantial existing programs and actions, integrating new actions with these wherever possible.
- Leverage existing staff, programs, initiatives and other resources.
- Leverage IIC funding for infrastructure projects including composting.
- Identify and secure additional incremental funding needed to ensure barriers can be overcome and actions can be implemented toward meeting targets.
- Seek sustainable, self-supporting program funding models to minimize the need for additional centralized funding.

4.3 Continuous improvement

- The ZWAP2030 team, working with a wide range of units, will use a cyclical continuous improvement process to optimize implementation toward meeting targets and seek efficiencies:
    - Collect and analyze data
    - Identify new opportunities and actions
    - Test and evaluate
    - Implement and scale up

4.4 Risks and mitigation strategies

Risk	Mitigation Strategy
Falling short of 2030 targets due to implementation barriers. Key sectors include student housing and labs.	• Regularly assess performance against objectives and identify barriers early • Use continuous improvement process to update existing actions and develop new actions based on previous results • Implement resourcing strategy to maximize advancement of actions. Future solutions for student housing to be developed may require additional resourcing. • Use UBC's buying power to work with major vendors to maximize reusability and recyclability of products such as scientific equipment and supplies.

Lack of external waste processing solutions – e.g., specialized recycling services, organics processing services.	• Develop new on-campus organics processing capability to replace old facility • Continue to explore partnerships with vendors and suppliers, such as supplier take-back programs • Regularly canvass the market for new/updated services via RFIs etc.
Odours and operational issues related to future on-campus organics processing facility.	• Prioritize strategies for odour control and management of other operational risks in facility design, contracting, and operations planning. • Ensure lessons learned from existing composting facility are well understood and taken into account.

Climate Action Plan 2030 and Zero Waste: Implementation Updates

November 2022

John Madden, Director, Sustainability & Engineering

CAP 2030 Implementation Updates

1. A pathway to decarbonize the academic district energy system (ADES) to advance toward 85% GHG emission reduction target by 2030
2. An update to the Zero Waste Action Plan that aligns to the 50% waste reduction target established in CAP 2030

CAP2030 & Strategic Plan Alignment

Goals:

- Lead globally & locally in sustainability & wellbeing across our campuses & communities by using UBC as a testbed for innovation and applied research in climate action and zero waste

INITIAL TECHNOLOGY SCREENING

1. Design and Install prior to 2030. Eliminate options that are not commercially available as design needs to be completed by 2025.
2. Overall 5 MW of capacity needed. Eliminate options that cannot provide > 1 MW capacity by 2025.

Air Source Heat Pump	~~Marine Heat Pump~~	~~River Heat Pump~~	Closed Loop Geo-Exchange	~~Open Loop Geo-Exchange~~	~~Sewer Heat Recovery~~	Renewable Natural Gas
~~WWTP Effluent Heat Recovery~~	Triumf Waste Heat	~~Data Centre Waste Heat~~	~~Other Industrial Waste Heat~~	~~District Cooling Heat Recovery~~	~~Other Cooling Heat Recovery~~	~~Renewable Natural Gas CHP~~
~~Electrical Substation Heat Recovery~~	~~Fuel Cell HR~~	~~Solar Thermal~~	~~Nuclear Small Modular Reactor (SMR)~~	Electric Boilers	~~Lab Exhaust Air Heat Recovery~~	~~Biogas (Locally Produced)~~
~~CEC Condensing Economizer~~	BRDF Condensing Economizer	~~Hydrogen~~	~~Waste-to-Energy~~	~~Waste-to-Energy CHP~~	~~Biomass~~	~~Biomass CHP~~
~~Hydrogen CHP~~	~~Atmospheric Carbon Capture~~	~~Biomass Carbon Capture~~	~~Waste-to-Energy Carbon Capture~~	~~Natural Gas Carbon Capture~~		

INTERNAL EVALUATION - CRITERIA

Evaluation criteria aligned with CAP 2030 & UBC's Climate Emergency Declaration:

1. Financial (capital & operational)
2. GHG Reduction
3. Environmental Impacts (exclusive of GHG)
4. Social license (inc. Climate Justice)
5. Ease of Implementation
6. Reliability, Maturity & Maintainability of Technology
7. Reliability of Energy Supply & Market
8. Site Integration
9. Policy & Legislative Risk
10. Co-benefits & Synergies (inc. Innovation)
11. Adaptation & Resiliency Benefits

ADES RECOMMENDED PATHWAY

- **Electrification pathway implementation** for district energy:
  - Phase 1: **Heat recovery** from the BRDF (condensing economizer)
  - Phase 2: **Electric boiler**
  - Optimization potential for **thermal storage** to reduce peak electrical demand

- **Re-evaluate technologies** and campus growth in 5 years for future **Phase 3 project implementation after 2030** - scaled to address any shift in **campus growth**

ADES DECARBONIZATION - PROCESS

2022 | **2023**

Consultant Study

DES Pathway development

Internal Evaluation

Pathway evaluation against CAP2030 major project criteria

Recommended pathway

Committee Input & Endorsement

SEAC

OSSC

SSSC

BoG Committee

Project Development

Detailed feasibility study - inc. costing & external funding

Budgeting

Feed into Major Capital Projects process

Committees:

***SEAC**: Sustainable Energy Advisory Committee*
***OSSC**:Operational Sustainability Steering Committee*
***SSSC**: Sustainability Strategy Steering Committee*
***BoG Committee**: Sustainability & Climate Action Committee*

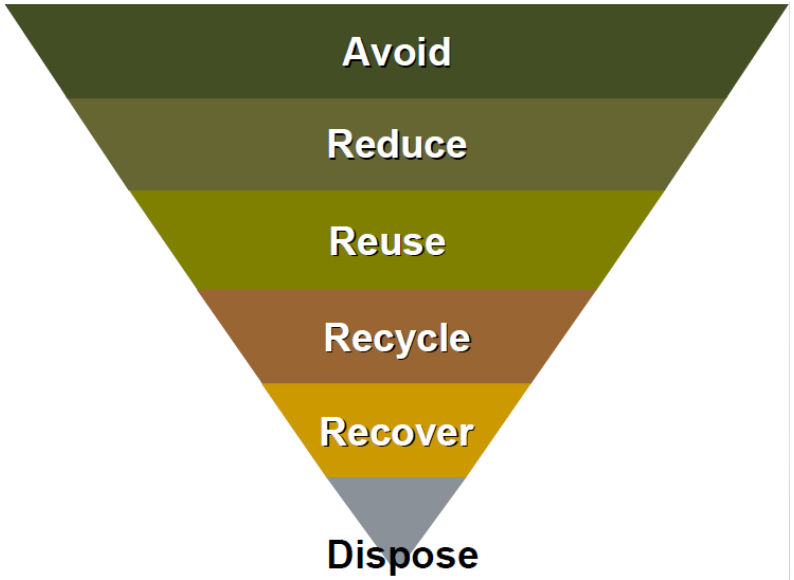
Zero Waste Action Plan (ZWAP) 2030: Towards a Circular Economy

WHY A NEW PLAN? WHAT HAS CHANGED?

- Original plan adopted in 2014; target dates have passed
- CAP2030 sets new waste GHG target and overall direction: by 2030, UBC will apply a circular economy lens to enable a 50% reduction in waste, progressing toward a zero-waste community.
- Align with UBC's priority Sustainable Development Goals
- Emergence of role of plastic pollution and environmental impacts, government policy directions

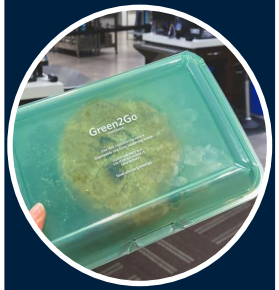
KEY CHALLENGES & OPPORTUNITIES

- Despite progress and successes, targets were not reached
- Some complex systemic challenges including issues beyond UBC
- Lack of resourcing for key initiatives
- We can address:
  - "Specialty" wastes
  - Lack of data to inform and optimize actions
  - Composting limitations
  - Growth of student housing sector
- Increased focus on circular economy approach and waste hierarchy



ZWAP UPDATE WILL FOCUS ON:

Waste Operations



Food Systems

Target: 50% reduction in food waste disposal and 80% in single use cups by 2030.

Green Labs Reduction & Diversion

Student Housing:

Target: 50% reduction of waste disposal by 2030

Construction & Demolition Waste

Good & Services

Circular Economy Lens + Engagement and Outreach + Monitoring

Implementation: Keys to Success

- Build on substantial existing programs and actions; continue strong level of engagement across UBC units
- Alignment with CAP2030 actions
- Leverage Infrastructure Charge funding for infrastructure projects including composting; secure incremental funding needed to execute plan
- Seek sustainable/self supporting program funding models

Questions and Discussion