SUBJECT	Climate Action Plan 2030: Emerging Directions and Draft Targets for UBC Vancouver and Okanagan Campuses
SUBMITTED TO	Sustainability & Climate Action Committee
MEETING DATE	February 4, 2021
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 and Innovation Andrew Szeri, Provost and Vice-President Academic, UBC Vancouver Peter Smailes, Vice-President Finance & Operations Ainsley Carry, Vice-President Students Marcia Buchholz, Vice-President, Human Resources Lesley Cormack, Deputy Vice-Chancellor and Principal, UBC Okanagan Michael White, Associate Vice-President Campus and Community Planning John Metras, Associate Vice-President Facilities Rob Einarson, Associate Vice-President Finance & Operations, UBC Okanagan John Madden, Director, 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. April 7, 2020 (OPEN SESSION)
   Action/Follow Up: Initiating the next phase of UBC Climate Action Plan 2030 development for both UBC Vancouver and Okanagan Campuses, reflecting input from the Task Force [above], in addition to broader community and stakeholder engagement and the associated technical and financial analysis needed to determine an accelerated pathway to net-zero emissions at UBC.

EXECUTIVE SUMMARY

In December 2019, UBC's Board of Governors unanimously endorsed a Declaration on the Climate Emergency, joining over 1,700 jurisdictions around the world to commit to accelerated emission reductions that align with the Paris Agreement of limiting global warming to 1.5C. With this endorsement, the Board emphasized that climate action continues to be a top strategic priority for the University. Specifically, the Declaration gives impetus for UBC to accelerate decarbonization of its core operations, to expand the scope of action to address extended (indirect) emissions that UBC has some influence over, and to consider a climate justice lens in its future response. This includes the commitment to deepening engagement with Indigenous communities. To help meet these intentions, the Climate Action Plan 2030 (CAP2030) process has been initiated on both the UBC Vancouver and Okanagan campuses. This report provides an update on the process, including emerging directions and identifying draft targets for both campuses to align with or exceed the Paris Agreement targets to help limit global warming to 1.5 degrees.

CAP 2030 is building on the significant success that UBC has had to date for campus operations, including a projected 62% GHG reduction over 2007 levels for UBCV in 2021 (with the completion of the Bioenergy Facility expansion) and a 33% reduction over 2013 levels for UBCO (primarily through district energy system upgrades). However, this process is enabling UBC to significantly extend its global climate leadership by going beyond the 45% Paris GHG reduction target by 2030 for campus operations and establishing an accelerated pathway to becoming net zero on both campuses. All of this while for the first time also including indirect emissions that traditionally UBC has not had to account for, including commuting, air travel, food, embodied carbon from buildings, and materials and waste. The CAP2030 emerging directions and draft targets for both the Vancouver and Okanagan campuses are contained in Appendices A and B.

This work is being supported by a multi-portfolio planning team including UBC's Strategic Decision Support Unit, and in partnership with key UBC research faculty. Given the uniqueness of each campuses' systems and physical contexts, CAP2030 plans are being tailored for each campus. In addition to confirming the 2030 GHG targets, the team will also be refining the more detailed implementation schedule and investment planning that is needed to achieve net zero campuses, recently aided by the announcement of a significantly more aggressive carbon pricing policy in Canada. Guidance will be sought in the coming months from UBC's Executive on overcoming fiscal challenges due to the COVID-19 pandemic, and level of ambition the University is able to invest in over the next decade. Phase I of CAP2030 for each campus will be presented to the Board by fall, 2021, anticipating that work will need to continue into 2022 to finalize the preferred technical solutions to address the full suite of emissions reductions.

I. UBC Vancouver Campus Climate Action Plan 2030: Emerging Directions and Draft Targets

Greenhouse gas emission reduction targets and actions are divided into two main source areas:

- Campus Operations: these are greenhouse emissions generated mainly from the operations of buildings and the supply of energy (often referred to as Scope 1 and 2 emissions). UBC is directly responsible for these emissions and must pay BC carbon tax and offsets for them. Campus Operations emissions account for 29% of all campus emissions that are tracked in UBC Vancouver's inventory.
- Extended Impacts**:** these are emissions generated indirectly through commuting to and from campus, business air travel, food systems, materials and resources (often referred to as Scope 3 emissions). UBC does not have direct control over these emissions sources, and does not pay carbon tax or offsets on them. These emissions account for 71% of the total.

Within these two areas the emerging CAP 2030 outlines ten strategic action areas, draft targets, supporting actions and financial considerations being developed for the Vancouver campus.

A. Campus Operations Emission Reduction Targets

For 2030, a target range of 75% to 100% GHG emission reduction below 2007 has been identified for the campus operations. It gets progressively more challenging to achieve the higher part of this range, as fewer low-cost solutions remain available. Reducing emissions by 90% translates to eliminating virtually all conventional fossil fuel use from Campus Operations. The net-zero scenario goes further by also addressing remaining emissions from low carbon energy. While technically possible, the technology solutions for this, such as direct air capture of carbon, are still emerging and have not been widely adopted, posing potential financial premiums for early adoption. Therefore, the following climate action areas have been identified for deep exploration and costing to address climate change within Campus Operations:

1. ***Academic District Energy System**:* By 2030, 100% of the energy used by the Academic District Energy System will come from low carbon sources.
2. ***Buildings**:* By 2030, new buildings and renewals will target near zero operational emissions, and existing building emissions will be reduced to reach a target still to be confirmed.
3. ***Fleets:*** UBC will procure new vehicles and equipment that are zero emissions where feasible solutions exist.
4. ***Internal Carbon Pricing (ICP)**:* An internal carbon proxy price is being proposed as a financial mechanism to account for the actual carbon costs and damages associated with capital investment decisions. The introduction of a carbon proxy (shadow) price will help better align financial decision-making criteria with UBC's climate goals. The price level is still being confirmed, but will seek to calibrate to policy implemented by the City of Vancouver and Metro Vancouver.

B. Extended Impact Areas Emission Reduction Targets (Scope 3 GHG Emissions generated from Business Air Travel, Commuting, Food Systems, Waste and Materials)

For 2030, a target for **45% from 2010 levels** has been identified for extended emission reductions, achieving the Paris Agreement 1.5C target. This is in line with the mandate of the UBC climate emergency declaration. The following provides some highlights of the proposed actions to achieve these targets; please see Appendix A for greater detail and the associated timelines.

5. ***Commuting Target:*** By 2030, achieve a 45% reduction in commuting emissions from 2010 levels. This includes progress with remote working, flex days and e-learning, increased behaviour change programming, advocacy for rapid transit, and improvements to on-campus infrastructure such as electric vehicle charging stations.
6. ***Business Air Travel Target:*** By 2030, reduce Business Air Travel emissions by 50% from pre-COVID levels. This starts with creating a baseline of travel for measurement and reporting, along with immediate support for growing capacity of virtual tools and platforms across operational and academic functions.
7. ***Food Systems Target:*** By 2030, achieve a 50% GHG emission reduction associated with food systems, starting with the development of a Food System Resilience & Climate Action Strategy, along with support for campus-wide climate food labelling, and a toolkit to encourage more sustainable dietary choices and habits.
8. ***Waste and Materials Target:*** By 2030, UBC will apply a circular economy lens to enable a 50% reduction in waste, supporting UBC to achieve its Zero Waste ambition. This begins with updating the Zero Waste Action Plan and focusing on programs of re-use of materials, sustainable procurement, and improvements to waste management infrastructure.
9. ***Engagement and Outreach Programs Target:*** By 2030, two-thirds (66%) of UBC faculty, staff and students will be aware of and actively contributing toward UBC's climate action goals, building on the success of engagement programs to date, as well as incorporating the outcomes of the Climate Emergency, particularly the strong focus on climate justice, including the deepening of indigenous engagement.
10. ***Embodied Carbon in Buildings Target:*** By 2030, establish an embodied carbon baseline and align new building and renewal designs with a 50% reduction target. This can be achieved through clear guideline for assessing, reducing and reporting embodied carbon, creating an operational and academic research hub, adopting a carbon "red list", and creating targets for equitably sourced materials.

By definition, UBC does not have direct control over its Extended Impacts emissions. Achieving this will require an investment in coordination between all levels of government, further technology innovation and adoption, and working with businesses and stakeholders across various value chains. Most importantly, it will require strong buy-in and support from UBC's students, staff and faculty, who through their own personal choices have the most impact over these emissions.

C. Complementary Climate Action Areas

i. ***Climate Justice.*** Throughout the development of the CAP2030 working groups were asked to integrate climate justice lens across emerging climate actions and to help address specific questions framed through the Climate Emergency Task Force. Addressing climate justice was particularly relevant when developing climate actions related to food systems, commuting and business air travel. Working collaboratively with other units such as UBC Sustainability Initiative (USI), the team will continue to identify ways that the Climate Emergency Task Force recommendations can be addressed through the scope of CAP 2030 and its implementation, including ways to deepen engagement with our indigenous hosts.

ii. ***Campus Housing.*** Providing student, faculty and staff housing on campus also plays a significant role in helping to reduce commuting emissions as well as contributing to the UBC's strategic plan objectives to improve health and wellbeing and creating thriving campus communities. Continued implementation of the Housing Action Plan is critical to support climate action, along with an exploration of new strategies and ideas to improve affordable housing options through the forthcoming Campus Vision 2050 process.

iii. ***Adaptation, Resiliency and Biodiversity.*** The first phase of CAP 2030 is focusing on mitigation efforts (i.e. GHG emission reduction actions to address climate change) however, we also need to increase the ability for our campus to become more resilient and adaptive in the face of climate crisis events such as rain storms, wild fires and heat waves which are increasing in both intensity and frequency. As part of the next phase staff will begin to scope and initiate the development of an Adaptation and Resiliency Strategy. Staff have also been scoping the development of a campus biodiversity strategy identifying actions and approaches that can help support CAP2030 mitigation and adaption opportunities.

iv. ***Partnerships.*** The success of CAP2030 will also require UBC to leverage internal and external strategic partnerships. Opportunities include Campus as a Living Lab program to identify climate initiatives and projects that support both operational objectives and academic research interests, as well as industry partnerships with the cleantech sector. Partnerships with student groups that help increase climate awareness and collective action. Partnerships across all levels of government need to be pursued where UBC can deploy its research functions to advance policy and technological innovations. On a global scale, UBC will continue to play a leadership role in networks such as UC3, U7+, ISCN and University Alliance for Sustainability.

D. Implementing UBC Vancouver's CAP2030: Risks, Costing, and Timing

Risks

Three main external risks include:

- emerging efficacy of technology of low carbon energy supply and energy efficiency solutions;

- policy uncertainty associated with changing provincial and federal mandates and programs that influence the business case for low carbon capital investments; and
- addressing the extended impact areas where UBC does not have direct or jurisdictional control.

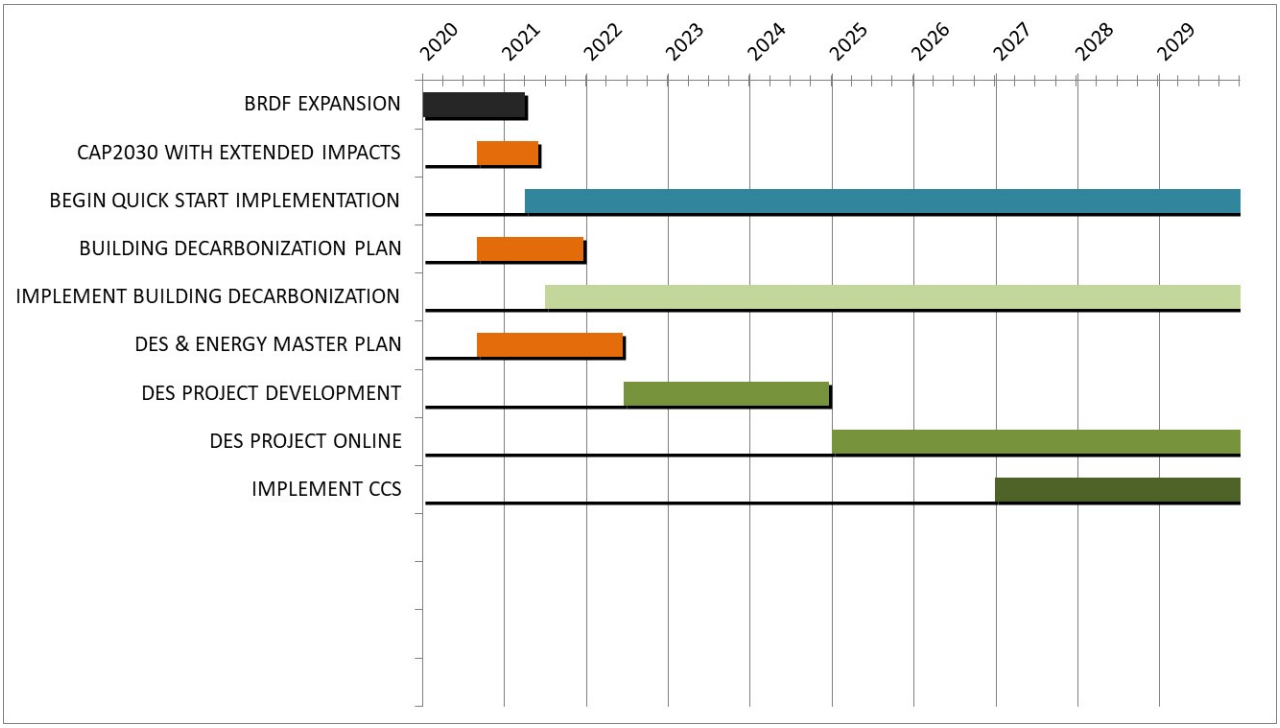
In addition, an internal risk exists around UBC's financing capacity, especially in regards to the budgetary challenges from Covid 19, which may impact the University's ability to implement necessary capital investments on the proposed timeline. The following sections address these risks, along with the associated costing processes, timelines and strategies to leverage external funding.

Campus Operations

CAP2030 has identified bold targets and key actions that can accelerate UBC towards its net-zero target for Campus Operations. Technically there are solutions that can support deep emission reductions through more aggressive performance requirements at building and site scales, as well as low carbon energy at the campus scale. However, the best solution or approach to decarbonization for UBC's current context requires further analysis. Therefore, a top priority is to conduct more detailed energy supply and building retrofit studies to identify the best approach to decarbonize UBC's core operations, progressively refine the costing, and ensure that limited resources are spent in the most effective manner.

While further studies are underway, immediate actions to reduce operational emissions will focus on the completion of the Bioenergy Facility expansion, building retrofit electrification projects, energy savings initiatives and behavior change programs. The timing of future capital and program investments to achieve the respective targets in the final CAP2030 Plan will vary widely. Generally, building scale decarbonization projects will be ongoing throughout the decade to 2030. Investments in the Academic District Energy (ADES) decarbonization project is targeted for 2025, after a comprehensive assessment of viable technologies. Figure 3 below outlines the implementation timeline for key CAP2030 plans.

Figure 1: Implementation timeline for key CAP2030 plans and projects



Investing in building and energy systems that reduce carbon emissions will also protect UBC against the increasing costs of carbon emissions. UBC Vancouver currently pays about $2.8 million / year in BC carbon tax and offsets. Without past action to reduce emissions, UBC would have paid more than $4.4 million/year. Annual carbon liabilities that UBC pays will increase materially in the future, with the federal government having announced an increase of its carbon price to $170/tCO2e by 2030, which BC's carbon tax will have to match to stay in compliance. Offset requirements (of an additional $25/tCO2e) and other regulations further add to this cost. Table 2 below provides an overview of the remaining carbon liabilities and the investment timeline for building and ADES scale decarbonization projects. UBC's expected future carbon liability is likely in excess of $100 million over a 25-year equipment and project life period.[1] Moving forward, investments in clean solutions will simultaneously reduce this liability and contribute to meeting UBC's GHG emission reduction targets. Another benefit of reducing UBC's dependence on fossil fuels is that it helps mitigate UBC's exposure to future volatility of those utility costs while also helping to increase resiliency, capacity and diversification of UBC's energy infrastructure and help future-proof UBC buildings in the face of climate change.

The CAP2030 will also leverage technological innovation, research and development in partnership with UBC's academic researchers, government and industry partners that will showcase UBC's continued leadership in taking urgent action to address climate change.

Table 1: Carbon liabilities and Phasing of Campus Operations decarbonisation projects

	Carbon liabilities	Clean solution Implementation
Building scale	~$50 million	2021-2030
ADES scale	~$50 million	2025-2030

Note: see footnote 1 on total carbon liability. Post BRDF expansion, about 50% of remaining campus buildings emissions will be from the ADES, and 50% from direct gas buildings.

Extended Impacts:

Addressing Extended Impacts is a new area for UBC and as such, the resource requirements will need significantly further scoping. The top priorities for 2021-22 will include developing a cross-campus climate action campaign to better engage faculty, staff and students to be aware and actively contribute toward UBC's climate action goals, advance the climate-friendly food strategy, campus-wide climate food labelling program, complete and launch a scalable furniture and equipment reuse program and develop policies, tools and programs that support remote working, flex-days and e-learning on an on-going basis. For future years, it is very likely that each major area will need to be staffed by one coordinator, including a modest operating and program delivery budget. The coordinators, over a recommended two-year period, would develop a program plan and business model, identify savings and efficiencies, and leverage external funding opportunities. Once this information is available, budgets can be refined and prioritized to deliver the maximum impacts.

[1] This is a high-level initial estimate based on multiplying UBC's remaining emissions (post BRDF expansion) by the announced federal carbon price ($170/t CO2e) and by an assumed average project life of 25 years. A more detailed NPV assessment of the liability will be provided in the future and will consider 1) a comprehensive list of policies that influence the carbon liability (i.e., BC carbon tax, offset requirements, clean energy regulations), 2) assessment of the appropriate project life, and 3) the appropriate discount rate.

II. UBC Okanagan Climate Action Plan 2030: Emerging Directions and Draft Targets

The UBC Okanagan Climate Action Plan 2030 Emerging Direction and Draft Targets have focused on two strategic areas:

- Campus Operations Emissions (buildings and energy supply)
- Extended Impact Area Emissions (food systems, business air travel and commuting)

A. Campus Operations Emission Reductions

Campus operations emissions (Scope 1 & 2) account for 14% of the campus' overall GHG portfolio mostly through the operation of buildings and energy systems.

1. Low Carbon Buildings and Energy Supply (Scope 1 and 2):

Target: By 2030, achieve between a 65% and 80% GHG reduction, from 2013 baseline, through high performance new buildings and existing building energy retrofits.

The moderate reduction scenario of 65% reduction in GHGs (Scenario 1) can be achieved with the continued implementation of the Strategic Energy Management Plan (SEMP), limited decarbonization of the Low Carbon District Energy System and selecting a limited number 'stranded loads' transitioning to a low carbon energy system.

The more aggressive GHG reduction targets can be achieved through:

a. Implementing the Strategic Energy Master Plan (SEMP) to reduce operational emissions from existing buildings by 50% (from the 2013 baseline);

b. Specifying lower operational GHG emission targets for new buildings;

c. Implementing the Low Carbon Energy Strategy (supply side) to be completed in early 2021 which is forecasted to achieve an incremental 15% GHG reduction to achieve a 65% overall GHG reduction;

d. Transitioning 'stranded loads' (for example, existing buildings that use fossil fuel burning boilers and/or water heaters) to hook into a low carbon energy system which can achieve an incremental 15% reduction and an overall 80% reduction in GHGs by 2030;

The more aggressive target of 80% reduction will require further study to understand the increased level of investment - see the resourcing section below.

B. Extended Impact Emission Reductions (Scope 3)

By 2030, the GHG reduction target is proposed to be 45% reduction in GHGs by 2030 in alignment with the Paris Agreement target of keeping global temperatures at 1.5 degrees C.

The Extended Impact Emission Reductions would focus primarily on business air travel, commuting and food systems. Extended Impact Emissions (Scope 3) account for the remaining 86% of emissions, highlighting the importance of addressing these emissions in the UBCO CAP 2030, in line with UBC's explicit mandate to reduce extended impact emissions through the Climate Emergency Declaration.

The proposed targeted reductions being identified in selected areas:

2. ***Commuting: By 2030, achieve a 50% to 60% reduction in GHG emissions related to staff, faculty and student commuting.***

   The draft target and supporting actions will be confirmed and brought forward through the UBCO Transportation Planning Process. Strategic bundles of actions will focus on transportation demand management strategies (i.e. parking pricing, incentives and campaigns that support campus community to take sustainable modes of transportation, improved accessibility and convenience for transit, cycling and walking).

3. ***Food Systems: By 2030, develop a climate-friendly food system to reduce food system-related* GHG emissions by 50%; target 80% climate-friendly food menus in 2025**.

   This can be achieved by implementing climate friendly food procurement guidelines for food service outlets, behavioral change campaigns, and consumer food waste reduction / recovery strategy.

4. ***Business Air Travel: By 2030, achieve a 50% GHG reduction associated with Business Air Travel Emissions from pre-COVID levels.***

   Business air travel is one of UBC Okanagan's largest source of indirect emissions, accounting for at least 24% or 3,528 tonnes of carbon dioxide equivalent (tCO2e). Much of this travel is for business between the campuses, and to meet academic research requirements. By leveraging recent learnings from the Covid-19 Pandemic including the availability of better communication technology solutions it is anticipated that air travel can be reduced while maintaining or improving UBC's educational and research objectives. This acknowledges the dependence upon air travel for faculty and students to carry out certain types of research and scholarly projects, as well as dependencies between the campuses as it relates to system-wide activities.

5. ***Outreach and Engagement*: *By 2030, (66%) of all UBC faculty, staff and students will be aware of and actively contribute toward UBC's climate action goals for which they have influence or control.***

   The inclusion of extended emissions in the UBCO CAP 2030 requires the development of new engagement campaigns to support commuting, food, air travel waste, and other emerging UBCO CAP focus areas.

C. Emerging and Future Climate Action Initiatives for UBC Okanagan Campus

While the current CAP 2030 process is focused on the development of mitigation strategies to reduce fossil fuel impacts, responding to climate change will also require the development of adaptation strategies to reduce the impact associated with climate change. It is recommended that a Climate Adaptation and Resiliency Plan be developed for the Okanagan campus as a subsequent phase (FY 22-23).

There is significant opportunity to apply policies, guidelines and actions that are being developed on the Vancouver campus while also responding to the operational context of the UBC Okanagan campus. Areas of future policy advancement may apply to fleet and equipment, green building guidelines, embodied carbon as well as waste and materials.

D. UBC Okanagan CAP 2030: Resourcing and Financial Implications

Campus Operations

The UBC Okanagan campus has rapidly advanced key studies to identify decarbonization pathways for building and energy supply options. Based on analysis of emission reductions associated with the Strategic Energy Management Plan (identifying measures to reduce energy and emissions in existing buildings) and the Low Carbon Energy Strategy there is a range of two possible emission reduction scenarios. Table 4 outlines the preliminary estimated investment required to achieve Scenario 1's moderate (realistic) target. Short-term actions will be addressed through the Fiscal 21 22 budget process to address this pathway, as an incremental step toward a more aggressive reduction target.

Table 2: Campus Operations Strategies/Actions – Estimated Investment Required for Scenario 1 and Cumulative GHG Savings for Campus Operations Strategies/Actions

Strategy/Action	Current Status / Development Phase	Initial Investment Required	Total Investment Required 2020-2030	2030 GHG Savings rel. to 2013
Strategic Energy Management Plan (SEMP)	Implementation	$200k/yr	$2M	50%
75% District Energy Decarbonization	Concept Design complete by March 2021	$2-3M	$4-8M	60%
50% Stranded Load Decarbonization	Timing aligned with end of life equipment replacements	TBD	$2-5M[2]	65%

Achieving an 80% emission reduction by 2030 builds on what is needed for the 65% reduction (Scenario 1). Preliminary work suggests that achievement of this target is possible, and requires additional work including decarbonizing the remaining 25% energy supply and 50% stranded load.

The more aggressive scenario will require further study and significant levels of investment to assess a range of energy supply options to fully decarbonize the district energy heating generation sources, as well as to assess stranded load reduction potential on a building by building basis. In order to pursue this ambition, UBC Okanagan will require additional staff resourcing, a higher level of investment to connect stranded loads to district energy a series of buildings, and a commitment from ancillaries to connect into a low carbon DE system or alternatively achieve a passive house and/or equivalent low carbon building standard. A detailed business case for each of the investments to help support advancing toward this target will need to be pursued.

Extended Emissions

In addition to the in-kind staff time already committed to the CAP program, additional resources will be required to support capacity building, change management, engagement and campaigns to support reductions in extended emissions. Further scoping is required to identify resources and program funding required to address UBCO's extended impact emissions. Short-term priorities and quick-start actions identified in this report will be addressed through the Fiscal 21-22 budget review process.

[2] The UBCO High Level Net Zero Carbon Energy Strategy indicated overall capital and operating cost reductions would be achieved by connection of loads to the District Energy System. Costs listed would offset costs to routine capital budget for required equipment renewal. Project priority to be determined by relative business case.

E. Next Steps for CAP2030 Completion (both campuses)

- Review 2021/22 budget needs through the annual UBC operating budget planning process to secure funds needed for the continued advancement of priority quick start actions and to provide funding for technical and financial studies for the range of both operational and extended actions.
- Work with USI and others on the outcomes of the Climate Emergency Task Force to pursue alignment, coordination and deeper exploration of areas of emphasis, such as the integration of climate justice across the range of climate action activities.
- Report back to Board in Fall 2021 with Phase I of the CAP2030 for both campuses, which will include:

UBV Campus Operations

- Targets: Provide narrowed/refined GHG reduction target range by category.
- Implementation planning and resourcing: provide a more detailed implementation matrix and updated resourcing strategy and estimates.
- Carbon Pricing: finalize Internal Carbon Price level.
- Fleet: Complete draft Fleet emission reduction actions.
- Energy Supply: Provide status update on technical and financial investigations into energy supply options (these investigations will continue into early 2022).
- Buildings:
  - Refined actions for new & existing buildings;
  - Update on technical & financial investigations into existing building low carbon retrofits;
  - Provide rough order of magnitude of costs for an initial subset of priority buildings (more detailed retrofit plan and costing to be developed by end of 2021).

UBCO Campus Operations

- Complete findings from the Low Carbon Energy Strategy with recommendations and the supporting financial business case for advancing on a preferred option to support the energy supply emission reduction targets.
- Specify building level carbon reduction targets for new capital building projects.

Cross Campus

- Draft detailed action plan and initiatives to address Extended Impact emission sources for commuting, food systems and business air travel for both campuses.
- With the emerging results of the technical and financial analysis, work with the UBC Executive to help determine an optimized pathway to achieve targeted reductions and report findings in a Phase II CAP2030 Report to Board in 2022.

APPENDICES

1. Appendix A: Climate Action Plan 2030 Vancouver Campus—Emerging Directions and Draft Targets
2. Appendix B: Climate Action Plan 2030 Okanagan Campus—Emerging Directions and Draft Targets

PRESENTATIONS

1. Climate Action 2030: Emerging Directions and Draft Targets UBC Vancouver and Okanagan Campus (PPT)

SUPPLEMENTAL MATERIALS (optional reading for Governors)

1. UBC Internal Carbon Pricing—memo outlining the application and approach of using Internal Carbon Pricing (ICP) to support low carbon capital investments

Appendix A: UBC Vancouver Climate Action Plan 2030: Emerging Directions and Draft Targets

The UBC Vancouver-Point Grey campus is located on the traditional, ancestral and unceded territories of the xʷməθkʷəy̓ əm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

UBC's vision for climate action

Climate Action Plan 2030 will position UBC as a model of how universities can mobilize to address the climate emergency and Paris targets through bold, impactful actions to accelerate and deepen reductions across operations, and expanded action on reducing indirect emissions.

Climate Action Plan 2030: Context and Background

CAP 2030 strategic direction

In December 2019, UBC's Board of Governors unanimously endorsed a Declaration on the Climate Emergency, joining over 1,700 jurisdictions around the world to commit to accelerated emissions reductions that aligns with the Paris Agreement of limiting global warming to 1.5C. With this endorsement, the Board emphasized that climate action continues to be a top strategic priority for the University. Specifically, the Declaration gives impetus for UBC to accelerate decarbonization of its core operations, to expand the scope of action to indirect emissions that UBC has some control over, and to consider a climate justice lens in its future response. To support these commitments, the Climate Action Plan 2030 (CAP2030) process has been initiated.

Climate action a long running priority for UBC

Climate action has been a priority for UBC for the past two decades. Past Climate Action Plans have done much to reduce the University's greenhouse gas (GHG) emissions. The BioEnergy Expansion project which is currently underway will come online in early 2021 enabling UBC's scope one and two GHG emissions from campus operations to be reduced by an estimated 62% compared to the 2007 baseline. This means UBC has successfully met its 2015 target of a 33% reduction, and will come close to meeting its 2020 targets of a 67% reduction (both below 2007 baseline). UBC currently also has a net-zero emission target for 2050. In 2019, Times Higher Education ranked UBC as the top university globally in addressing the climate crisis. UBC has also played an important role in elevating this issue across the global university network, including through the University Climate Change Coalition (UC3), the University Alliance for Sustainability (UAS), the International Sustainable Campus Network (ISCN) and the U7+ Alliance that help ensure higher learning institutions across the globe are effective agents of change.

Catalysts of Change: Emerging external and internal changes since CAP2020

UBC's previous Climate Action Plan process, CAP2020, was completed in 2016, and achieved significant GHG reductions through multiple new projects and initiatives. Since then much has changed on the climate change file, both internally and externally, that will have important implications to UBC's future response. These changes include:

- *IPCC special report on 1.5C warming:* In 2018, the Intergovernmental Panel on Climate Change (IPCC) released a special report on the impacts of global warming. It determined that the impacts of climate change would likely be worse than previously expected, and that the previously assumed safe limit of a 2C increase would result in irreparable damages, and an increased chance of runaway climate change. The report found that limiting warming to 1.5C would help protect against the worst changes. It is commonly understood that the 1.5C limit should be seen as the maximum safe level. Limiting climate change to this level will require global emissions reductions by 45% by 2030 (below 2010), and to net-zero by 2050. Global climate models are warning of an alarming 3-4C increase in temperatures by the end of the century.

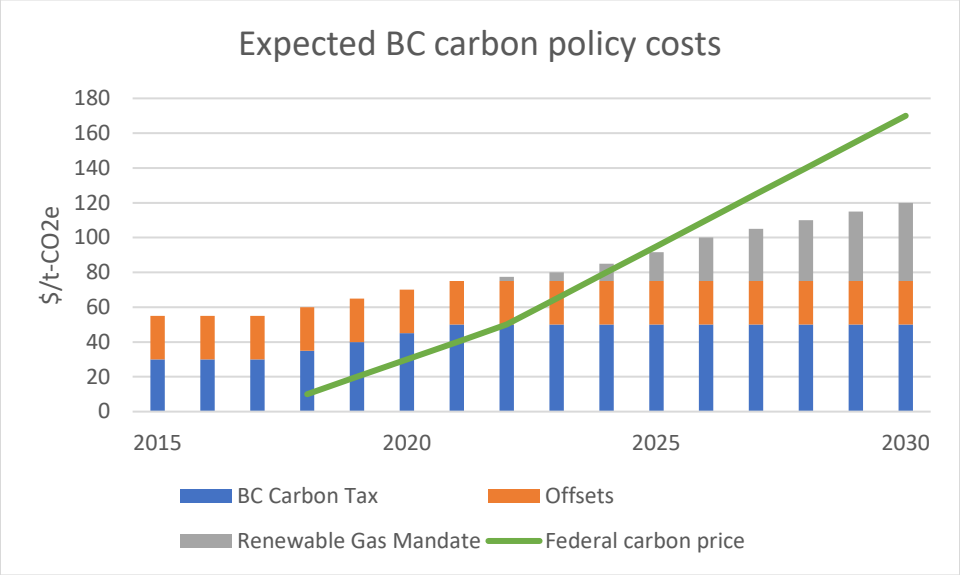
- *Youth lead climate strikes:* In September 2019, millions of people around the world participated in peaceful marches in the lead up to the United Nations Climate Summit. The marches were initiated by a youth-led climate movement called Fridays For Future, where students went on strike to raise awareness on the disproportionate impact climate change has on the future of today's youth. This movement grew from a single teenage girl protesting in Sweden, to one of the largest protest movements in the world. The September 2019 climate marches were a catalyst for a series of Climate Emergency Declarations across the world, including by UBC.

Figure 1: UBC Climate Strike, September 2019

Photo credit: Climate Justice UBC

- *Increasing policy stringency at the provincial and federal level:* Since CAP2020 was completed, there have been significant advances in climate policy. At the provincial level, the CleanBC Plan materially increases ambition, with committed climate policies helping reach 75% of B.C.'s 40% reduction level by 2030. At the federal level, the Pan Canadian Framework for Climate Change is the first comprehensive federal climate response to materially lower emissions. By 2021, UBC will pay a carbon price of $75 for each tonne of carbon dioxide (t-CO_2e) emitted ($50/t-$CO_2$e for BC Carbon Tax and $25/t-$CO_2$e for public sector offset requirements). Recently, the federal government committed to increasing its carbon price to $170/t-$CO_2$e by 2030 and introduced legislation to set legally binding targets with accompanying accountability mechanisms. However, it is not just explicit carbon pricing that will drive GHG reductions. For CleanBC, regulations like the Renewable Gas Standard will drive the majority of the province's GHG reductions, and come with an implicit but meaningful carbon price. This strengthening policy backdrop supports stronger action by all.

Figure 2: Carbon costs of announced BC and federal climate policies (natural gas)



Note: 1) The federal carbon price escalation was only recently announced and at this stage we do not yet know how the federal and provincial carbon policies will interact. The expected total carbon costs for UBC by 2030 is in the range of $170 to $240/t-$CO_2$e. 2) The carbon costs of the renewable gas mandate are estimated based on currently available information (natural gas represents ~90% of UBC's total direct GHG emissions).

Infobox: UBC's increasing carbon liability

UBC Vancouver currently pays carbon liabilities of around $3 million per year. This will increase materially in the future (if UBC does not continue to decrease its scope 1 and 2 carbon emissions) as governments tighten policy to meet their climate commitments. Recently, the federal government announced an increase of its carbon price to $170/t$CO_2$e by 2030, which BC's carbon tax will have to match to stay in compliance. Offset requirements add an additional $25/tCo2e to this cost. Given that equipment and infrastructure is around for many years, **UBC's expected future carbon liability would accumulate to $100 million** over the next 25-years if no further actions are taken to reduce carbon emissions. Without UBC's past action, this liability would have been more than double this amount. Moving forward, investments in clean, low carbon solutions will be required to further reduce this liability. The liability must also be considered when assessing the level of ambition that the University will aim for with CAP2030.

- *Clean technology breakthroughs:* In the past decade, technology development has grown faster than expected as cost declines have made mass adoption of many clean energy and energy efficiency solutions much more viable. As such, more viable technology pathways now exist to help meet UBC's climate targets.

- *Building on lessons from COVID-19:* The world's quick and decisive response to the COVID-19 pandemic has shown that major challenges can be addressed with the urgency they require. At UBC, the response to the pandemic also holds important lessons on how to address climate change. For example, emissions from business air travel and commuting – two of the largest sources of UBC's Extended Impact emissions and larger than Campus Operations – were dramatically reduced while maintaining UBC's mission to excellence in teaching and research. Building on these lessons will be critical in making good on UBC's Climate Emergency Declaration.

Infobox: Climate Action Plan 2030 – Scope & Terms of Reference
UBC's CAP2030 process has been initiated to help support UBC's Climate Emergency Declaration, to accelerate action and align plans, policies and programs with the 1.5C Paris Agreement target.

Objectives of CAP2030 include:
- Setting new interim targets that sit between UBC's current 2020 and 2050 targets;
- Accelerating the decarbonization of campus operations from the current 2050 target date;
- Expanding CAP scope to include areas of influence extending beyond UBC's operations, such as commuting, air travel, and food.

CAP2030 working group members were instructed to consider key elements from the Climate Emergency Declaration, with a specific focus on including a climate justice lens to help evaluate priority actions. Climate justice considerations were introduced into working group discussions and will continue to be addressed within the refinement of actions wherever appropriate.

CAP2030—an extensive university initiative
In order to realize the vision and ambition of CAP2030 it will require UBC to activate all of its institutional, intellectual, operational and community capacities. Some of the most innovative research into clean, low carbon technology solutions is happening right here at UBC. The CAP2030 process is an opportunity for the University's operations teams and research community to work together and apply this research to solve our own energy and climate challenges. The Campus as a Living Laboratory program has a track record of success on advancing innovative low carbon solutions, including the Bioenergy Research Demonstration Facility (BRDF) and the current expansion. These were core components of the original CAP and the CAP2020 respectively and will reduce UBC's emissions by a combined 23,000 t-CO_2e per year.

Collaboration is already ongoing to determine the next breakthrough clean energy and climate solutions at UBC, including development of on-campus hydrogen production and use for fleet vehicles and buildings, faculty collaboration on reducing air travel emissions, Carbon Capture Utilization and Storage (CCUS), and waste heat capture. Continuing to leverage this strength in the future will be key to meeting UBC's aggressive climate targets and to accelerate the uptake UBC-created solutions beyond our campus.

Successful delivery of UBC's climate action will require all parts of the UBC community to be engaged and to participate in order to achieve collective impact. This is especially true for addressing UBC's Extended Impacts, such as commuting, air travel and food. On one hand, UBC has less direct control over these emissions sources. On the other hand, UBC students, faculty and staff, through their own individual choices, have an opportunity to take action and contribute to these emissions reductions.

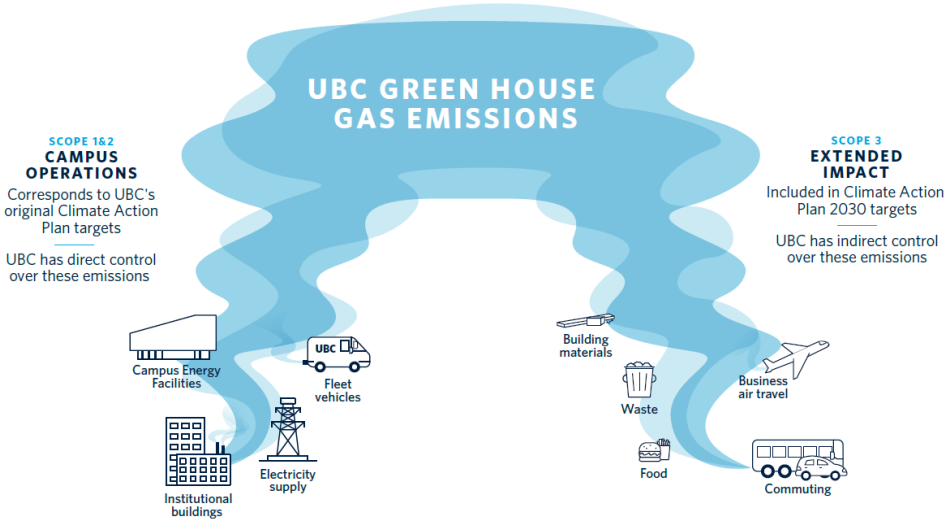
UBC's program development will need to support this action, and purchasing policies will also play an important role.

Figure 3: UBC operations and research collaboration at the Bioenergy Research Demonstration Facility

Note: The Bioenergy Research and Demonstration Facility (BRDF) is a joint collaboration between UBC Energy and Water Services and UBC Applied Science. Once the current BRDF expansion is completed in 2021, it will reduce about 14,500 t-CO_2e/yr.

UBC Green House Gas Emission Sources

Figure 4: UBC's emissions sources and categories

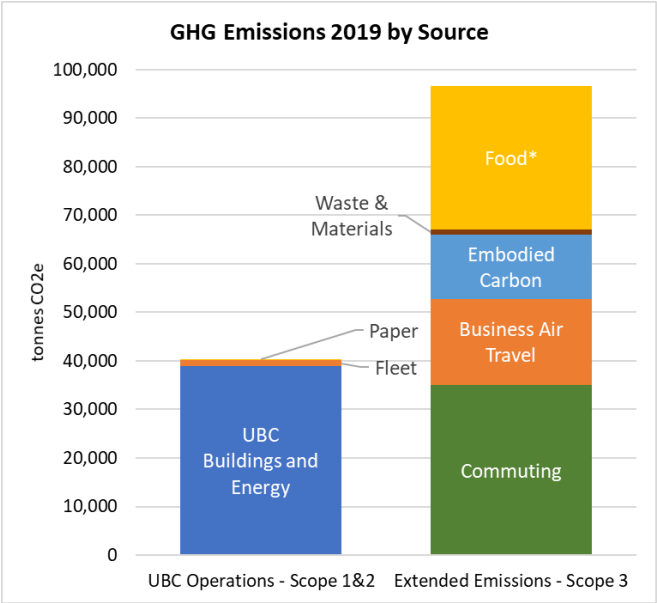


Heating and operating buildings account for 97% of UBC total campus operations emissions, and the vast majority of this comes from burning natural gas (86%). Emissions generated through campus operations (see Figure 4) are defined as emissions from sources directly controlled and operated by UBC (Scope 1 emissions), and from upstream emissions from electricity consumed on campus (Scope 2). These are considered emissions that UBC "owns" and must offset under provincial regulations and correspond to the original CAP targets. Campus operations emissions in 2019 were 40,400 t-CO_2e. The University is on track to reduce emissions to about 23,000 t-CO_2e, when the BRDF expansion project becomes operational in early 2021. When the expansion is complete and the facility in operation, it is anticipated that UBC will advance toward reducing emissions by an estimated 62% below 2007. As such, UBC will already be outperforming the Paris Agreement 1.5C target of 45% reduction.

"Extended Impact" emissions are those that UBC does not directly own or control, but indirectly impacts through University activities and its ability to influence through behavioral change programs, sustainable supply chain procurement guidelines and others. These emissions are generally referred to as Scope 3 emissions and include sources such as commuting to and from campus, business air travel, food consumed on campus, waste, and building materials. While UBC has some influence on these emissions, in effect they are someone else's Scope 1 and Scope 2 emissions, and the University is not responsible for carbon tax or offset payments on them. Extended Impact emissions are about 2.5 times larger than Campus Operations emissions.

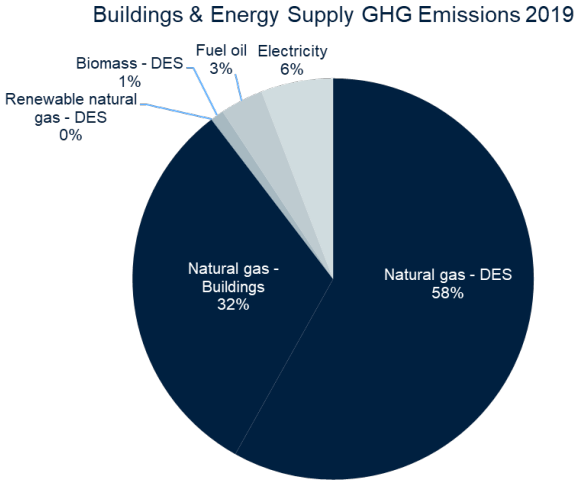
CAP2030 is the first time UBC has made an explicit mandate to reduce "Extended Impact" emissions. This offers new opportunities to significantly reduce UBC's climate impacts through strategic actions identified below.

Figure 5: UBC Campus Operations Emissions and Extended Impacts emissions (2019)



Note: Extended Impact emissions are estimated and less accurate than Campus operations. For the Waste & Materials category, emissions shown only include those from disposal and do not include life cycle emissions, which are much larger.

Figure 6: UBC Campus Operations Emissions by energy source (2019)



Note: Electricity emissions (Scope 2 emissions) only accounted for 6% of total Campus Operations emissions in 2019. However, the relative importance of these emissions will increase in the future as 1) they become a larger proportion of total emissions as UBC reduces its fossil fuel use, 2) due to expected increased consumption of clean electricity to help displace fossil fuel use and 3) the provincial government has indicated that the electricity emission factor will increase to give a more realistic representation of the supply mix.

CAP2030 vision and draft targets

The global climate crisis is accelerating, and strong collective action must be taken to avoid the worst impacts. With CAP2030, UBC is committing to achieve deep carbon reductions for campus operations by 2030, materially exceeding the 1.5C Paris emissions targets. CAP2030 further seeks to expand strong action to UBC's Extended Impacts, and to meet the 1.5C emissions targets for these emissions. With CAP2030, UBC is committing to address the climate crisis with the urgency that it requires. Through strategic investments in climate action, UBC will be leveraging its institutional, operational and intellectual capacities to chart a leadership path for other post-secondary institutions to emulate. Increased investments in expanding clean energy supply, energy efficient technologies and carbon capture and use will also provide an opportunity for partnering with faculty researchers devoted to help advance innovation in these areas.

Emission Reduction Targets for Campus Operations

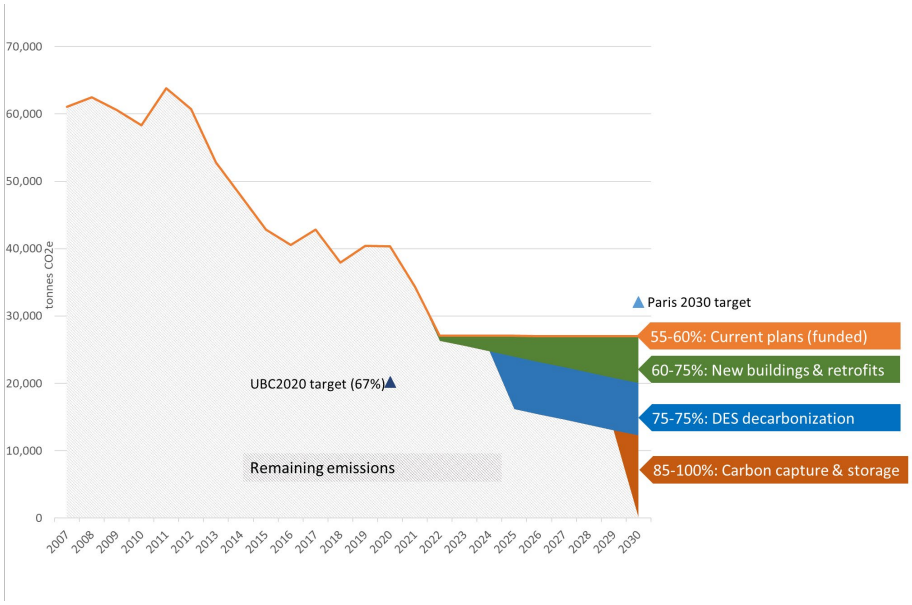
For 2030, a target range of **75% to 100%** GHG emission reduction below 2007 has been identified, noting that UBC is already on track to achieve a 62% reduction by 2021. It gets progressively more challenging to achieve the higher part of this range, as fewer low-cost solutions remain available. Reducing emissions by 90% translates to eliminating virtually all conventional fossil fuel use from Campus Operations. The net-zero scenario goes further by also addressing remaining emissions from low carbon energy. The technology solutions for this, such as direct air capture of carbon, are still emerging and have not been proven at a wide scale. The ambition for 2030 will determine by how much UBC is able to accelerate its decarbonization target, currently set for 2050.

UBC is well-positioned to achieve deep carbon reductions and accelerate decarbonization of its core operations. A combination of factors including UBC's history of successfully advancing ambitious climate action, increasing policy alignment across different levels of government with increased external funding

to support accelerated technology innovation, and increasing community support for ambitious action will help to advance UBC's climate ambition. Given the size of UBC's Vancouver Campus, this can serve as an invaluable demonstration for how other campuses and neighbourhoods could achieve decarbonization while experiencing significant growth.

Figure 6 shows the historical operations emissions, plus potential reduction ranges that could cumulatively reduce emissions to net zero.

Figure 7: Campus Operations Emissions Reductions Pathways.

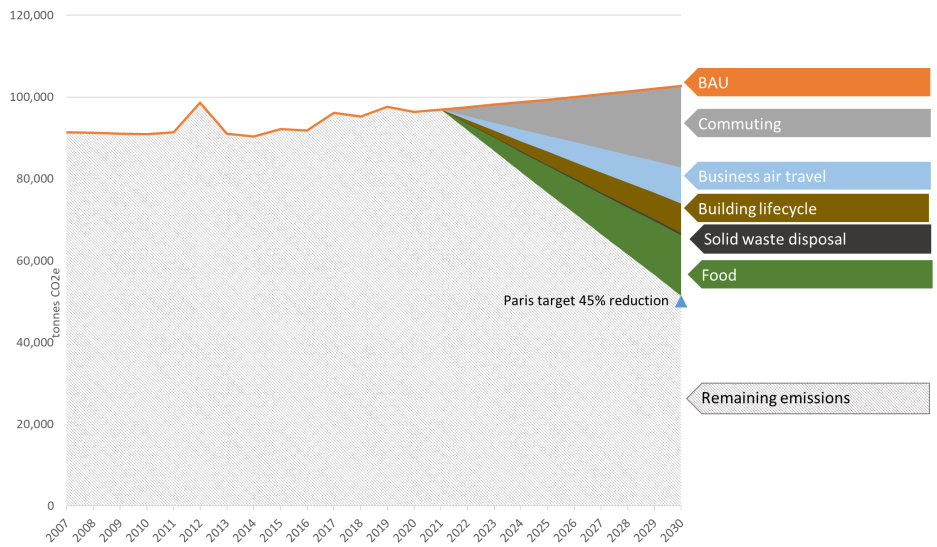


Emission reduction target for UBC's Extended Impact Emissions Areas

For Extended Impact emissions, CAP2030 proposes a target for **45% from 2010** levels, reaching the Paris Agreement 1.5C target by 2030. This is in line with the mandate given by the climate emergency declaration.

By definition, UBC does not have direct control over its Extended Impacts. Achieving this will require coordination between all levels of government, further technology innovation and adoption, and working with businesses and stakeholders across various value chains. Most importantly, it will require strong buy-in and support from UBC's students, staff and faculty, who through their own personal choices have the most control over these emissions.

Figure 8: UBC Extended Emissions: 2030 Targeted Emissions Reduction by Action Area



As described for Figure 5, Waste emissions shown only include those from disposal and do not include life cycle emissions, which are much larger.

Draft targets and Key Actions

Below is a high-level summary of key actions identified in the CAP2030 working group process, broken out across ten action areas. It is meant to provide an overview of areas of focus, key actions and overall level of ambition of CAP2030. A more comprehensive list of actions and details will be further refined and confirmed in collaboration with key stakeholders. Importantly, climate justice considerations for the actions will be further advanced as the University's understanding of this issue evolves.

Campus Operations

Academic District Energy System:

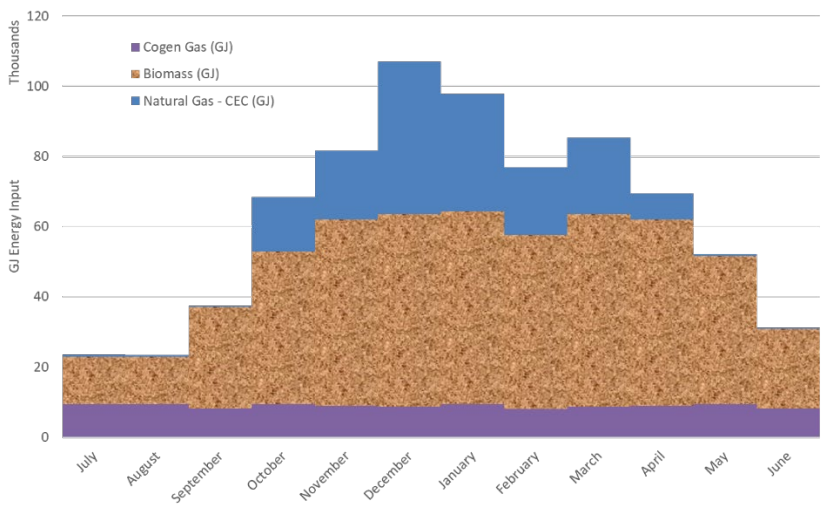
Target: *By 2030, 100% of the energy used by the Academic District Energy System will come from low carbon sources[1].*

Rationale: The Academic District Energy System (ADES) is the major source of heat to campus buildings. It has also been the single largest source of UBC's GHG reductions, with emissions declining from approximately 50,000 t-CO_2e in 2007 (by the previous steam district energy system) to 24,400 t-CO_2e in 2019. Emissions will further decline to approximately 13,000 t-CO_2e once the BRDF expansion is completed in 2021, a 75% reduction in system emissions while also expanding heating services to new buildings. Natural gas used to represent almost all the energy input into the ADES. By mid-2021,

[1] Low carbon energy sources includes renewable energy such as BC Hydro grid electricity (currently 98% clean and 100% incremental load clean), locally generated electricity (e.g., solar pv), biomass, renewable natural gas (RNG), hydrogen made from renewable electricity (i.e., green hydrogen) or from fossil fuels while managing carbon emissions (i.e., blue hydrogen), and using fossil fuels directly while capturing and storing/utilizing the carbon (e.g., fossil fuels with CCS). Low carbon energy excludes all traditional uses of fossil fuels.

approximately 70% of the energy will come from low carbon sources, which meet the vast majority of the baseload requirements.

Figure 9: Monthly fuel input into the ADES (2021-2022)



Note: Currently, natural gas is predominantly used for shoulder and peak times in fall and winter. The BRDF provides the majority of the baseload energy through carbon neutral biomass.

Actions - Immediate (Start F2021-22)

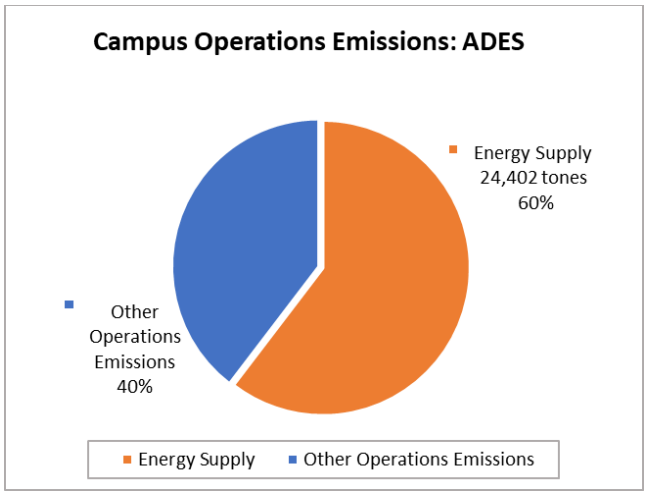
- Evaluate potential feasibility of low carbon energy sources to decarbonize the ADES, such as large high lift heat pumps.
- Explore opportunities for thermal storage to reduce daily peak demand and lowering DES temperature to increase system efficiency and enabling lower temperature energy sources.

Short Term - By 2024

- Conduct a detailed technical and financial feasibility assessment of the short-listed low carbon energy supply option(s).
- Engage with BC Hydro to ensure adequate amounts of clean electricity is available to support strategic electrification of natural gas-based systems, and with Fortis BC to secure more renewable natural gas (RNG). (Relevant to both the ADES and at the building level).

Medium Term - By 2030

- Starting in 2025, implement solutions identified from above studies, with a goal to track to 100% low carbon energy by 2030.
- Explore and evaluate potential solutions to reach and accelerate UBC's net-zero target, such as direct air capture of carbon to address remaining emissions from low carbon energy sources.



Buildings

Target: *By 2030, new buildings and building renewals will target near zero operational emissions[2], and existing building emissions will be reduced to reach a target to be confirmed.*

Rationale: Heating and operating UBC's buildings represent 96% of total Campus Operations emissions[3], and this energy currently accounts for about $22 million in annual energy costs. Direct natural gas consumption by buildings (i.e., buildings that are not connected to the ADES) represent about 30% of the total. Ensuring new buildings are built to high performance, existing buildings are strategically retrofitted, and that energy supplied to buildings becomes increasingly low-carbon is imperative for UBC to achieve its bold GHG emission reduction ambitions for 2030 and beyond, will minimize energy consumption, and will reduce escalating carbon costs.

Actions - Immediate (Start F2021-22)

- Eliminate fossil fuel equipment installation in new and existing buildings, unless sufficient amounts of RNG are secured for the lifetime of the equipment[4].
- Develop and implement new building and renewal project GHG intensity targets, differentiated according to building type to complement existing energy use intensity targets; this will require more energy efficient designs and switching to low carbon energy sources.
- Develop a building decarbonization plan that integrates with maintenance and renewal programs, and a resourcing strategy to support incremental costs.

Short Term – By 2024 and Medium Term - By 2030

- Implement building retrofits strategically as per the above plan and funding.

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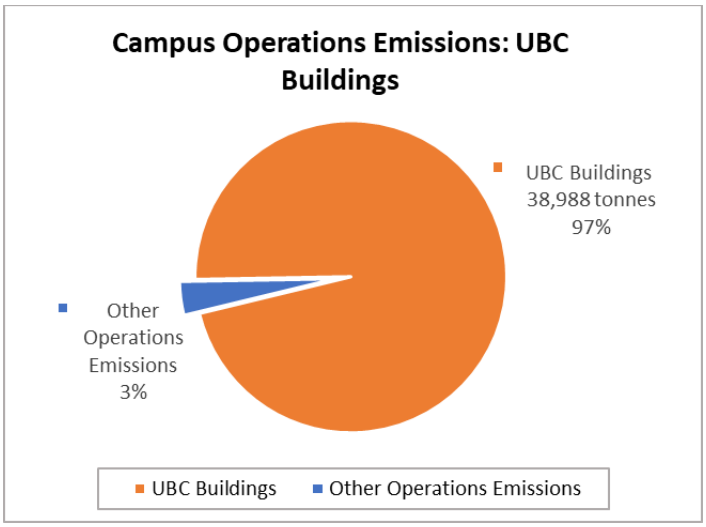
[2] Near zero operational emissions assumes that building level, future energy and GHG intensity targets are being met and all energy supply is from low carbon DES, BC Hydro electricity, and/or renewable natural gas.

[3] UBC's buildings include a lot of energy intensive laboratory space. Due to equipment such as fume hoods and steam and humidification systems, energy consumption of these buildings is materially larger than for traditional buildings, which tend to be dominated by space and water heating.

[4] As a low-carbon, non-fossil fuel, Renewable Natural Gas can replace natural gas in a building that is not connected to the ADES. However, historically the available supply of RNG has been limited.



Note: This graphic includes all emissions at the building level, and includes direct natural gas use by buildings as well as by the ADES described above.

Fleet

Target: *UBC will procure new vehicles and equipment that are zero emissions where feasible solutions exist.*

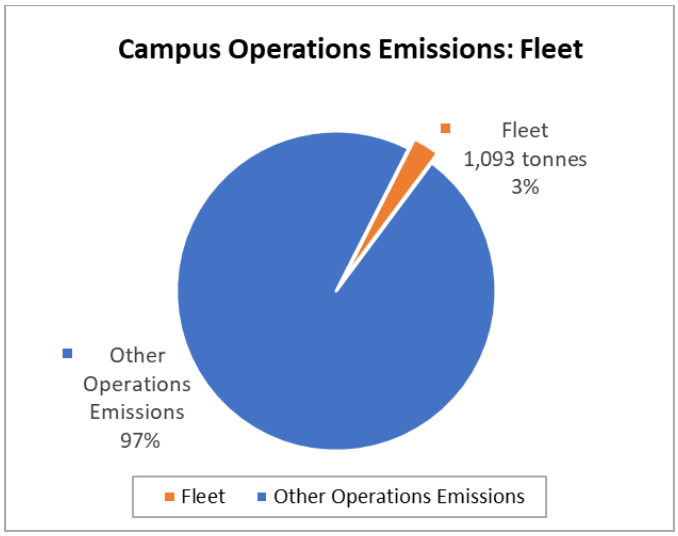
Rationale: While UBC's fleet of vehicles and motorized equipment has a relatively small impact on overall GHG emissions, vehicles are a highly visible part of UBC's operations. Between 2007 and 2018, UBC Building Operations has reduced UBC fleet GHG emissions by 52%, and achieved the only E3 Fleet Platinum rating in Canada. Transitioning to zero emissions vehicles and enabling vehicle sharing among departments can realize significant co-benefits in addition to reduced GHG emissions, including greater overall financial performance and improved quality of fleet services for end users.

Actions – immediate (Start F2021-22)

- Establish a Zero Emissions Vehicle & Equipment First (ZEV First) Procurement Policy that will require all new vehicles and equipment be zero emission, as long as the model type is available and is not cost prohibitive after applying internal carbon pricing and lifecycle cost analysis.

Short – by 2024

- Expand and leverage Building Operations' fleet management program to all of UBC, continue to pursue fleet optimization and increased efficiency, and develop a comprehensive ZEV Charging, Fueling, & Maintenance Strategy to guide ZEV transitions on campus.



Financial Mechanisms to Support Climate Action: Internal Carbon Pricing

Rationale: Carbon pricing is seen as a key policy tool and a financial mechanism to address climate change. It works by incorporating the true costs of carbon pollution into the decision-making process. So far, external climate policy has lagged behind providing an actual representation of the costs of damages, and is likely to remain uncertain in the future. To address these challenges, CAP2030 proposes the introduction of a carbon proxy (shadow) price to better align financial decision-making criteria with UBC's climate goals and provide certainty, predictability, consistency and rigor for decision making. Unlike a carbon charge, the proxy carbon price does not result in the exchange of money; it is simply used to inform decisions. The application of an internal carbon proxy price can result in more money being invested initially in climate-friendly systems that reduce carbon dioxide emissions, however, it often saves money when factoring in the life cycle cost-benefits of the solution. With the introduction of a proxy price, UBC will join the City of Vancouver and Metro Vancouver to create a local cluster of global leadership on carbon pricing.

Actions - Immediate (Start F2021-22)

- Finalize a starting price level and a predictable schedule for price increase for the carbon proxy price. The price level is still being confirmed, but will seek to calibrate to policy implemented by the City of Vancouver and Metro Vancouver.
- Pilot the carbon proxy price approach in lifecycle cost analysis for several energy supply, equipment renewal and energy conservation projects.
- Develop guidance documentation and supporting toolkit to help operationalize the carbon proxy price analysis at UBC.

Short Term - By 2024

- Implement a carbon proxy price and use life cycle cost analysis to inform decision-making for energy projects (energy supply, energy equipment, energy conservation projects), as well as to fleet purchases and programs.

- Pilot and implement a carbon proxy price and use life cycle cost analysis to inform decision making on capital and infrastructure planning.

Extended Impacts:

Commuting

Target: *By 2030, achieve a 45% reduction in commuting emissions from 2010 levels.*

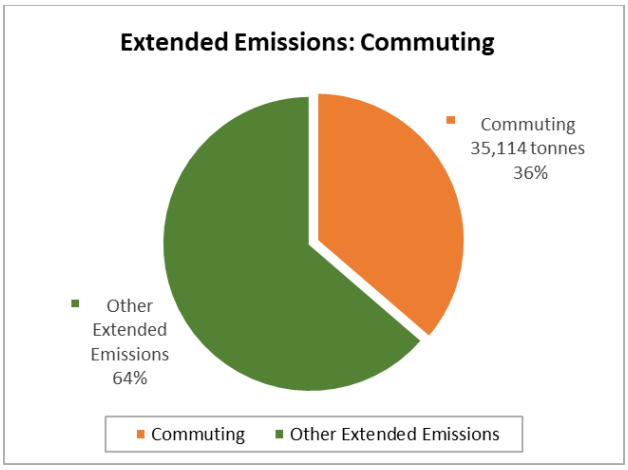
Rationale: Accounting for approximately 36,000 t-CO_2e emissions per year, commuting of students, faculty and staff to the Vancouver campus is the highest Extended Impact emissions category. UBC has been very successful at increasing the transit mode share from 18% in 1997 to 54% in 2019 as a result of the introduction of the U-Pass program for students in 2003. However, further growth in the transit mode share is constrained until there is a rapid transit connection to UBC. This risks an increase to the single occupant vehicle mode share above the current 32% and therefore an increase in commuting emissions. There are opportunities for significant emissions reductions by decreasing commuting trips, shifting choices of transportation modes and vehicle types, and increasing transit capacity in the longer term. Climate justice also factors into development of transportation policies and programs, to ensure that equity across the UBC community is considered.

Actions – Immediate (Start F2021-22)

- Develop policies, targets and tools that enable and support departments in incorporating teleworking, flex days and e-learning on an ongoing basis. Explore evaluation of the teleworking potential of all staff and faculty positions at UBC with HR to understand the university-wide potential for remote work and help ensure equity objectives are met.
- Explore funding via a “Sustainable Transportation Levy” as part of parking permit fees (e.g., $0.10 / trip, 10% or ~$10/month, TBC) to fund sustainable transportation initiatives including a Sustainable Transportation Program, that will support reductions in commuting emissions.
- Establish an ongoing Sustainable Transportation Program to deliver infrastructure, programs and initiatives that enable sustainable transportation choices and drive behavioural change to reduce commuting emissions.
- Continue to pursue a SkyTrain connection to campus by 2030 (existing action).
- Identify a suite of improvements including infrastructure, procedural, and policy changes to improve the Electric Vehicle (EV) charging user experience and capacity to support transition towards electrical vehicle ownership in the UBC community.

Short Term - By 2024

- Transition parking permit fee structure to daily permits only (eliminating monthly, term, and annual permits), and offer a discount/subsidy for monthly transit passes for all staff and faculty.
- Improve cycling experience and potential for trips to and from campus, such as improved secure bike storage, working with government partners to provide dedicated bike lanes to/from campus and a joint bike share program with the City of Vancouver.



Business Air Travel

Target: *By 2030, Reduce Business Air Travel emissions by 50% from pre-COVID levels.*

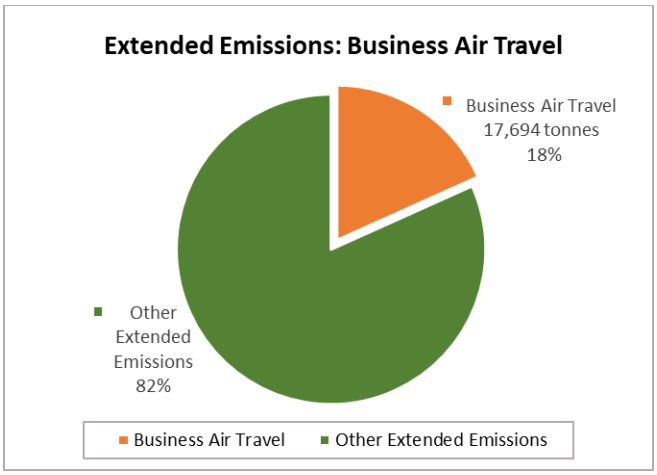
Rationale: Business air travel is one of UBC's largest source of Extended Impact emissions, accounting for at least 17,500 t-CO_2e/yr. This is equivalent to about 50% of total Campus Operations emissions. Much of this travel is by UBC faculty, students, and staff to attend academic conferences. By leveraging the availability of better communication technology solutions, greater social awareness, and recent learnings from the COVID-19 pandemic, air travel can be reduced while maintaining or improving UBC's education and research objectives, and is a key opportunity to increase access to educational opportunities for students and departments lacking means for engaging in extensive travel. This acknowledges the dependence upon air travel for faculty and students to carry out certain types of research and scholarly projects.

Actions – Immediate (Start F2021-22)

- Track and report GHG emissions and other key parameters for all UBC business air travel using data from Workday.
- Eliminate 100% of non-essential travel and utilize growing capacity of virtual tools and platforms as priority alternatives, noting essential travel includes that which is dependent upon in-person research and scholarship.

Short Term - By 2024

- Develop & implement an air travel reduction program that leverages UBC's expertise in social & behavioral change, communications, marketing, and virtual alternatives to lower air travel demand and emissions.
- Lead a coordinated approach to reduce air travel across the University ecosystem by leveraging UBC's leadership role across peer networks (e.g., UC3, U7+).



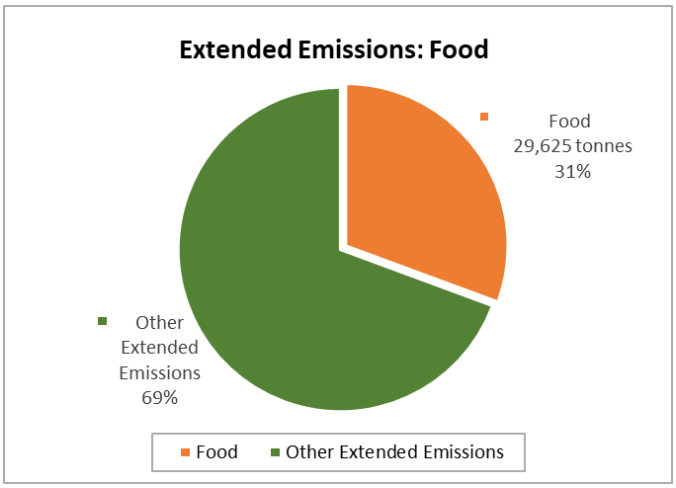
Food Systems

Target: *By 2030, achieve a 50% GHG emission reduction of food systems.*

Rationale: UBC campus food systems account for over 29,000 t-CO_2e per year and is the second highest category in Extended Impact emissions after commuting. From a global perspective, food systems are an enormous driver of climate change and contribute between 21 - 50% of global GHG emissions. UBC is well positioned to lead an integrated approach in creating a just and resilient campus-wide food system. Through partnerships with communities both on and off campus, a Climate-Friendly Food System at UBC will use science-based targets to reduce food system-related GHG emissions. The creation of a campus-wide food system strategy will address all components of UBC's food system, including food production, service providers, consumers, and food waste recovery.

Actions – Short Term – by 2024

- Develop a Food System Resilience & Climate Action Strategy to advance climate-friendly foods in both food production and recovery, amend the UBC Supplier Code of Conduct to reflect UBC's climate commitments, and develop mandatory Climate-Friendly Just Food System Procurement Guidelines for all campus food providers.
- Enhance the measurement and reporting of the campus food system's environmental footprint, and include factors relating to food system justice and labour rights.
- Develop mandatory campus-wide climate food labelling, and a toolkit to increase sustainable dietary choices and habits.



Waste and Materials

Target: *By 2030, UBC will apply a circular economy lens[5] to enable a 50% reduction in waste, progressing toward a zero-waste community.*

Rationale: While UBC's reported GHG emissions from waste disposal are a very small fraction of overall emissions, waste-related emissions are much higher when considering life cycle emissions that include production of goods and materials – analogous to what is included in embodied carbon calculations for construction. In 2019, the Ellen MacArthur Foundation reported that 45% of 2050 global emissions reductions will need to address production of goods and materials, and circular economy strategies could eliminate almost half of these emissions. A Zero Waste Action Plan update planned for 2021 will more strongly prioritize emissions reductions opportunities such as reuse, apply a circular economy lens, and address barriers that have limited progress toward UBC's zero waste goals to date.

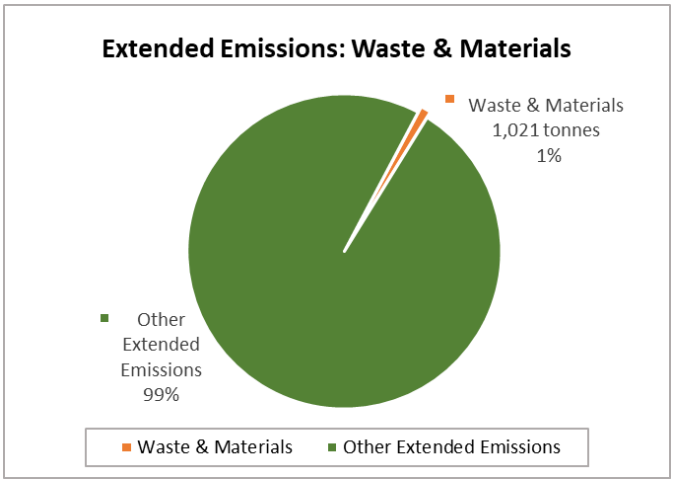
Actions – Immediate (Start F2021-22)

- Initiate a process for updating the Zero Waste Action Plan, which will include refining and integrating the actions below.
- Complete the planning and resourcing for launch of a scalable reuse program that includes furniture, residence items, and scientific equipment.

Short Term – by 2024

- Fund, develop & implement the Waste Operations Strategy (implemented through Building Operations), which will provide critical waste management infrastructure and business process updates needed to reach goals.
- Scope and develop a central sustainable procurement program that could include vendor and product sustainability criteria, packaging requirements, updated procurement guidelines and processes, and integration with the Integrated Renewal Plan.

[5] In contrast to a conventional linear economy ("take, make and dispose"), a circular economy lens increases the focus on reuse and recycling of goods and materials back into the economy to avoid and eliminate waste and generate economic value.



Note: Waste emissions shown only include those from disposal and do not include life cycle emissions, which are much larger.

Engagement and Outreach Programs

Target: *By 2030, two thirds (66%) of UBC faculty, staff, and students will be aware of and actively contributing toward UBC's climate action goals.*

Rationale: UBC's climate-related engagement and outreach programs have demonstrated successes in reducing energy and emissions from UBC operations through energy conservation initiatives, and campaigns delivered by programs including Green Labs, Sustainability Coordinators and Sustainability in Residence. With the inclusion of Extended Emissions targets in CAP2030, new and expanded communications and engagement capacity will be critical to underpin the behaviour and social changes needed to reach the Paris target-aligned goals for business air travel, commuting, food, waste, and embodied carbon in buildings.

Actions – Immediate (Start F2021-22)

- Develop a cross-campus climate action campaign oversight and management model to holistically review, coordinate and support deployment of the emerging social and behavioural change campaign proposals put forth through the CAP 2030 and Climate Emergency engagement processes.

Short Term – by 2024

- Update UBC's Sustainability Engagement Strategy to integrate the greatly expanded priorities, additional stakeholders, and equity and inclusion objectives of the Climate Emergency Response, CAP2030 and emerging UBC Sustainability Communications Plan, and create a comprehensive climate action communications plan.
- Develop new and expanded sustainability engagement and outreach programs including the Sustainability Coordinator program for high-impact audiences, ensuring adequate and ongoing resourcing to amplify engagement on climate action.

Embodied Carbon

Target: *By 2030, establish an embodied carbon baseline and align new building and renewal designs with a 50% reduction target.*

Rationale: As UBC continues to drive down operational emissions from buildings, it is becoming more important to address emissions that arise from materials used to construct these buildings. These emissions represent a significant share of all UBC's Extended Impact emissions. There has been significant progress made in initial research and scoping this area; UBC is already a recognized innovator and leader in building projects that use low carbon materials and innovative construction techniques, as demonstrated by the Brock Commons Tallwood Project. Research will need to continue into developing more accurate and streamlined assessment methods for embodied carbon, reliable regional supply chains for low carbon materials, as well as design and construction strategies to further reduce embodied carbon across the campus.

Actions – Immediate (Start F2021-22)

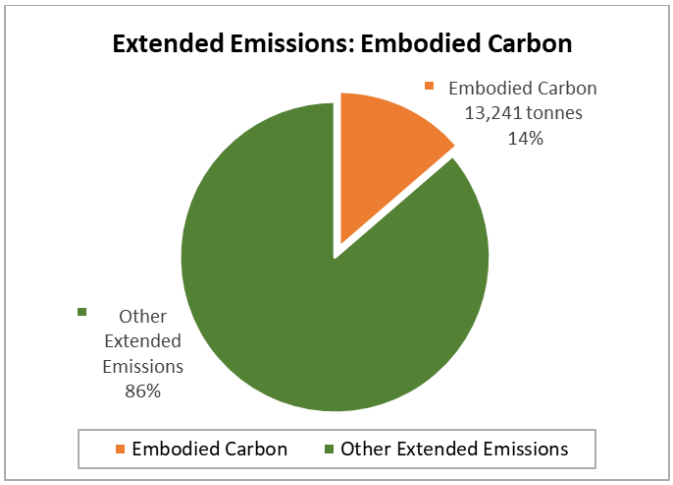
- Develop a clear guideline for assessing, reducing and reporting Embodied Carbon in new buildings and major renewals, needed to establish emissions baselines and performance targets.
- Create an operational and academic research collaboration or hub for UBC building performance/Embodied Carbon, including researchers in Civil Engineering and Forestry.
- Develop and adopt a "carbon red list" to discourage, reduce or potentially eliminate materials with the highest embodied carbon impacts.

Short Term – by 2024

- Reduce new and renewal buildings' embodied carbon (EC) by requiring embodied carbon reductions for major building materials through Technical Guidelines and Design Briefs, including submission of embodied carbon assessments and bill of materials.
- Develop an embodied carbon target for UBC buildings by type and/or for campus as a whole, for application on projects in 2025-2030.

Medium/Long Term – by 2031+

- Develop separate targets and actions for healthy and equitably-sourced materials/buildings throughout their lifecycle



Complementary Action Areas

The following actions are tied to other planning initiatives that are not part of CAP2030, but contribute to CAP2030 objectives.

Housing at UBC

A strategy supporting affordable housing at or near UBC for students, faculty and staff to reduce commuting emissions was identified as an important issue.

Actions - (Immediate to Medium Term):

- Continue to implement UBC's Housing Action Plan to address housing affordability challenges for UBC faculty, staff, and students by increasing housing opportunities on campus.
- Explore additional opportunities for affordable on-campus housing through the upcoming Campus Vision 2050 land use process.
- Continue to prioritize and advocate for a Skytrain connection to campus which will increase access to affordable housing opportunities (part of Commuting priority actions).

Adaptation, Resilience & Biodiversity

CAP2030 is focused on the mitigation of greenhouse gas emissions to meet UBC and Paris Agreement targets. However, adaptation and resiliency in the face of a changing climate is a key issue to incorporate into planning and operations - for example, designing stormwater management systems that can accommodate more intense rainfall events. Addressing climate and ecological crises simultaneously is critical in developing a resilient campus. In addition, natural assets are also part of a holistic suite of solutions that can contribute to mitigating GHG emissions – e.g., shading of buildings to reduce cooling energy loads, and carbon sequestration via trees and vegetation.

Actions – Immediate (Start F2021-22)

- Develop the scope and process and initiate development of an Adaptation and Resilience Strategy.

- Continue to scope and develop biodiversity strategies, with the goal of identifying actions and solutions that will contribute to achieving CAP2030 GHG mitigation targets and help inform future Campus Plan Vision 2050.

Managing Risks and Seizing Opportunities

With CAP2030, UBC will continue to forge a leadership path on taking urgent action to address the climate crisis. There are many reasons to be optimistic about our ability to dramatically reduce emissions and achieve our targets. However, pushing the envelope on what is possible invariably comes with risks. Three main risks include:

- **Technology risk:** Viable climate-friendly technology solutions already exist or nearing commercialization which can address most of UBC's Campus Operations and Extended Impact emissions. However, some of these emerging technologies do not have a proven track record yet, which is needed to assess technical and financial performance and reliability. In several instances, we do not currently have a line of sight on what technology solution is best placed to solve a certain issue (e.g., ADES low carbon solution, reliability and effectiveness of building level heat pumps, solution for steam-based process loads etc.). With the pace of innovation, an additional risk exists around lack of industry awareness and experience (e.g., design consultants, contractors etc.) to design, install and maintain the latest technology solutions. Lastly, UBC's choice of energy systems solutions is dependent to a large extent on future availability of sufficient amounts of clean energy supply, control of which is outside of UBC's influence.
- **Policy risk:** The external policy backdrop will have significant implications on the financial performance and local availability of key solutions and initiatives. Stalling, weakening and general unpredictability of provincial and federal climate policy will make the business case for strong action at UBC increasingly challenging.
- **Extended Impact risk:** Some of the largest GHG reduction opportunities are also where UBC has the least direct control. Success for reducing Extended Impact emissions relies on alignment and action among multiple stakeholders and all levels of government.

Risk and uncertainty are inherent in any ambitious undertaking; the key question is how to manage this. To increase the chance of success, CAP2030 will focus to:

- Commit to a strong CAP2030 process that allows for continued optimization;
- Study technical issues carefully, aim for a diversity of clean technology solutions, and keep all viable options on the table;
- Embed life-cycle costing and life-cycle assessments as an integral part of the evaluation of options (especially considering that UBC is the owner and occupant of the buildings and operator of campus infrastructure underscoring the importance of looking at capital investments that address environmental, social and economic objectives).
- Lobby all levels of government for continued strengthening of climate policy, and implement an internal carbon price (carbon proxy price) to protect from policy uncertainty;
- Create a mechanism to re-assess efforts and strategies on addressing Extended Impacts and engage key partners that are crucial for this success.

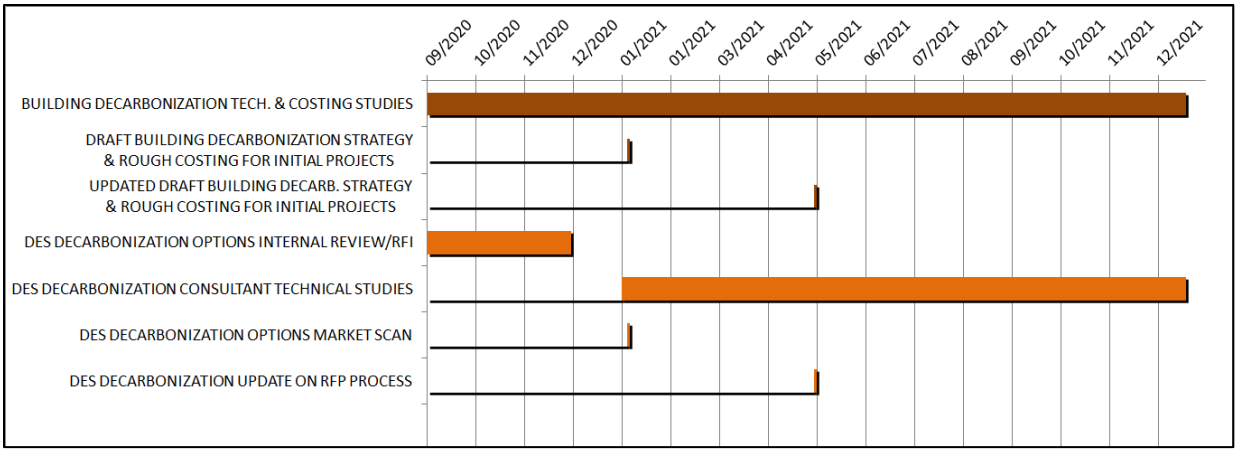
It is also worth noting that risk can move in both directions, with the external environment becoming more favorable to strong action.

The measures identified in CAP2030 also establish UBC as a testbed for innovation and technological breakthroughs, allowing UBC operations and researchers to take measured risks, pilot innovation, monitor effectiveness of new approaches, and learn from setbacks and failures to solve one of the key existential risks facing society today.

Resourcing CAP2030

Approach and initial estimate on resourcing -- Campus Operations:
CAP2030 has identified bold targets and key actions that can accelerate UBC towards its net-zero target for Campus Operations. Technically there are solutions that can support deep emission reductions through more aggressive performance requirements at building and site scales, as well as low carbon energy at the campus scale. However, the best solution or approach to decarbonization for UBC's current context requires further significant analysis. Therefore, a top priority is to conduct key studies to identify the best approach to decarbonize UBC's core operations, progressively refine the costing, and ensure that limited resources are spent in the most effective manner.

Figure 10: Key studies for Campus Operations decarbonization



As UBC advances towards deeper reductions, increasing levels of capital investment will be required. While it is too early to provide an estimate of investment needed for achieving the deep GHG reductions identified by CAP2030, a sense of the scale of investment can be given when considering future carbon liabilities. Translating the recent update of the federal carbon price, announced to reach \$170/t-CO_2e by 2030, to UBC's remaining carbon emissions (~27,000 t-CO_2e after BRDF expansion completion) gives carbon liabilities at approximately \$100 million over a 25-year project period (provincial offset requirements and implicit carbon costs from regulations will further add to this).[6] Investments in clean

[6] This is a high-level initial estimate based on multiplying UBC's remaining emissions (post BRDF expansion) by the announced federal carbon price (\$170/t CO2e) and by an assumed average project life of 25 years. A more detailed NPV assessment of the liability will be provided in the future and will consider 1) a comprehensive list of policies that influence the carbon liability (i.e., BC carbon tax, offset requirements, clean energy regulations etc.), 2) assessment of the appropriate project life, and 3) the appropriate discount rate.

solutions will be needed to avoid having to pay this liability. It is likely that some decarbonization projects at UBC can be completed below the federal carbon price, while others will be above.

Infobox: Marine Drive heat pump project study

Electrification of building HVAC equipment is a key opportunity to reduce UBC's GHG emissions. UBC Student Housing and Community Services (SHCS) commissioned a study to assess replacement of gas-fired make up air units (MUA), which provide ventilation, with air source heat pumps (ASHP) at the Marine Drive Residences.

Heat pumps work by using electricity to transfer heat from the outside environment to inside the building. As such, they can be extraordinarily efficient, with the units assessed for Marine Drive about four times more efficient than existing equipment. At Marine Drive, ASHP replacement of MUAs can cut total building GHG emissions in half, by about 400 t-CO_2e/yr. Upfront capital costs are higher by about $800,000 compared to like for like replacement of natural gas systems. However, the project is eligible for ~$400,000 in incentives. In this example, when considering the incentives, energy savings over the project lifespan, and cost of carbon at $150/t-CO2e, ASHP lifecycle costs are competitive.

The timing of investments will vary widely. Generally, building scale decarbonization projects will be ongoing throughout the decade to 2030. Investments in Academic District Energy (ADES) decarbonization projects are forecasted to commence around 2025. Figure 11 below outlines the implementation timeline for key CAP2030 plans. Table 1 gives an overview of the remaining carbon liabilities and the investment timeline for building level decarbonization and ADES decarbonization projects.

Figure 11: Implementation timeline for key CAP2030 plans and projects

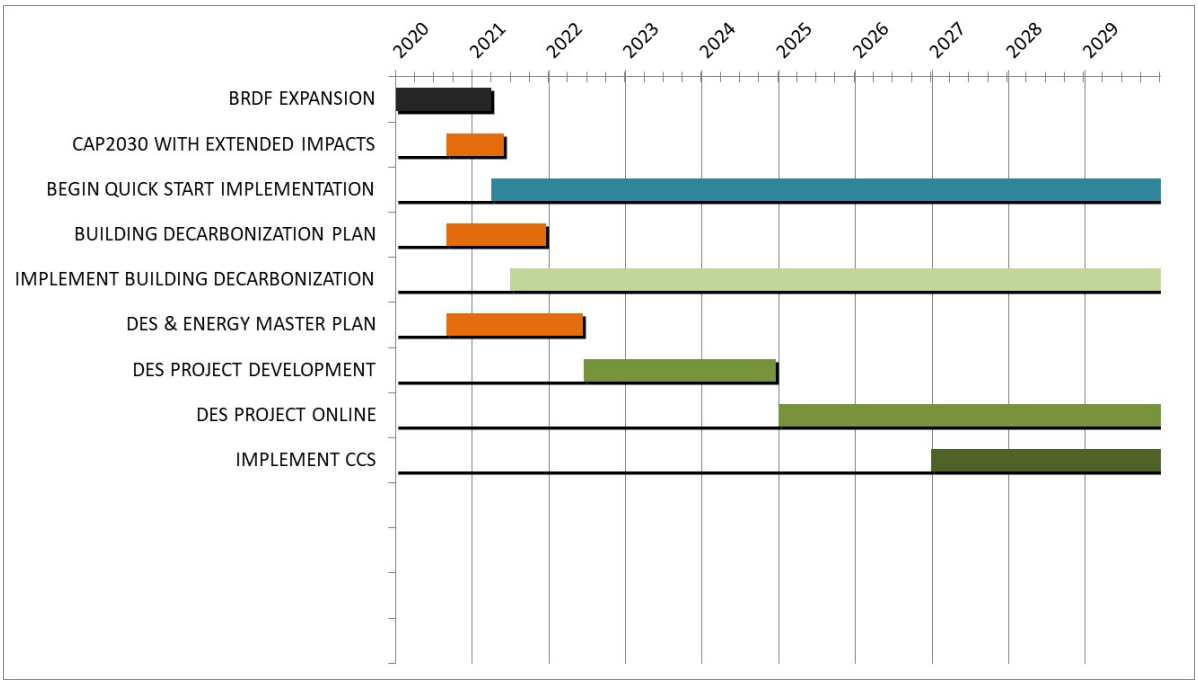


Table 1: Phasing of Campus Operations decarbonization projects

	Carbon liabilities	**Clean solution Implementation years**
Building scale	~$50 million	2021-2030
ADES scale	~$50 million	2025-2030

Note: see footnote 5 on total carbon liability. Post BRDF expansion, about 50% of remaining campus buildings emissions will be from the ADES, and 50% from direct gas buildings.

Approach and initial estimate on resourcing – Extended Impacts:
In contrast to Campus Operations emissions which are generally addressed through capital investments, reductions in Extended Impacts will be driven by policy, procedures, and process implementation, and programs aimed at achieving behaviour change in the UBC community. This, in combination with the fact that many emission reduction opportunities of 'low-hanging fruit' are still available in the Extended Impact categories, means that relative to Campus Operations emissions, its resourcing needs are lower and will be in the form of human resources, administrative, or program funding.

Addressing Extended Impact emissions is something the University can commence quickly, to drive action and to show leadership and commitment to the Climate Emergency Declaration. Figure 10 above highlights the implementation timeline for addressing Extended Impact. Table 2 below outlines initial estimates on resourcing needs.

Table 2: Initial estimates on resourcing needs for addressing Extended Impact emissions (medium to high ambition implementation path)

	Resources ($/year)	**Timeline**
Addressing Extended Impact Emissions	$500,000 - $1,000,000 / year	2022-2030

Addressing Extended Impacts is a new area for UBC and as such, the resource requirements require significantly further scoping. Advancing with an implementation budget of approximately $500,000/year by 2022 may enable up to 45% GHG reduction by 2030. This would allow each major area to be staffed by one coordinator, including a modest operating budget. The coordinators, over a recommended two-year period, would take the high-level actions developed by working groups and develop detailed action plans, including business and funding models where appropriate. Once this information is available, budgets can be refined and prioritized to deliver the maximum impacts.

CAP2030 development and short-term priorities

There are several short-term priorities to ensure that the CAP2030 process is successfully completed and early action is taken. This will require resourcing in fiscal year 2021-2022, including:

- *CAP2030 key implementation studies:* these technical and financial studies are critical to helping inform and advance implementation of CAP2030 in an effective manner. Scoping and development of communications and engagement campaign support in high impact extended emission areas. .
- *Avoid locking in new fossil fuel equipment:* There are several hundred pieces of fossil fuel (natural gas) equipment in buildings, responsible for about half of Campus Operations emissions. This equipment periodically needs to be replaced, with new equipment often staying in operation for 15-20 years. Avoiding locking in of new fossil fuel equipment is critical to achieve the CAP2030 vision. It will require extra funds to cover the higher upfront capital costs of low carbon alternatives (many of which will have lifecycle savings when including the cost of energy and carbon). Importantly, this will protect against the risk of having to replace equipment before its end of life at a later date, which would come at considerable costs later.
- *Addressing quick start actions:* The CAP2030 working groups identified several quick-start actions, most of which focus on addressing Extended Impact emissions. This will allow UBC to move quickly to advance key initiatives for some of the most meaningful GHG reduction opportunities identified in the CAP2030 process.

This short-term resourcing will build the necessary understanding to set the University up for success, ensure that the long-term costs of climate action are minimized, and demonstrate early leadership on priorities identified in the Climate Emergency Declaration.

Resourcing Strategy:

Successful implementation of CAP2030 priorities will require that the right resources are made available. The CAP2030 project management team is currently working with UBC Strategy and Decision Support (SDS) to develop a comprehensive resourcing strategy for CAP2030, which will identify efficiencies and explore innovative resourcing approaches. Some initial strategies identified include:

- Leverage, align, and redirect internal programs and resources where possible, such as applying a climate action lens to Routine Capital Fund, Buildings Renewal Fund and others; identify and implement carbon reduction opportunities on schedule replacement of equipment and infrastructure (e.g., equipment end of life replacement, renewals, renovations); and scoping

and costing key projects to ensure they are “shovel ready” when external funding becomes available.
- Leverage external funding including: confirm advocacy strategy for senior government and utilities; taking advantage of current CleanBC incentive programs; competing for federal and provincial climate and clean energy grants, and competing for federal and provincial stimulus funding.
- Explore, build and leverage partnerships to advance CAP2030, through research interests; BC’s main energy utilities; and the Canadian Infrastructure Bank among others.
- Explore opportunities to mobilize UBC’s alumni funding network to support UBC’s quest for accelerated decarbonization, which can serve as an example to the world.

More details on the CAP2030 resourcing strategy will be presented to Board in summer.

Co-benefits to climate action

Taking strong action on climate change is critical to improving UBC’s contribution to reducing globally harmful GHG emissions, however, this is far from the only benefit. Advancing an ambitious CAP2030 will further many other UBC interests, including:

- Protect UBC against the increasing costs of carbon policy at the provincial and federal level (UBC currently pays about $3million/year in carbon tax and offsets);
- Mitigate UBC’s exposure to future volatility in conventional energy costs;
- Increase resiliency, capacity, and diversification of UBC’s energy infrastructure in the face of climate change;
- Future-proof UBC’s buildings to the impacts of climate change;
- Leverage technology innovation, research, and development at UBC with Industry partners;
- Leverage external funding to advance key research and innovation priorities by UBC;
- Increase external investments into University Infrastructure priorities;
- Support sustainability challenges within the institution and capitalize on teaching and learning opportunities; and
- Bolster UBC’s internationally recognized reputation and leadership in climate action and sustainability in operations and research.

These co-benefits should be considered alongside technical, financial, risks, and other criteria when assessing investments in CAP2030 priorities.

Glossary

Academic District Energy System (ADES): District energy systems that produce steam, hot water, or chilled water at a central plant and distribute it to buildings to provide space and water heating and cooling. UBC ADES is the main source of heating to campus buildings.

Air source heat pump (AHES): An air source heat pump is a system that transfers heat from outside the building to inside the building for heating (or vice versa for cooling). As it transfers heat and doesn't create heat, ASHPs can be extraordinarily energy efficient, with heat generated up to 400% of energy input.

Alliance of World Universities (U7+): An international alliance of university presidents to engage in discussions and concrete action and commitments to address the most pressing global challenges in a multilateral context.

Bioenergy Research and Demonstration Facility (BRDF): A plant that produces heat and electricity from biomass fuel, renewable natural gas, and conventional natural gas. The biomass fuel is gasified to create syngas that is burned to produce steam. The heat produced by the BRDF is distributed by the ADES to buildings in the form of hot water.

Business as usual (BAU): Refers to a situational context or scenario that does not undergo any change; a scenario where no climate action is taken.

Campus Operations Emissions: Campus emissions from sources directly controlled and operated by UBC, inclusive of emissions directly controlled and operated by UBC (Scope 1), and upstream emissions from electricity consumed on campus (Scope 2).

Carbon capture and storage (CCS): Collecting and storing carbon dioxide released into the atmosphere and concentrating it in order to mitigate the negative effects it has on the environment if left in the atmosphere.

CleanBC: A plan developed by the British Columbia provincial government that sets 2030 climate goals through energy and industry emission reduction innovations and initiatives.

Climate Action Plan (CAP): A framework that provides a pathway to net zero emissions for the Vancouver campus by 2050. This was first initiated in 2010, and have ben subsequently updated for 2020, and now 2030.

E3 Fleet Rating (E3): A unique made-in-Canada rating program that evaluates and recognizes excellence in the green performance of vehicle fleets.

Extended Impact Emissions: Campus emissions that UBC does not directly own or control, that are indirect impacts created through University activities that UBC can influence through behaviour change programs and sustainable supply chain procurement guidelines. These are emissions generally referred to as scope 3 emissions that includes commuting, business air travel, food, waste, and building materials.

Greenhouse Gas (GHG) emissions: Gases emitted from fuel combustion and other sources, that contribute to the greenhouse effect and global warming. This includes carbon dioxide, methane, nitrous oxide, ozone, and chlorofluorocarbons.

Heating, ventilation and air conditioning (HVAC): The system and technology of heating and cooling of buildings through heating, ventilation and air conditioning.

Integrated Renewable Program (IRP): An integrated platform for UBC's Finance, Human Resources, and Student administrative processes and system environments with Workday.

International Sustainable Campus Network (ISCN)**:** An International forum that support higher education institutions in the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability into research and teaching.

Renewable natural gas (RNG): A biogas (or biomethane) that results from bacteria breaking down organic waste from sources such as landfills, agriculture and wastewater treatment facilities, and is upgraded to a quality similar to fossil natural gas. Because of its biological source, it is considered a carbon neutral energy source.

University Alliance for Sustainability (UAS): An alliance between Freie Universität Berlin, the Hebrew University of Jerusalem (Israel), the Peking University (China), St. Petersburg State University (Russia), and UBC to focus on sustainability as a comprehensive topic for collaborating in research, teaching, and campus management.

University Climate Change Coalition (UC3): A coalition of North American research universities committed to climate action and cross-sector collaboration to accelerate local climate solutions and build community resilience.

Zero emissions vehicle (ZEV): A vehicle that has the potential to produce no tailpipe emissions. These can still have conventional internal combustion engines but must be able to operate without it. Some types of ZEVs are battery-electric, plug-in hybrid electric, and hydrogen fuel cell.

Appendix B: Climate Action Plan 2030 UBC Okanagan Campus - Emerging Directions and Draft Targets

ACKNOWLEDGEMENTS
We begin by acknowledging that UBC's Okanagan Campus is located on the territories of the Syilx (Okanagan) peoples, and that UBC's activities take place on Indigenous lands throughout British Columbia and beyond.

The Syilx Okanagan people have been here since time immemorial. In September 2005, the Okanagan Nation Alliance officially welcomed UBC to Okanagan territory in a ceremony, Knaqs npi'lsmist, where UBC signed a Memorandum of Understanding with the Okanagan Nation Alliance. The university works with the Okanagan Nation in the pursuit of campus plans for UBC Okanagan in respectful acknowledgement of the Syilx Okanagan people's stewardship of their territory for thousands of years

UBC CAP 2030 Vision

In December 2019, UBC's Board of Governors unanimously endorsed a Declaration on the Climate Emergency, joining over 1,700 jurisdictions around the world to commit to accelerated emissions reductions that aligns with the Paris Agreement of limiting global warming to 1.5°C[1]. With this endorsement, the Board emphasized that climate action continues to be a top strategic priority for the University. Specifically, the Declaration gives impetus for UBC to accelerate decarbonization of its core operations, to expand the scope of action to indirect emissions that UBC has some control over, and to consider a climate justice lens in its future response. To support these commitments, the Climate Action Plan 2030 (CAP2030) process has been initiated.

UBC Okanagan Context

UBC Okanagan is an innovative hub for teaching, learning and research and learning, situated in the heart of Syilx Okanagan Territory. The campus is a close-knit academic community that has experienced rapid growth over the last 10 years. The staff, faculty and student population has increased by 209% from 3,975 to 12,279 and is projected to reach as high as 20,000 by 2040[2]. Since 2005, the number of buildings on campus has increased by a factor of three, from 12 to 46.

Despite rapid growth, UBC Okanagan is working hard to advance climate action and achieved a 33% GHG reduction in 2019 (building energy, fleet, and paper) compared to the campus' 2013 baseline year[3]. Early projects to support climate action include the construction of a geothermal district energy system to reduce reliance on fossil fuels for building energy supply and a building optimization program to monitor legacy academic building energy consumption, implement energy and carbon reduction measures, and pilot a public energy dashboard. These early advancements laid the foundation for the development for broader policy in the 2016 UBC Okanagan's Whole Systems Infrastructure Plan (WSIP), which set the campus' first climate action goal to achieve a *"net-positive performance in operational energy and carbon"* by 2050. The key outcomes of the WSIP that support energy and carbon reduction include the establishment of a dedicated energy team, expansion and ongoing optimization of district energy supply to new capital projects and the development of green building design goals for the Campus Design Guidelines. The WSIP's implementation represents a significant effort across many operational and administrative units, and has created a strong foundation of operational leadership, heading into the CAP 2030 process.

Most recently the Skeena Residence was completed - a 6 storey, 220-unit residence and its first Passivehaus project, designed to the highest performance level of the BC Energy Step Code. In 2019 the campus was awarded the CleanBC's Better Buildings Net-Zero Energy-Ready Challenge Construction and Design Incentive Award, in recognition of best practices in the early adoption of innovative low-carbon building design. The project integrates leading-edge green building "Living Lab" research for UBCO Faculty and green building innovation of provincial, national and international significance. Given the urgency and need for accelerated climate action, the CAP 2030 process presents an opportunity to leverage additional opportunities for the campus community as a whole to advance innovative low carbon solutions.

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[1] Meeting the 1.5°C Paris Target (IPCC pathway) requires a global net anthropogenic GHG reduction of 45% from 2010 to 2030 and reaching net zero around 2050

[2] UBC Okanagan Outlook 2040

[3] 2013 was selected as UBCO's baseline year, as it represents the point at which the first major phase of new campus development was complete; the district energy system closed loop conversion was complete, and campus energy performance levelled off.

Figure 1: 2019 Construction of Skeena Residence

UBC Okanagan CAP 2030 Scope and Terms of Reference

This document forms the early consolidation and assessment of the far-reaching and diverse inputs collected through the UBC Climate Emergency Engagement Process that fed into focused deliberations of topic-based working and technical committees. The synthesis of these extensive assessments and outputs constitutes UBC Okanagan's interim report "Climate Action Plan 2030: Emerging directions and draft targets" and will be a key step in the formulation of UBC Okanagan's first draft Climate Action Plan 2030, targeting completion by fall 2021. It will become a key policy that aims to support commitments of UBC's Climate Emergency Declaration.

Project Objectives:

1. Establish GHG emission reduction targets for 2030.
2. Accelerate the decarbonization of campus operational GHG emissions toward the campus Whole Systems Infrastructure Plan goal to achieve a "net-positive performance in operational energy and carbon" by 2050.
3. Widen the scope of GHG reduction activity to extend UBC's influence to address emission reductions in areas such as commuting, air travel and food.

It will offer new emission reduction actions and targets, based on emission reduction plans and initiatives that are currently underway, including:

1. Strategic Energy Management Plan – A corporate focused plan to advance energy and carbon reductions across existing buildings
2. Low Carbon Energy Strategy – A campus wide strategy is underway to advance decarbonization of energy supply
3. UBC Okanagan Transportation Plan – A campus wide planning process is underway to support key objectives, including reductions in faculty, staff, student commuting emissions
4. UBC Okanagan CAP Food Strategy Group – A campus-wide working group to advance climate-friendly food options.

The CAP 2030 process has also established as series of topic-based working groups focused on the following areas, noting that system wide approaches are being pursued where feasible:

- energy supply & buildings
- commuting
- business air travel
- embodied carbon
- waste, materials & paper
- food
- financial tools
- communications & engagement
- fleet and equipment

This report describes progress in each of these areas in terms of targets and actions, as well as what further work is required to better coordinate and accelerate action. Internal and external partnerships, including Campus as a Living Lab opportunities, are being explored to harness the institutional, intellectual and community capacities necessary to support the Plan's development and implementation. A climate justice lens is being applied to ensure equity, inclusion and diversity are upheld and advanced while accelerating climate action.

While the CAP 2030 process is focused on the development of mitigation strategies to reduce fossil fuel impacts, responding to climate change will also require the development of adaptation strategies to

reduce the effects of climate change. Foundational climate adaptation and resiliency strategies have already been integrated into a number of campus plans and guidelines. Specific examples include climate modelling and overland flood path mapping (UBCO Integrated Rainwater Management Plan), climate adaptive design guidance (UBCO Design Guidelines), and landscape guidance for climate adaptation and wildfire protection (UBCO Whole Systems Infrastructure Plan). The CAP 2030 will identify mitigation actions with adaptation co-benefits, noting that reducing climate risk through resilience will be addressed in a subsequent planning phase.

UBC Okanagan Emissions Profile

UBC Okanagan prepares annual GHG emissions inventories for campus operations emissions. Campus operations emissions are from sources directly controlled and operated by UBC (Scope 1 emissions) and from upstream emissions from electricity consumed on campus (Scope 2 emissions). Reported campus operations emissions in 2019 were 2,422 tCO2e. The campus achieved a 33% emission reduction below the campus' 2013 baseline. Heating and operating building emissions account for 92% of the total campus operations emissions and present the highest impact area for operations emission reduction.

Under the Provincial Carbon Neutral Government regulation, the university is currently required to report and offset operations emissions at a rate of \$70/tCO_2e (\$25/tonne tax for offsets from operational emissions to meet public sector carbon neutrality as well as paying a \$45/tonne[4] carbon tax on the purchase of natural gas). In 2021, this rate will increase to \$75/tCO_2e and, based on the 2020 business year, UBC Okanagan will remit nearly \$200K to offset the carbon tax and offset requirements. This will increase materially in the future (if UBC Okanagan does not continue to decrease its scope 1 and 2 carbon emissions) as governments tighten policy to meet their climate commitments. Recently, the federal government announced an increase of its carbon price on fuels to \$170/tCO2e by 2030, which BC's carbon tax will have to match to stay in compliance. Offset requirements add an additional \$25/tCO2e to this cost. Given that equipment and infrastructure is around for many years, **UBC Okanagan's expected future carbon liability would accumulate to \$11.3 million[5]** over the next 25-years if no further actions are taken to reduce carbon emissions. Without UBC Okanagan's past action, this liability would have been nearly 35% [6] higher. Moving forward, investments in clean solution will be required to further reduce this liability. The liability must also be considered when assessing the level of ambition that the University will aim for with CAP2030.

Beyond regulatory requirements, UBC Okanagan voluntarily conducts an annual inventory of its extended impact emissions (Scope 3 emissions) based on availability of data. Extended impact emissions are indirect sources not owned or controlled directly by the institution, but may be influenced through University policy, guidelines, financial tools and mechanisms as well as behavioral change initiatives.

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[4] The British Columbia Carbon Tax will increase \$5tCO_2e tonne annually until it reaches \$50/tCO_2e.

[5] This is a high-level initial estimate based on multiplying UBC Okanagan's remaining emissions by the announced federal carbon price (\$170/tCO_2e) and by an assumed average project life of 25 years. A more detailed NPV assessment of the liability will be provided by the CAP Team in the future and will consider 1) a comprehensive list of policies that influence the carbon liability (i.e., carbon tax, offset requirements, clean energy regulations), 2) assessment of the appropriate project life, and 3) the appropriate discount rate.

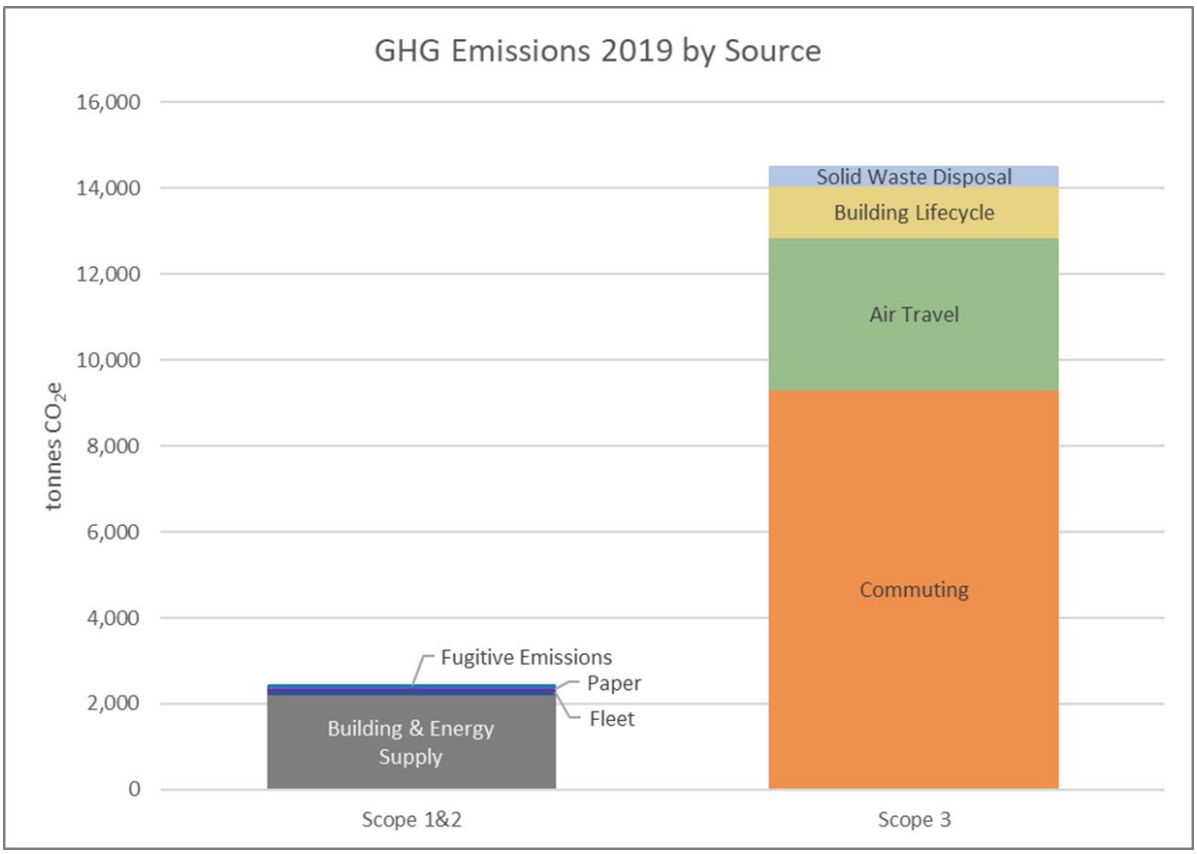
[6] Based on UBC Okanagan's established 2013 baseline

Extended impact emissions include:

- Commuting to and from campus (students, staff and faculty),
- Air travel for business purposes (staff and faculty),
- Building lifecycle (building materials),
- Solid waste, and
- Food consumed on campus (emissions related to food not currently measured)

Campus operations emissions (Scope 1 & 2) account for 14% of the campus' overall GHG portfolio. Scope 3 emissions account for the remaining 86% of emissions, highlighting the importance of addressing these emissions in the UBCO CAP 2030, in line with UBC's explicit mandate to reduce extended impact emissions through the Climate Emergency Declaration.

Figure 2 UBC Okanagan Operations and Extended Impact Emissions



Operations Emissions (Scope 1 & 2) based on Annual Carbon Neutral Government Program Reporting and Offset Requirement. Extended Impact Emissions (Scope 3) emissions are estimated using consistent methodology between the campuses. Methodologies to calculate Scope 3 emissions are emergent. Assumptions are available in inventory reports.

UBC Okanagan CAP 2030 Emerging Directions and Draft Targets

Campus Operations Emissions

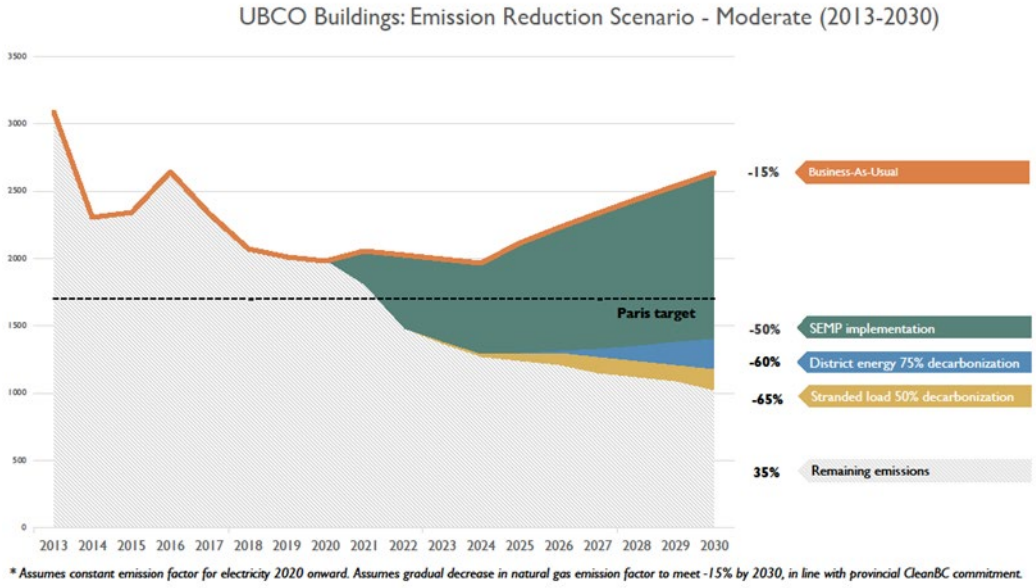
Building Energy and Supply Strategies

Target: By 2030, achieve between a 65% and 80% GHG reduction, from 2013 baseline, through high performance new buildings and existing building energy retrofits.

Operational strategies and draft targets for the UBO CAP 2030 are currently under development and will be informed by the Strategic Energy Management Plan and Low Carbon Energy Strategy. These plans will support decisions and actions specific to setting campus GHG targets to be included in the UBCO CAP 2030, future building retrofits and future campus infrastructure expansion. Based on analysis of emission reductions associated with these plans (identifying measures to reduce energy and emissions in existing buildings) there is a range of two possible emission reduction scenarios.

Scenario 1: A moderate (realistic) target of 65% emission reduction by 2030, from 2013. Preliminary work suggests that achievement of this target would require investment to implement the Strategic Energy Management Plan over 10 years, in addition to investment to decarbonize 75% of the energy supply system at the campus scale, and decarbonize 50% stranded loads (Figure 3).

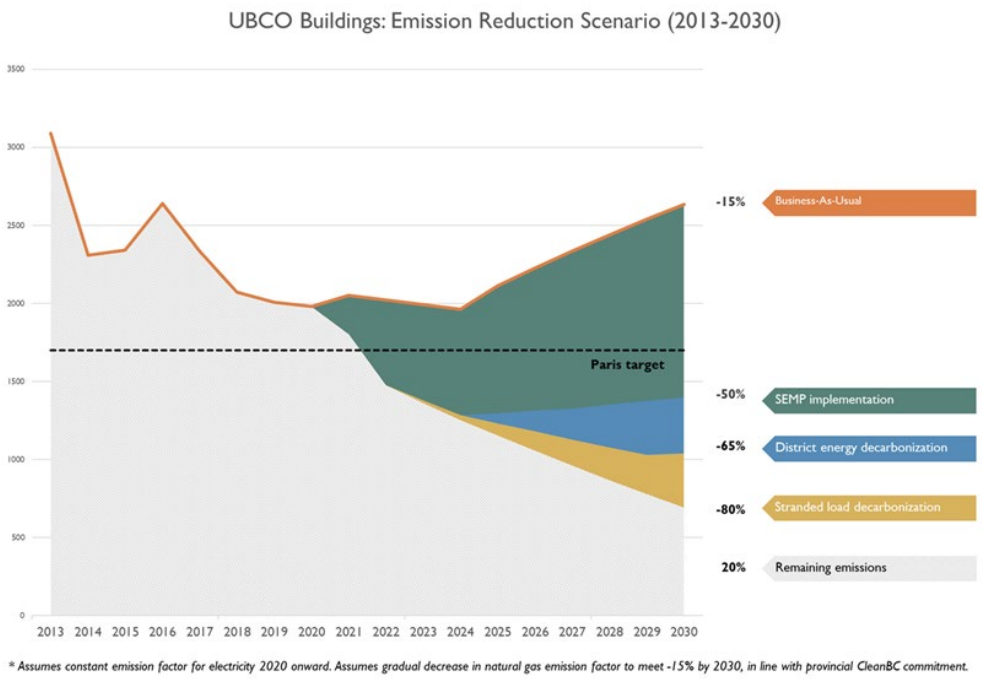
Figure 3: UBCO Operations Potential Emissions Reductions – Moderate (Realistic) Target 65% reduction by 2030



Scenario 2: An aggressive (aspirational) target of 80% emission reduction by 2030, from 2013.
This more aggressive scenario builds on what's needed for the 65% reduction (Scenario 1). Preliminary work suggests that achievement of this target is possible, and requires additional work including decarbonizing the remaining 25% energy supply and 50% stranded load.

If a more aggressive scenario is supported by the Board, this will require further study and significant levels of investment to assess a range of energy supply options to fully decarbonize the district energy heating generation sources, as well as to assess stranded load reduction potential on a building by building basis. In order to fulfill this ambition, UBC Okanagan will require additional staff resourcing, a higher level of investment to connect stranded loads to district energy and a commitment from ancillaries to connect into a low carbon DE system or alternatively achieve a passive house and/or equivalent low carbon building standard. A detailed business case for each of the investments to help support advancing toward this target will need to be pursued (Figure 4).

Figure 4: UBCO Operations Potential Emission Reductions - Aggressive (Aspirational) Target 80% reduction by 2030



Existing Buildings - Strategic Energy Management Plan (Demand side)

Target: By 2030, reduce existing building energy emissions by 50%, from 2013 baseline

The Strategic Energy Management Plan (SEMP) updated in 2020 is key plan for the campus to reduce building energy consumption, utility costs and carbon emissions in existing campus buildings. It has identified demand-reduction strategies, conservation projects, fuel-shifting opportunities, and detailed, shelf-ready projects to be considered for implementation over the next ten years. The plan demonstrates that **implementation of demand-side management measures over 10 years has the potential to reduce operational emissions from buildings by 50% by 2030, from the 2013 baseline.**

Actions: Immediate (Start FY 21-22)

- Secure recurring funding to support continued plan implementation
- Resourcing and Financial Implications – initial investment $200K per year

Energy Supply - Low Carbon Energy Strategy (Supply Side)

Target: De-Carbonize the District Energy System and address "stranded" loads

The Low Carbon Energy Strategy is underway to support low carbon energy supply strategies for campus growth over the next two decades. Work to date has established that compared to stand alone buildings, district energy utility services is the preferred approach on both main campus and Innovation Precinct. Rooted in the pro-forma technical and financial analysis, including sensitivity analysis, this approach is considered to have the most viable options for deep decarbonization, self-sustaining operations and resilience.

The following immediate actions are required in support achievement of Scenario 1: **A moderate (realistic) target of 65% emission reduction by 2030, from 2013.**

Actions: Immediate (Start FY 21-22)

- Complete concept design of all phases of decarbonization of the plant (by March 2021). Implement first phase.
- Resourcing and Financial Implications: initial investment $2-3M (March 2022)
- Review and revise relevant UBCO performance targets (climate specific) and guidelines as necessary to ensure building retrofits and new buildings align with Low Carbon Energy Strategy

Extended Impacts Emission Reductions (Scope 3)

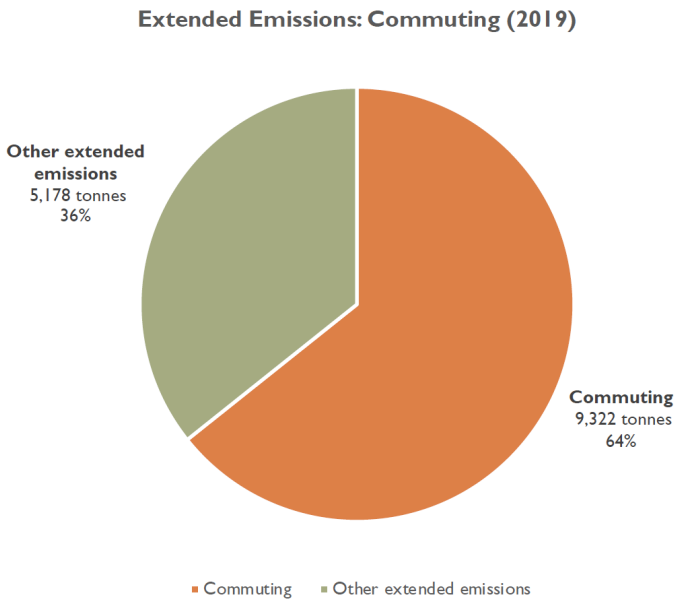
The UBC Climate Emergency declaration has set an explicit mandate to reduce extended impact emissions (scope 3). These emissions are significantly larger than scope 1 and 2 operational emissions, presenting greater opportunity for impact. Strategies and targets to reduce commuting and food emissions are currently being developed, informed by the UBC Okanagan Transportation Plan and the UBCO CAP Food Strategy Group. As extended impact emissions are largely beyond the campus' direct control, behavioral campaigns to increase capacity and participation of all members of the campus community in choices and actions to achieve reduced emissions in these scope areas.

Commuting

Target: By 2030, achieve a 50% to 60% reduction in Staff, Faculty and Student Commuting Emissions

Staff, faculty and student commuting is one of UBC Okanagan's largest source of extended impact emissions, accounting for 64% or 9,322 tonnes of carbon dioxide equivalent (tCO2e) – Figure 5. This is 300% greater than the total Okanagan direct emissions (Scope 1 & 2). In 2019, over 8,800 daily trips were generated by people driving alone, which is 37% of all trips to and from campus. By 2040, this number could increase to nearly 16,000 trips by people driving alone. Under a business-as-usual (BAU) 2040 scenario, GHG emissions from commuting will continue to be the largest share of the campus' Scope 3 emissions.

Figure 5: UBCO Extended Emissions from Commuting

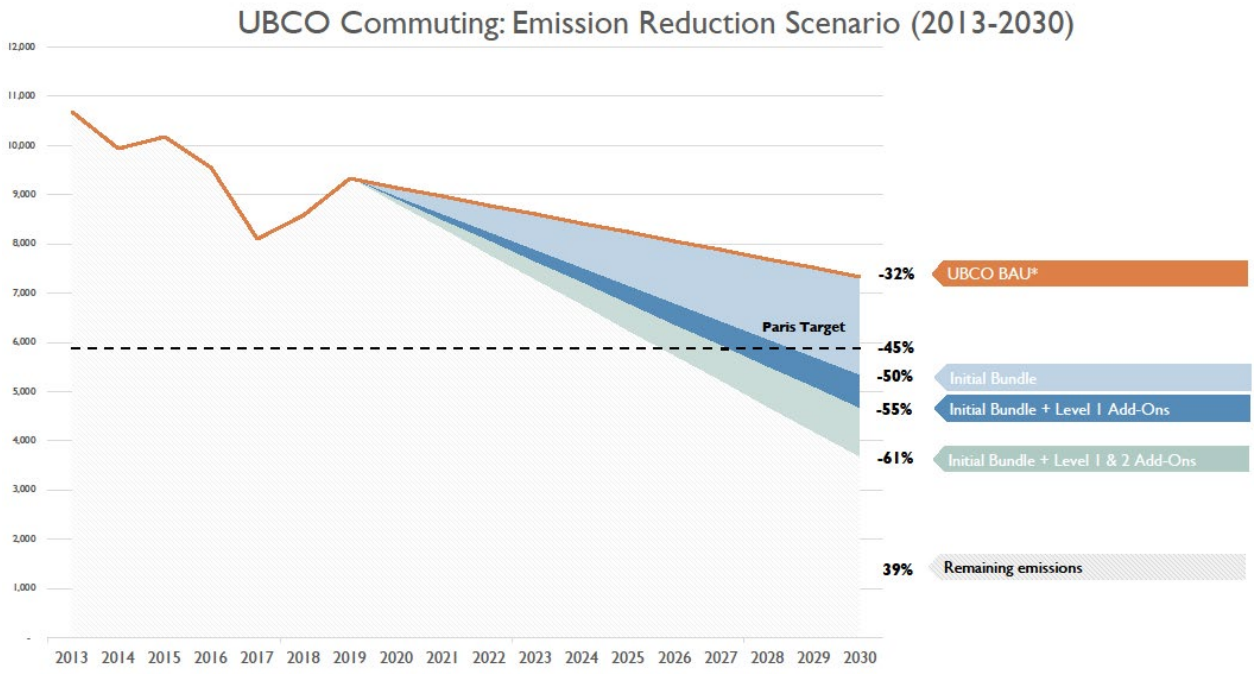


Actions – Immediate (Start FY 21-22)

The UBCO Transportation Plan is currently in development to support implementation of the 2015 Campus Plan, respond to advances in planning and development on and surrounding the campus, and contributes to UBC's commitment to address the climate emergency. The Transportation Plan will support the Climate Action Plan's overall strategy to address commuting emissions by providing transportation targets and a suite of strategies required to meet the transportation targets.

In fall/winter 2020, the Transportation Plan is evaluating and consulting on three bundles of strategies. Highly feasible actions have been grouped into in the "initial bundle", while those that are less feasible but have a higher impact are included in the "+ Level 1" and "+Level 2" bundles. As conceived, the + Level 1 bundle would incrementally ladder onto the initial bundle, and likewise the + Level 2 bundle would ladder on to the initial and + Level 1 bundles. The potential reduction in commuting emissions for each of the three bundled scenarios against the 2013 baseline used for the Climate Action Plan are presented in Figure 6. As demonstrated, it is anticipated that the proposed emerging draft strategies target a reduction in commuting emissions by 50% to 60% and **have the potential to achieve or exceed the 1.5 degree Paris reduction target, of 45% reduction by 2030**, compared to the BAU, if fully implemented.

Figure 6: UBCO Extended Impacts Potential Commuting Emission Reduction Scenarios



** UBCO BAU assumes the implementation of BC Transit's Low Carbon Fleet Program and the Provincial Zero Emissions Vehicle Regulation (with 30% of new vehicle sales to be ZEV by 2030).*

The UBCO Transportation Plan is intending to deliver the proposed bundles of strategies to the campus community and regional partners for input in December 2020 to inform the development of a final "preferred" list of strategies to carry forward in the Transportation Plan. One strategy is to strongly embrace remote working and online learning because combined they have the greatest opportunity at reducing the university's GHG emissions from commuting. If all eligible staff and faculty worked from home twice a week the university could see an 8% reduction in GHG emissions from commuting overall. If students only needed to travel to campus four days a week, the university would see a 20% reduction in GHG emissions by commuting. The Transportation Plan team has been working with Human Resources to ensure consistency with the work they are doing to update the telecommuting policy, which is aimed at providing the tools for departments to manage staff working remotely. Once a preferred list of strategies is confirmed, potential GHG reduction impacts of the preferred list of strategies will be calculated. High level costing will be estimated for the final set of strategies included in the Plan. Further consultation will occur in the spring, with the objective to have the final plan complete by June 2021.

The UBCO CAP 2030 commuting emission reduction target of 50% to 60% is dependent on the Transportation Plan's development, both in terms of confirming the potential for commuting emission reductions in order to establish a commuting GHG reduction target for the CAP, and to achieve demonstrable emission reductions, through the Transportation Plan's implementation.

The development of an implementation strategy to address the transportation plan vision and objectives, including the implementation of measures to reduce GHG emissions will begin in 2021.

Food Systems

UBC Draft Target: By 2030, develop a climate-friendly food system to reduce food system-related GHG emissions by 50%; target 80% climate-friendly food menus in 2025.

While UBCO's food carbon footprint is difficult to accurately measure, it is anticipated that there are significant reduction opportunities identified through the UBC CAP Food Working Group. At the Vancouver campus, food systems account for an estimated 29,000 tonnes of CO2e per year. Key members of UBCO's existing Food Strategy Group have assembled a UBCO CAP Food Group, comprised of nearly 20 faculty, students and key operations staff members, to explore opportunities for UBCO to reduce its impact at the procurement, transportation, food preparation and waste disposal stages. Synergies with UBCV on system-level strategies are currently being scoped. This work is aligned with the new in-house operation model of food service that was extended to the UBC Okanagan campus in 2019, which aims to provide local and environmentally friendly food options.

Actions – Immediate (Start FY 21-22)

- Support the UBCO CAP Food Team to refine preliminary recommended actions (Table 1), for inclusion in the UBCO CAP 2030. This work is anticipated to be completed late March 2021.
- Advance a Campus as a Living Lab Pilot Project to support UBC Okanagan Food impact measurement and goal setting. This project is anticipated to be completed by the Fall 2021.

Table 1: UBCO Food Systems Preliminary Recommendations

Category	Preliminary Recommendations
Food Supply	- Develop and implement climate friendly food offering and procurement guidelines (in collaboration with UBCV) - Develop contract stipulations for 3rd party and independent food business and franchises - Foster partnerships to enhance community driven food procurement, security and transparency and incorporate traditional ways of knowing to campus catering systems - Perform systematic review of campus-wide food system procurement
Behavior Change	- Establish a campus community place to support student and environmental health through ongoing programs, services, and opportunities. - Develop an Engagement and Communications Strategy for Climate-Friendly Food Choices and Waste Management
Consumer Food Waste	- Develop and implement a food waste reduction/recovery strategy - Amend or develop UBCO guidelines for food service outlet requirements - Measure impacts of Nechako Pritchard Dining Hall 'all you care to eat' strategy for learning and potential scalability to other food service outlets

The UBCO CAP Food Team has commenced work to understand what work is already underway and where opportunities for quick advancement of recommendations exist. Refinement and prioritization phasing and resourcing requirements will be considered in the next phase of the CAP 2030 process.

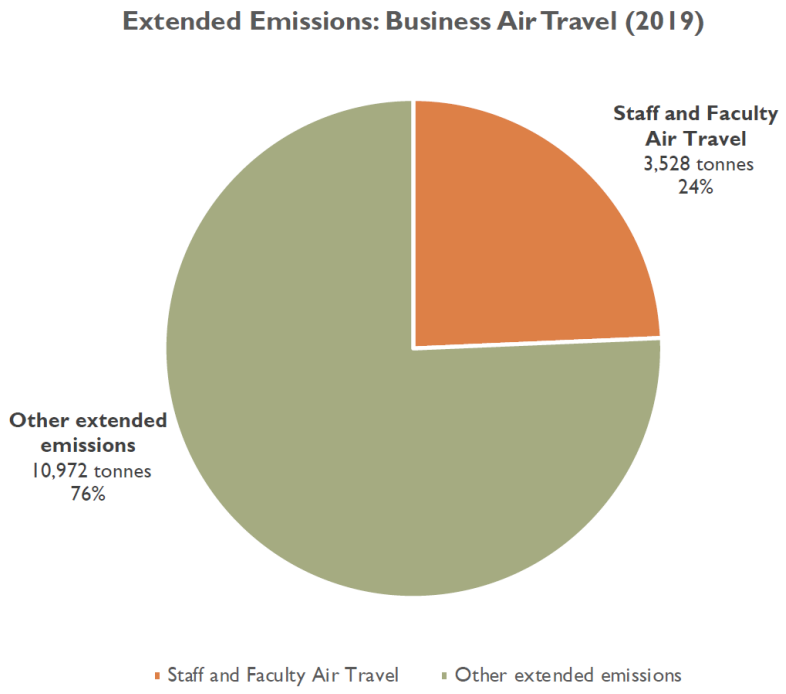
Business Air Travel

UBC Target: By 2030, achieve a 50% reduce in Business Air Travel emissions from pre-COVID levels

Business air travel is one of UBC Okanagan's largest source of indirect emissions, accounting for at least 24% or 3,528 tonnes of carbon dioxide equivalent (tCO2e). Much of this travel is for business between the campuses, and to meet academic research requirements. By leveraging recent learnings from the

Covid-19 Pandemic including the availability of better communication technology solutions it is anticipated that air travel can be reduced while maintaining or improving UBC's educational and research objectives. This acknowledges the dependence upon air travel for faculty and students to carry out certain types of research and scholarly projects, as well as dependencies between the campuses as it relates to system-wide activities.

Figure 7: UBCO Extended Emissions from Air Travel



Actions – Immediate (Start FY 21-22)

- Work with UBCO FO to identify the process of implementing improved tracking and measurement using workday.
- Support UBC's goal to eliminate 100% non-essential travel and utilize growing capacity of virtual tools and platforms as priority alternatives by working with relevant UBCO stakeholders to scope potential improvements in uptake of UBCO virtual alternatives to air travel. Improvements will consider Okanagan requirements to participate in system-wide activities, and scheduling optimization to minimize air travel frequency.
- Develop a process to obtain and incorporate UBCO feedback in the development of UBC's emergent air travel policies (note, UBC air travel actions in Appendix A).
- Support a UBCV-led SEEDS Study to assess barriers and opportunities to reducing air travel for staff and faculty travel between the two campuses.

Actions – Short to Medium Term (2-4 y)

- Incorporate UBCO stakeholder feedback into the development and implementation of a UBC air travel emissions reduction program that supports and promotes the use of virtual alternatives, addresses barriers and leverages partnerships such as UC3.

Outreach and Engagement

UBC Target: By 2030, (66%) of all UBC faculty, staff and students will be aware of and actively contribute toward UBC's climate action goals for which they have influence or control (e.g., making sustainable commuting choices, choosing low emission alternatives to business air travel).

UBC Okanagan's engagement and behavior change program, The Power of You, has demonstrated success in energy conservation and operational emission reductions in offices, labs and student residences. In FY 19/20 the program has achieved a 35% waste diversion rate through campus engagement, a 20% fume hood reduction during Shut the Sash Lab Campaign, 7,120 kg CO2e reduction in staff, faculty and student commuting emissions in the National Campus Commuter Challenge. The inclusion of extended emissions in the UBCO CAP 2030 requires the development of new engagement campaigns to support commuting, food, air travel waste, and other emerging UBCO CAP focus areas.

Actions – Immediate (Start FY 21-22)

- Map emerging engagement and behavior change actions required to support UBCO CAP development and implementation.

Actions – Short to Medium Term (2-4y)

- Develop new and expanded sustainability communications & engagement programs for high-impact audiences, ensuring adequate ongoing resourcing to amplify engagement on climate action.

Emerging Emission Reduction Topics for Potential Integration in UBCO CAP 2030

Specific efforts were made to identify system-based recommendations that could apply to both the Vancouver and Okanagan campus contexts. Opportunities to engage UBC Okanagan stakeholders in working group recommendations exists at this stage in the CAP 2030 process. The development of additional UBCO CAP 2030 topic areas and recommendations will require engagement of relevant Okanagan portfolios and units to understand priority topics, what work is underway and where opportunities for quick advancement exist, as well as what further assessment is needed to enable adoption and implementation of recommendations.

Actions – Immediate (Start FY 21-22)

- CAP Team to identify the necessary supports and mechanisms to adapt and implement working group recommendations for the Okanagan campus. Key working groups include - new buildings, business air travel, and behavior change.

CAP 2030: Resourcing and Financial Implications

Recognizing the University is operating in the Covid-19 environment, the Okanagan campus is incrementally identifying and staging the allocation of resourcing and investments that focus initially on low cost and high impact opportunities. It is anticipated that there will be additional levels of investment required to support achievement of the Okanagan CAP emerging goals and actions to reduce operational emissions and extended impact emissions. Additional funding and resourcing required to support the Okanagan CAP will be developed and reported, at subsequent phases in the CAP 2030 process.

Campus Operations Emission Reductions

The UBC Okanagan campus has rapidly advanced key studies to identify decarbonization pathways for building and energy supply options. Based on analysis of emission reductions associated with the Strategic Energy Management Plan (identifying measures to reduce energy and emissions in existing buildings) and the Low Carbon Energy Strategy there is a range of possible emission reduction scenarios.

Scenario 1: A moderate (realistic) target of 65% emission reduction by 2030, from 2013. Preliminary work suggests that achievement of this target would require investment to implement the Strategic Energy Management Plan over 10 years, in addition to investment to decarbonize 75% of the energy supply system at the campus scale, and decarbonize 50% stranded loads (Figure 4). Table 2 provides initial estimates on investment needs and timing for building and energy supply decarbonization to achieve the moderate (realistic) target. Short-term actions will be addressed through the Fiscal 21 22 budget process to address this pathway, as an incremental step toward a more aggressive reduction target.

Table 2: Investment Required for Scenario 2 and Cumulative GHG Savings for Campus Operations Strategies/Actions

Strategy/Action	Current Status / Development Phase	Initial Investment Required	Total Investment Required 2020-2030	2030 GHG Savings rel. to 2013
Strategic Energy Management Plan (SEMP)	Implementation	$200k/yr	$2M	50%
75% District Energy Decarbonization	Concept Design complete by March 2021	$2-3M	$4-8M	60%
50% Stranded Load Decarbonization	Timing aligned with end of life equipment replacements	TBD	$2-5M[7]	65%

An aggressive (aspirational) target of 80% emission reduction by 2030, from 2013.

[7] The UBCO High Level Net Zero Carbon Energy Strategy indicated overall capital and operating cost reductions would be achieved by connection of loads to the District Energy System. Costs listed would offset costs to routine capital budget for required equipment renewal. Project priority to be determined by relative business case.

This more aggressive scenario builds on what's needed for the 65% reduction (Scenario 1). Preliminary work suggests that achievement of this target is possible, and requires additional work including decarbonizing the remaining 25% energy supply and 50% stranded load.

If a more aggressive scenario is supported by the Board, this will require further study and significant levels of investment to assess a range of energy supply options to fully decarbonize the district energy heating generation sources, as well as to assess stranded load reduction potential on a building by building basis. In order to fulfill this ambition, UBC Okanagan will require additional staff resourcing, a higher level of investment to connect stranded loads to district energy a series of buildings, and a commitment from ancillaries to connect into a low carbon DE system or alternatively achieve a passive house and/or equivalent low carbon building standard. A detailed business case for each of the investments to help support advancing toward this target will need to be pursued.

Extended Impact Emission Reductions

Extended impact emissions are largely impacted by university policy, procedures and process implementation. In addition to the in-kind staff time already committed to the CAP program, additional resources will be required to support capacity building, change management, engagement and campaigns to support reductions in extended emissions. Further scoping is required to identify resources and program funding required to address UBCO's extended impact emissions. Short-term priorities and quick-start actions identified in this report will be addressed through the Fiscal 21-22 budget review process.

Climate Adaptation and Resiliency Planning

While the CAP 2030 process is focused on the development of mitigation strategies to reduce fossil fuel impacts, responding to climate change will also require the development of adaptation strategies to reduce the effects of climate change. It is recommended that a Climate Adaptation and Resiliency Plan be developed for the Okanagan campus as a subsequent phase (FY 22-23).

The UBC Okanagan campus is located in the ecological setting of the Okanagan Very Dry Hot Ponderosa Pine zone, which represents the driest woodland regions in BC, with hot, dry conditions in summer and cool conditions with little snow in winter. Mean annual precipitation (Kelowna Airport) is 298 mm, of which 102 mm (34%) falls as snow. Approximately 25% of the campus has high environmental sensitivity, representing primarily woodland and wetland ecological communities. With a diverse landscape of pine woodland and open grassland, the campus contains ecosystem communities of plants and wildlife identified as being species at risk. Locally, the Okanagan has experienced extreme weather conditions, including historic spring flooding, level four summer droughts, devastating wildfires, and record high temperatures over the past years[8].

Climate adaptation and resilience will prepare the campus to protect its infrastructure and ecological assets against future climate risk, and prepare the campus for anticipated regulatory climate resiliency planning and reporting requirements, anticipated to follow from the release of a Provincial Climate Adaptation Strategy in 2020. UBC Okanagan's climate adaptation planning to-date includes:

[8] City of Kelowna Climate Action Website, accessed at https://www.kelowna.ca/our-community/environment/climate-action, March 2019

- Climate modelling for new buildings (Skeena Passivehaus Project)
- Integrated Rainwater Management Plan, supports natural hydrological cycle with co-benefits to campus ecology, biodiversity (IRMP, 2017)
- Climate modelling for Integrated Rainwater Management Plan (IRMP, 2017)
- Climate sensitivity analysis for energy and carbon reduction measures (WSIP, 2016)
- Whole Systems Infrastructure Plan biodiversity and ecology recommended performance indicators, actions and co-benefits and implementation of multiple actions (WSIP, 2016)
- Climate Adaptive Design Recommendations (UBCO Design Guidelines, 2018)
- Wildlife and Species protection and restoration planning (ongoing)

Climate adaptation opportunities include:
- Campus Resilience Assessment Plan (planned)
- Climate 2050 Ready Requirements (new capital projects)
- Low embodied carbon in new buildings
- Campus Wildfire Plan update
- IRMP overland flood path plan development and future plan update

The development of a Climate Adaptation and Resiliency Plan for the Okanagan is recommended as a subsequent phase of the UBCO CAP 2030.

Actions: Immediate (Start FY 21-22)
- Work with relevant campus stakeholders to develop a proposed scope of work for a Climate Adaptation and Resiliency Plan

CAP 2030: UBC Internal Carbon Pricing Policy Briefing Note

OBJECTIVES

The objectives of UBC Internal Carbon Pricing (ICP) policy are to:

- Enable UBC to address GHG emission reductions as part of its decision-making for a project or initiative through establishing an internal carbon price on applicable GHG emissions
- Provide a mechanism to assess the total life-cycle costs and risks of climate change by translating carbon pollution into dollars to inform financial assessment of options over the lifetime of a project or initiative in a consistent, systematic and rigorous way
- Provide a financial mechanism that supports the university to make financial investments that are aligned to UBC's Climate Emergency Declaration commitments and Climate Action Plan 2030 (in process) goal to accelerate GHG emission reductions.

SCOPE

The policy is proposed to apply to options analyses that use *life-cycle cost analysis* to inform decision-making, including but not limited to the following projects or initiatives through a phased approach:

- Energy supply for buildings
- Mechanical equipment renewal
- Energy conservation
- New capital and building renewal
- Embodied carbon in buildings
- Business air travel
- New fleet purchases

STRATEGIC CONTEXT

Among the priority actions articulated in the UBC Climate Action Plan 2020 (CAP 2020) is a need to incorporate information on carbon pricing into options analysis as it becomes available. As we look forward to UBC's latest Climate Action Plan 2030 (CAP 2030) - a key component to accelerating UBC toward net zero carbon emissions by 2050 - an opportunity exists to pilot and operationalize such aims. Decarbonization of UBC's district energy system will be a key focus for the CAP 2030, which forms the basis and rationale for the initial scope of the internal carbon pricing policy.

An internal carbon pricing policy at UBC will build on the momentum generated regionally through by the City of Vancouver and Metro Vancouver. Both utilize an internal carbon pricing policy to guide decision-making on projects or initiatives that cause carbon pollution, such as, City building development, procurement of energy efficiency upgrades, procurement of energy sources, electricity purchases to power Metro Vancouver's operations, and retrofitting. Other municipalities, such as, New Westminster and Saanich, have corporate carbon pricing policies in place for internal operations. West Vancouver, North Vancouver, Victoria, Surrey and Toronto, along with the BC and federal treasury boards have expressed interest in this policy. In 2016, Yale University became one of the first post-secondary institutions to successful deploy an ICP policy, followed by Cornell, Princeton, and others. Many corporations have demonstrated success in implementing ICP, such as, Microsoft, Disney and Unilever.

POLICY JUSTIFICATION

Incorporating an internal carbon price in decision-making has long-lasting positive effects, both at an institutional-level as well at a societal-level:

- Demonstrates UBC's climate leadership and contributes to achieving the ambitions of UBC's Next Century, United Nations' Paris Agreement and Sustainable Development Goals (SDGs)

- Builds upon the regional success of the City of Vancouver and Metro Vancouver and ensures that UBC is keeping pace with regional and sector leaders
- De-risks University operations and investments against carbon pricing legislation
- Guides decision-making in a thoughtful and consistent way given an uncertain future; shifts investments to low carbon alternatives and incentivizes emission reductions
- Facilitates unpriced co-benefits of climate action including social, environmental and economic benefits, which are often under-represented in existing decision-making processes
- Supports changes in behaviours on campus and engages the campus community in climate solutions

POLICY DETAILS

The consultation on ICP involved a series of meetings with the CAP 2030 working groups to evaluate the options, help to design the policy and develop buy-in from the key campus partners. Operational Sustainability Steering Committee provided direction and guidance throughout the policy development process to ensure organizational support and strategic alignment.

Based on the internal consultation and research, a proxy price is recommended as the most suitable instrument for UBC to explore in the initial phase. A proxy (shadow) price is a price on paper in financial analyses when comparing different options. It does not directly entail money changing hands. It may affect which option is chosen, but will not result in additional payments for GHG emissions, internally or externally. It is not a carbon tax (or levy) as no actual fee will be collected. UBC may explore the carbon tax in a later phase.

UBC ICP accounts for the costs of climate change by translating carbon pollution into dollars, as follows: the estimate of the GHG emissions associated with a decision is multiplied by a carbon price and this figure is added to the costs. This cost will be included in the *Life Cycle Cost Analysis* (i.e., the GHG emissions and costs on the entire lifespan of a project) for each option alongside other relevant or actual costs (e.g., capital, operating and energy costs) to inform decision-making. Potential revenue streams (e.g., federal or provincial grants, low carbon fuel standard credits, etc.) should also be included in the *Life Cycle Cost Analysis*. It is worth noting that the analysis of life cycle cost and carbon would be one of the decision-making criteria and the final decision would be still subject to funding availability and other considerations, such as, functional requirements, ability to support broader transformation endeavors.

UBC ICP would adjust the assumptions that should already be taken into consideration. It is layered on top of the existing provincial carbon tax and carbon offset mechanisms; therefore, it is not expected to add significant administrative complexity.

UBC is in the process of testing and finalizing the appropriate internal carbon pricing level and a forward-looking schedule of pricing increases through research and consultation with key campus partners. At the initial phase, it's recommended to start with $160 per tonne (inclusive of any applicable provincial and federal carbon taxes) that will be applied as part of the pilot in 2021. This price level is commensurate with the climate targets, and benchmarked against the regional leaders City of Vancouver and metro Vancouver (see the Appendix 2). The final ICP pricing and schedule of increase will be confirmed and finalized by the end of 2021. The price level and schedule will be reviewed annually to allow for appropriate calibration.

RESOURCING AND FINANCIAL IMPLICATIONS

Deploying the actual policy does not require significant incremental resourcing but getting projects off the ground will likely come with a corresponding resource ask. The reason is that a project with lower GHG emissions may incur higher initial investment (i.e. higher capital expenditures for some infrastructure projects), even though the total cost (including energy cost, maintenance costs, etc.) over the project lifetime is lower. Thus, additional funding for the identified projects may be required to cover the increase in initial capital outlay. The amount of funding required will be refined through consultant studies for the identified projects. The mechanism through which the increased funding is deployed will be determined

through further discussion and analysis, e.g., Routine Capital Budget, Sustainability Fund, etc. The overall resourcing for ICP will be addressed as part of overarching CAP 2030 resourcing strategy.

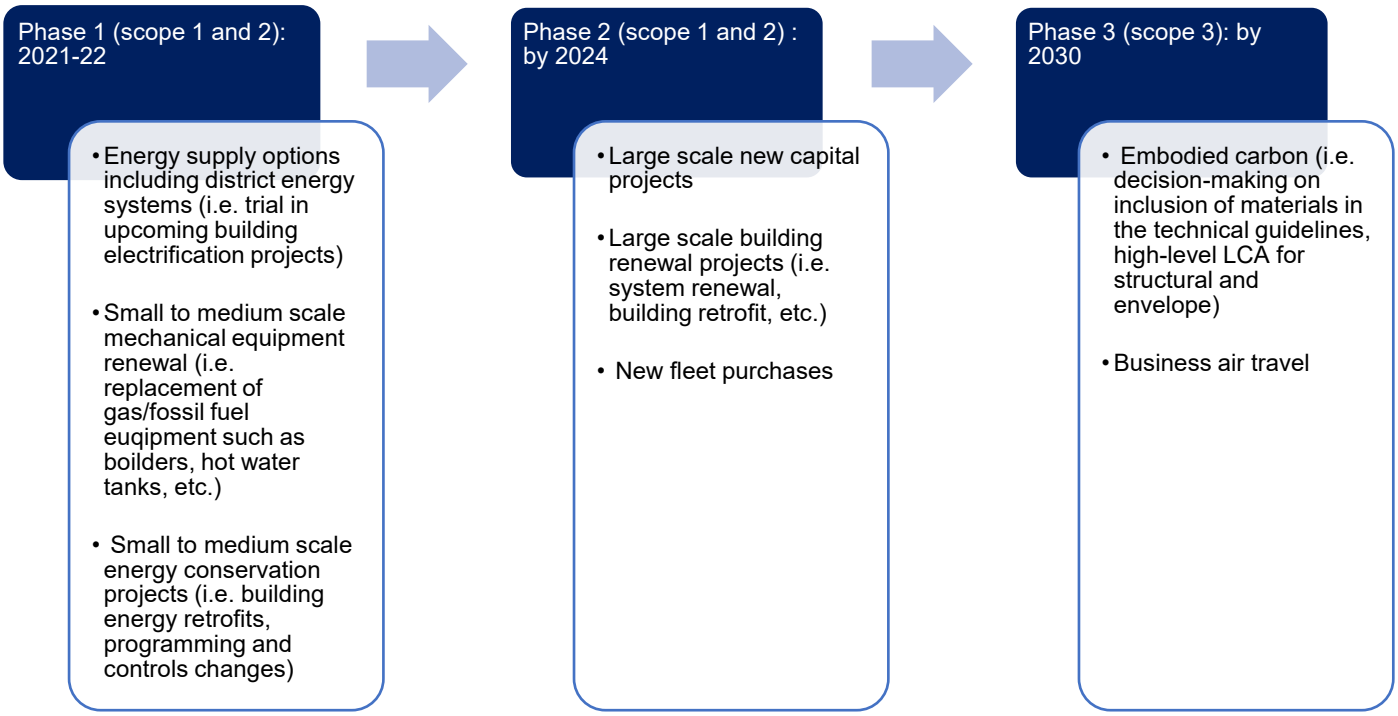
It is recommended that the financial implications of ICP are evaluated in the early stages of project evaluation. This ensures that any additional costs associated with the carbon price are incorporated early on in decision-making and project planning, ensuring that any financial impacts are understood and accounted for.

IMPLEMENTATION

The implementation of the UBC Internal Carbon Price Policy is proposed to be undertaken in a phased manner. Chart 1 shows some pilot project ideas that are being proposed for further exploration for each phase. This will be coordinated with the implementation of other complementary sustainability policies and plans, such as, the Climate Action Plan and Green Building Action Plan. These policies collectively aim to achieve carbon reduction targets through synergistic and thorough planning for all aspects of sustainability on campus.

The implementation is recommended to focus on scope 1 and 2 emissions for the first 2 phases and expand to scope 3 by 2030 considering the scale/impact of GHG reduction, ease of implementation, risks, change management and governance acceptability. The pilot projects and implementation timing will be determined and further refined in consultation with key campus partners and University leadership.

Chart 1: ICP Implementation by Phase



NEXT STEPS

- Start with $160 per tonne ICP (inclusive of any applicable provincial and federal carbon taxes) for the initial piloting; confirm and finalize the pricing level and schedule of increase through further consultation and testing by the end of 2021
- Develop detailed policy guidance documentation and supporting toolkit / calculator to operationalize the policy
- Determine and implement immediate pilot projects to increase familiarity and gain experience

- Build capacity across departments, such as, support tools, case studies, workshops, etc.
- Develop internal and external communication plan

BUSINESS CASE EXAMPLE FOR ILLUSTRATION PURPOSE

Analysis of the following case study, ex-post, illustrates the impact of an internal carbon price on the decision to replace a natural gas boiler (like-for-like) in the Robert F. Osborne Centre (OSBO), or to connect to the District Energy System (DES) altogether. A decision was made to replace the boiler, like-for-like. However, when accounting for the impacts of climate change, the decision would favour connecting to the DES, instead.

As Table 1 demonstrates, ICP is added to the energy price[1] which translates into different energy costs depending on the fuel sources and consumption. The present value of this energy cost in concert with the present value of capital expenditures and maintenance cost renders a life cycle cost that is more indicative of the true cost of the decision over a 15-year time span. Figure 1 shows that without an internal carbon price, the decision would favour a like-for-like replacement; with an internal carbon price applied, however, the decision favours switching to the DES. In this case, with an internal carbon price applied, the present value of all costs to switch to the DES is approximately $66k lower than the one associated with a like-for-like replacement.

In summary, incorporating ICP provides a positive business case (Net Present Value =66K) for switching to DES compared to a like-for-like natural gas boiler replacement; the higher the ICP is, the stronger the business case is in support of switching to DES (see figure 2).

It should be noted that ICP, as a proxy price, does not directly entail money changing hands; It does affect which option may be chosen. In this case, the option to switch to DES incurs higher initial capital expenditures compared to like-for-like replacement ($323K vs. $582K); however, considering all costs (capital, energy and maintenance costs), switching to DES is more favorable.

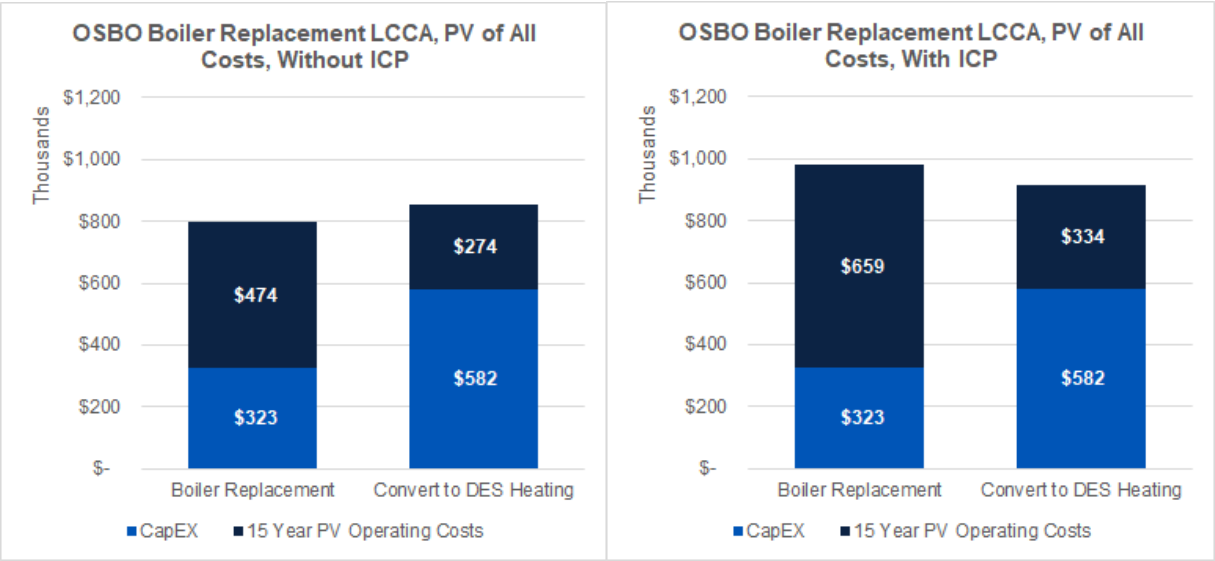
Table 1: Energy Cost Comparison of Options for the Robert F. Osborne Centre (OSBO)

FY2021 Energy Rate ($/GJ)	Option 1: Natural Gas Boiler Like-for-Like Replacement	Option 2: Switch to DES	
	Natural Gas Rate 25	Natural Gas Rate 22	Biomass
Energy Price ($/GJ)	7	6	4
Provincial Carbon Tax ($/GJ)	2	2	0
Carbon Offset ($/GJ)	1	1	0
ICP Net of Provincial Carbon Tax[2]($/GJ)	6	6	0
Total Energy Rate without ICP ($/GJ)	10	9	4
Total Energy Rate with ICP ($/GJ)	16	15	4
Energy Consumption (GJ/Year)	3,220	1,038	2,292

[1] Inclusive of carbon offset

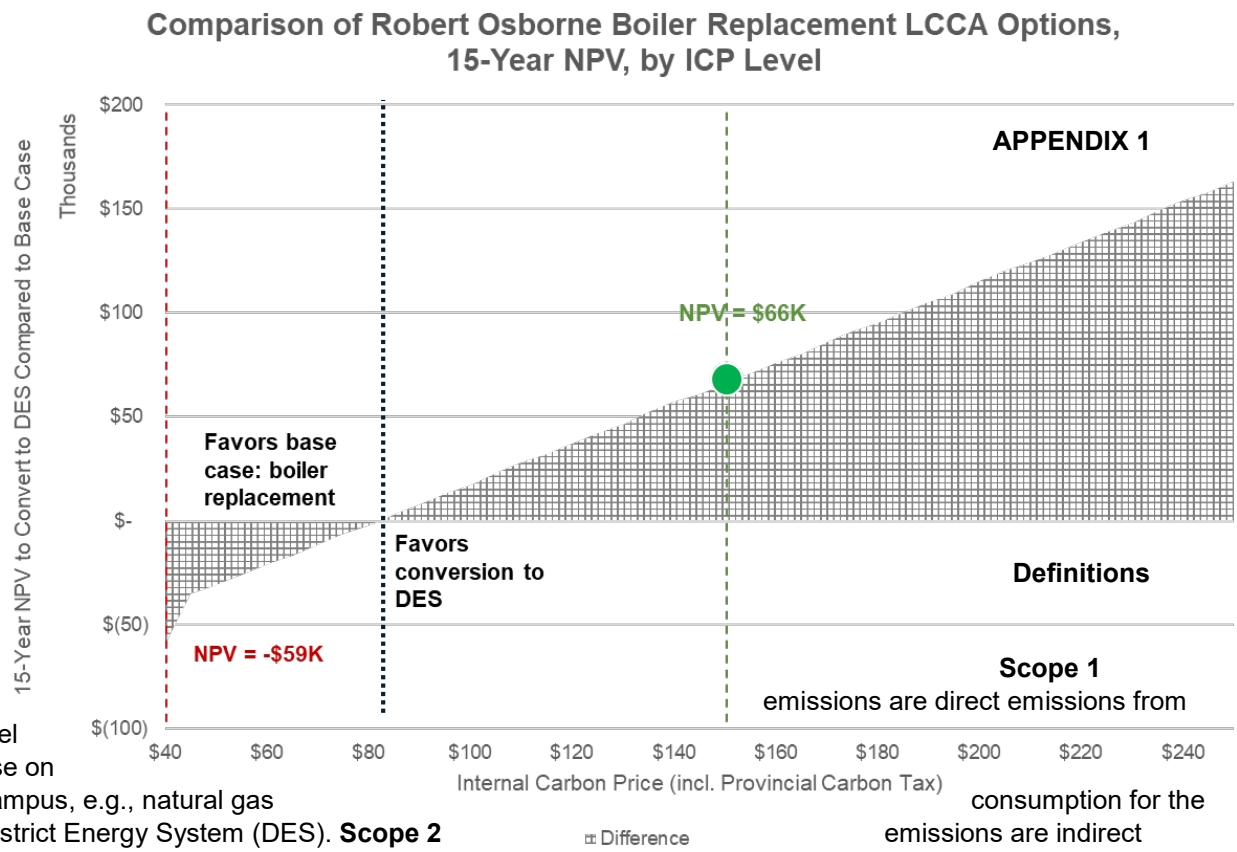
[2] Equals to the life cycle carbon intensity of each fuel multiplied by carbon price. For illustration purpose, this business case is based on the following assumptions: carbon price is at $150/tonne in FY 2020 inclusive of provincial carbon tax, escalate by $5/year; provincial carbon tax at $40/tonne in FY 2020, $45/tonne in FY 2021, and $50/tonne afterwards; both options include existing provincial carbon tax

Figure 1: Present Value of Total Cost Comparison of Options for the Robert F. Osborne Centre (OSBO)



Note: PV of operating costs = PV of energy cost + PV maintenance costs

Figure 2: Comparison of Robert F. Osborne Centre (OSBO), 15-Year NPV (the difference of present values of two options) by ICP level



Definitions

Scope 1 emissions are direct emissions from fuel use on campus, e.g., natural gas consumption for the District Energy System (DES). **Scope 2** emissions are indirect emissions due to energy use of campus, i.e., to produce electricity that is then supplied to UBC. **Scope 3** emissions are primarily off-campus emissions not included in UBC's GHG reduction targets and not offsettable under carbon neutral provincial regulations; however, they are estimated and reported as part of UBC's GHG inventory in the annual Carbon Neutral Action Reports, including those resulting from: transportation (commuting) to and from campus; business air travel for UBC staff and faculty; building life cycle (embodied energy); and solid waste management (e.g., landfilling of UBC's waste).

Life Cycle Cost Analysis: Analysis method which determines the net present value of all costs and revenues associated with alternative options stemming from a decision made regarding a project or initiative throughout the course of its expected life.

Carbon Dioxide Equivalent (CO2e): A metric measure used to compare emissions from various greenhouse gases on the basis of global warming potential.

APPENDIX 2 City of Vancouver and Metro Vancouver Internal Carbon Pricing Levels

City of Vancouver explored three possible approaches to set the carbon price: 1) aligning with Metro Vancouver's $150/tonne, 2) aligning with the social cost of carbon through research, and 3) aligning with the implicit carbon costs deemed necessary to achieve provincial and national climate change targets through economic modelling. Options 2 and 3 produced a range of $200 to $300 per tonne from a variety of studies. While options 2 and 3 may be more directly linked to the costs of mitigating climate change, there was also concern starting with a price significantly higher than current provincial policy and Metro Vancouver's policy when a significant amount of education and change management is needed to understand and implement this policy corporate wide.

Based on internal and external consultation, the City adopted an initial price point of $150 per tonne to align with Metro Vancouver while also being cognizant about potential change management issues that may stem from too high of an initial price level. Table 2 includes the City's carbon prices (inclusive of any applicable provincial and federal carbon taxes) The annual 6% escalator for 2022 and beyond was set to reach its 2030 goals with emissions levels that align with those required to realize provincial and federal climate targets.

Table 2: City of Vancouver Carbon Price level and schedule

Year	Carbon Price (per tonne of CO2e)
2018	$150
2019	$150
2020	$155
2021	$160
2022 and Beyond	Previous year's price multiplied by 1.06

Note: The above will be in effect as long as the sum of provincial and federal carbon taxes, current and future, do not exceed the Carbon Price in Table 1 for any given year; otherwise, the Carbon Price will need to be adjusted to reflect the provincial and federal carbon taxes of the day.

Metro Vancouver uses a total carbon price (inclusive of any applicable external carbon taxes) of $150 per tonne of CO2e in life cycle cost analysis. Unlike the City of Vancouver, however, the price will remain constant and does not include an escalator. Metro Vancouver's internal carbon price will be adjusted to account for any changes to provincial and federal carbon taxes, ensuring that the total carbon price is held constant at $150 per tonne of CO2e. Metro Vancouver's policy recognizes potential increases to the BC carbon tax as a result of the Government of Canada's Pan-Canadian Framework on Clean Growth and Climate Change.

CLIMATE ACTION PLAN 2030

EMERGING DIRECTIONS AND DRAFT TARGETS

FEBRUARY 2021

CAP 2030 EMERGING DIRECTIONS AND DRAFT TARGETS

1. CAP 2030--Drivers, Vision and Approach
2. UBC Vancouver Existing Situation: Current Emissions and Sources
3. UBC Vancouver CAP 2030 Analysis & Costing Approach & Timeline
4. Emerging Targets & Actions
5. Financial Tools, Resourcing and Timeline
6. Next Steps for UBC Vancouver

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1. UBC Okanagan CAP 2030 Approach
2. Emerging goals, targets and actions
    1. UBCO Campus Operations: Buildings and Low Carbon Energy Supply
    2. Extended Impact Emissions: Commuting, Food Systems, Air Travel
3. Financial Implications and Resourcing
4. Next Steps for UBC Okanagan

CLIMATE ACTION PLAN 2030—CATALYST, VISION AND APPROACH

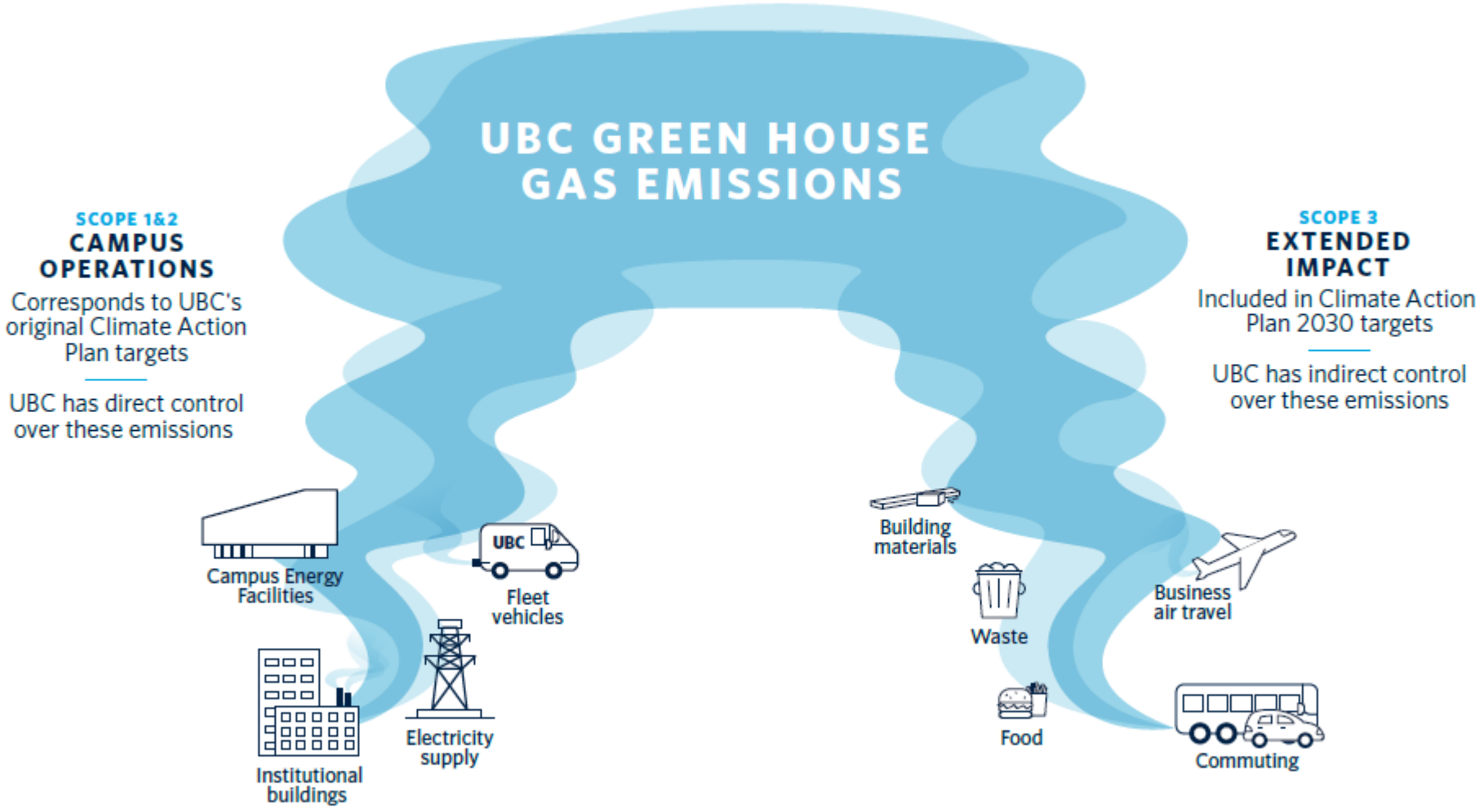
Catalyst for CAP 2030

- UBC Climate Emergency Declaration and Commitments including commitment to address climate justice across climate action efforts
- UBC's Strategic Plan Goal to "Lead globally and locally in sustainability and wellbeing across our campuses and communities
- IPCC Report: Less than a decade to act

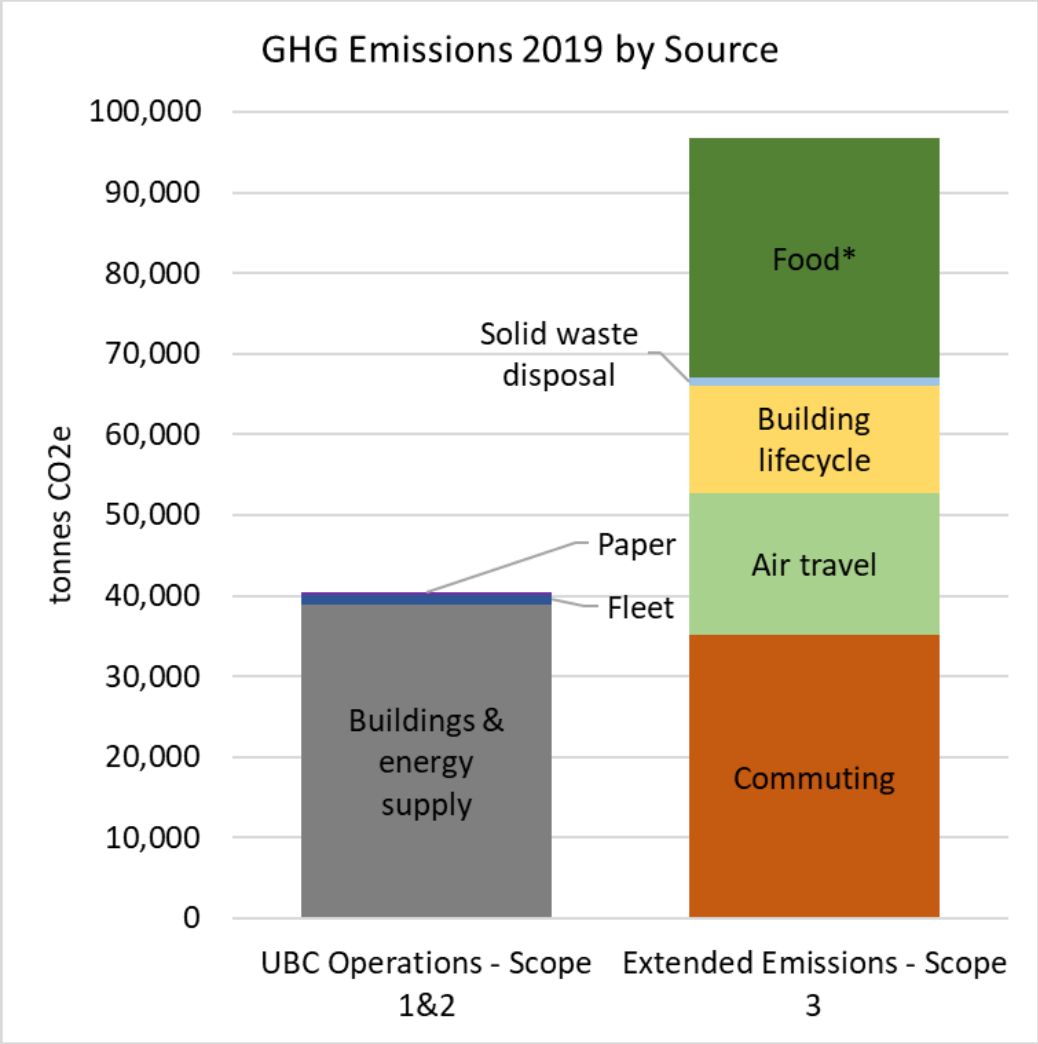
CAP 2030 Vision

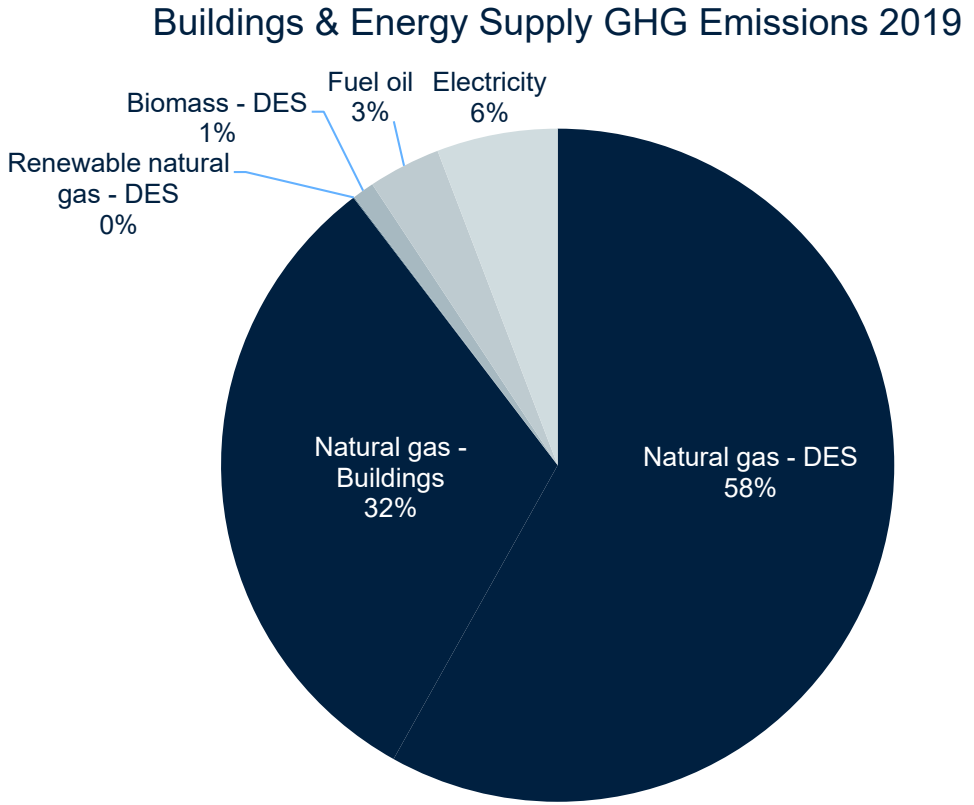
Climate Action Plan 2030 will position UBC as a model of how universities can mobilize to help address the climate emergency and Paris targets through bold, impactful actions to accelerate and deepen carbon reductions across operations, and expand action on reducing indirect emissions.

EXISTING SITUATION: ADDRESSING THE DIFFERENT TYPES OF EMISSIONS AT UBC

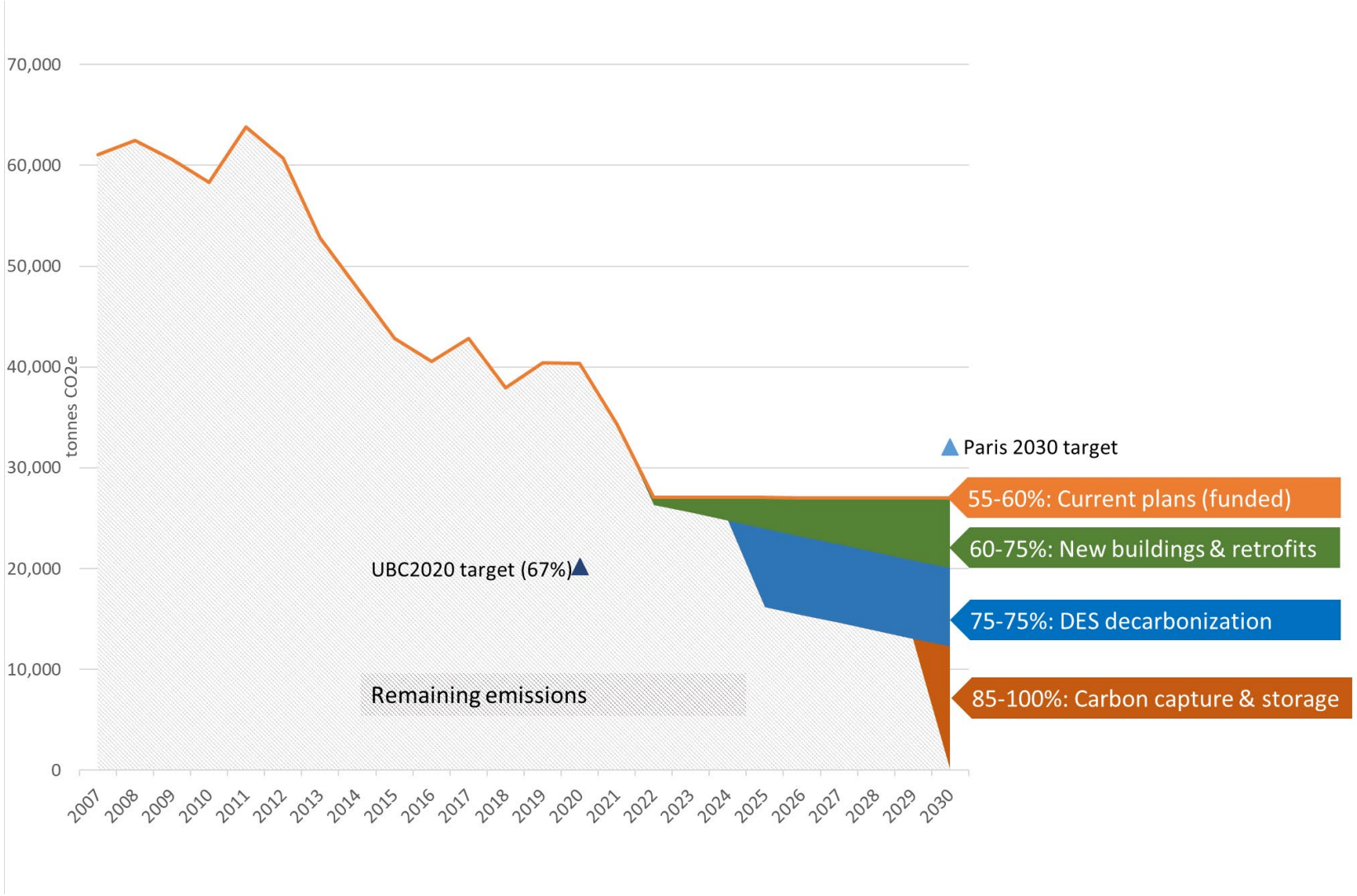


UBC VANCOUVER EXISTING SITUATION: TOTAL GHG EMISSIONS BY SOURCE





UBC CAMPUS OPERATIONS: POTENTIAL EMISSIONS REDUCTIONS



- Overall reduction targets 75 - 100% by 2030, to be refined through further analysis through 2021
- Federal carbon tax will create over $100M+/- carbon liability over 25 years (from UBC operations emissions)

CAMPUS OPERATIONS: TARGETED EMISSION REDUCTIONS

Academic District Energy System

- **TARGET: By 2030, 100% of the energy used by the UBC Vancouver District Energy System will be low carbon**
  - Potential low carbon energy supply options being investigated include large scale electric heat pumps using ground, aquifer, air or other heat source, thermal storage systems, Renewable Natural Gas, Low carbon hydrogen, natural gas with carbon capture & storage (longer term)
  - Actions
    - Continue technical and financial analysis of potential solutions
    - Develop Energy Master Plan that strategically integrates different solutions and considers complex interdependencies

GOALS & ACTIONS - UBC OPERATIONS EMISSIONS (SCOPE 1 & 2)

New Buildings

- **TARGET: By 2030, new buildings and renewals will target near zero operational emissions**
  - To achieve this target new buildings will require improved energy efficient design, fuel switching and eliminate any new fossil fuel equipment
  - Actions
    - Develop GHG Intensity targets for new buildings with cost-benefit analysis, integrate into policy and communicate to stakeholders

GOALS & ACTIONS - UBC OPERATIONS EMISSIONS (SCOPE 1 & 2)

Existing Buildings

- **TARGET: By 2030, 100% of approved renewal and retrofit projects to transition to low carbon energy systems subject to technical and financial feasibility analysis with the GHG emission reduction to be determined.**

- **Actions**
  - Develop a building decarbonization plan that integrates with maintenance and renewal programs, and a resourcing strategy to support incremental costs.
  - Following this, strategically implement building retrofits over time based on life cycle cost and GHG analysis on a case by case basis.
  - Work with UBC Properties Trust toward developing GHG targets and an action plan for this portfolio. Note neighbourhood buildings would be addressed in upcoming Community Energy & Emissions Plan.

GOALS & ACTIONS - EXTENDED EMISSIONS (SCOPE 3)

- **TARGET: across all areas (air travel, commuting, food, materials and waste), reduce emissions at least 45% to align with Paris target**

  - Costing implications: unlike operations, reductions will be driven by policies and programs to influence the community through engagement, capacity building and awareness. Modest investment in operating costs will be needed, but there can also be savings and efficiencies generated.

  - **Business Air Travel**
    - Actions--Immediate: Track and report GHG emissions and other key parameters for all UBC business air travel using Workday data
    - Short term (2-4 yrs.): Develop & implement an air travel emissions reduction program that supports and promotes the use of virtual alternatives, addresses barriers and leverages partnerships such as UC3.

GOALS & ACTIONS - EXTENDED EMISSIONS (SCOPE 3)

- **Commuting**

  - **Actions:**
    - Immediate: Embrace remote working, flex days and e-learning – e.g., set departmental targets
    - Explore the potential for a “Sustainable Transportation Levy” to fund actions as part of parking permit fees and/or restructuring of parking permit fees to daily only (i.e., no incentive for monthly etc.)
    - Establish a Sustainable Transportation Program to deliver infrastructure and programs to drive behaviour change
    - Identify a suite of on-campus improvements to support transition to electric vehicles

GOALS & ACTIONS - EXTENDED EMISSIONS (SCOPE 3)

Food Systems

- **Actions:**
  - Short term (2-4yrs): Develop a Food Systems Climate Action strategy that includes supplier code of conduct and new procurement guidelines
  - Explore subsidy program to cover additional food costs
  - Enhance and streamline measurement & reporting of food system GHG emissions and other indicators
  - Implement climate food labelling

GOALS & ACTIONS - EXTENDED EMISSIONS (SCOPE 3)

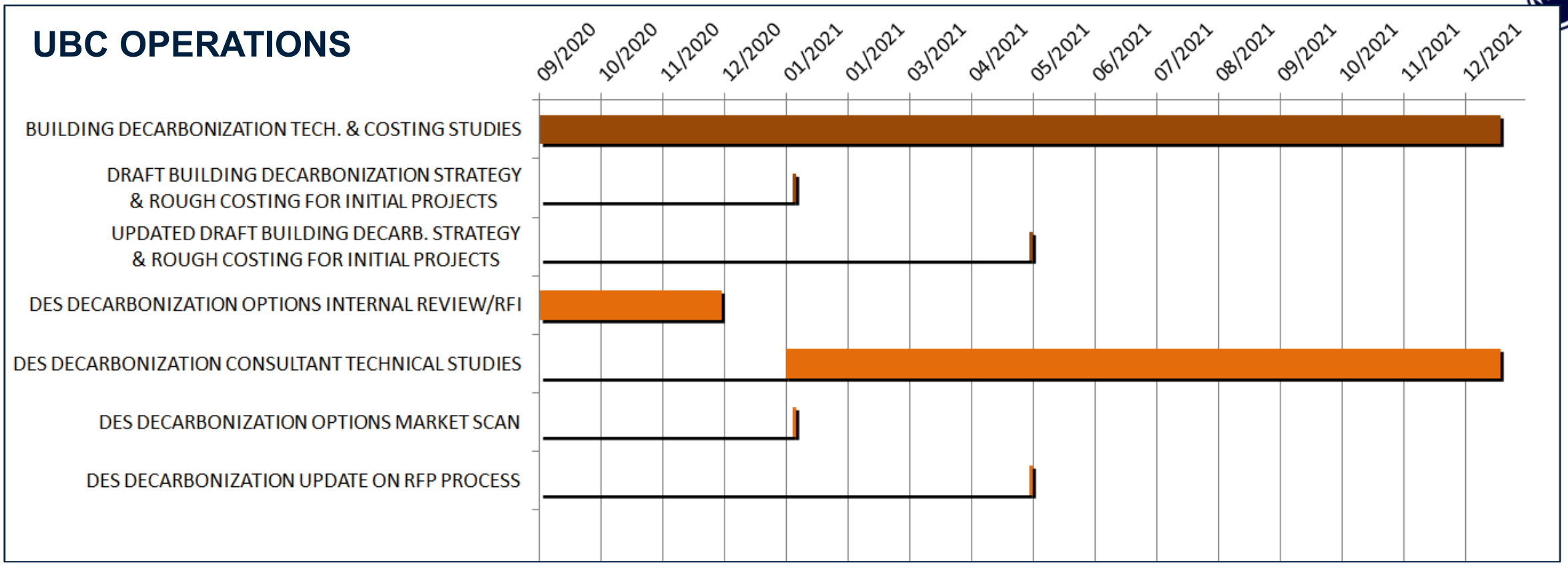
- **Waste & materials**
  - Updated reuse programs; Zero Waste Action Plan update for 2021 to include Waste Operations Strategy, reuse program and central sustainable procurement program.
- **Embodied Carbon in Buildings**
  - Develop a guideline for assessing & reducing embodied carbon, a carbon “red list”, and pursue a research collaboration for UBC building performance & EC.
- **Biodiversity**
  - Continue to scope and develop biodiversity strategies to support CAP2030 targets and inform Campus Vision 2050.
- **Engagement & Outreach Programs: underpins other Extended Emissions areas**
  - Create a more integrated, cross campus communications and engagement management model

FINANCIAL CONSIDERATIONS

- **Funding and Resourcing Strategy**
  - Invest in high impact areas which help reduce GHGs and avoid carbon liabilities long term (carbon liability estimated to be $100 M over 25 years)
  - CAP2030 phasing will undertake technical studies and detailed planning to help prioritize limited capital funds in areas of highest impact
  - CAP2030 will pursue and leverage external funding and partnership opportunities (e.g. Campus as a Living Lab, industry and utility partnerships, government and business
  - SDS is supporting development of a comprehensive resourcing strategy for CAP2030 which will identify efficiencies and explore innovative resourcing approaches.

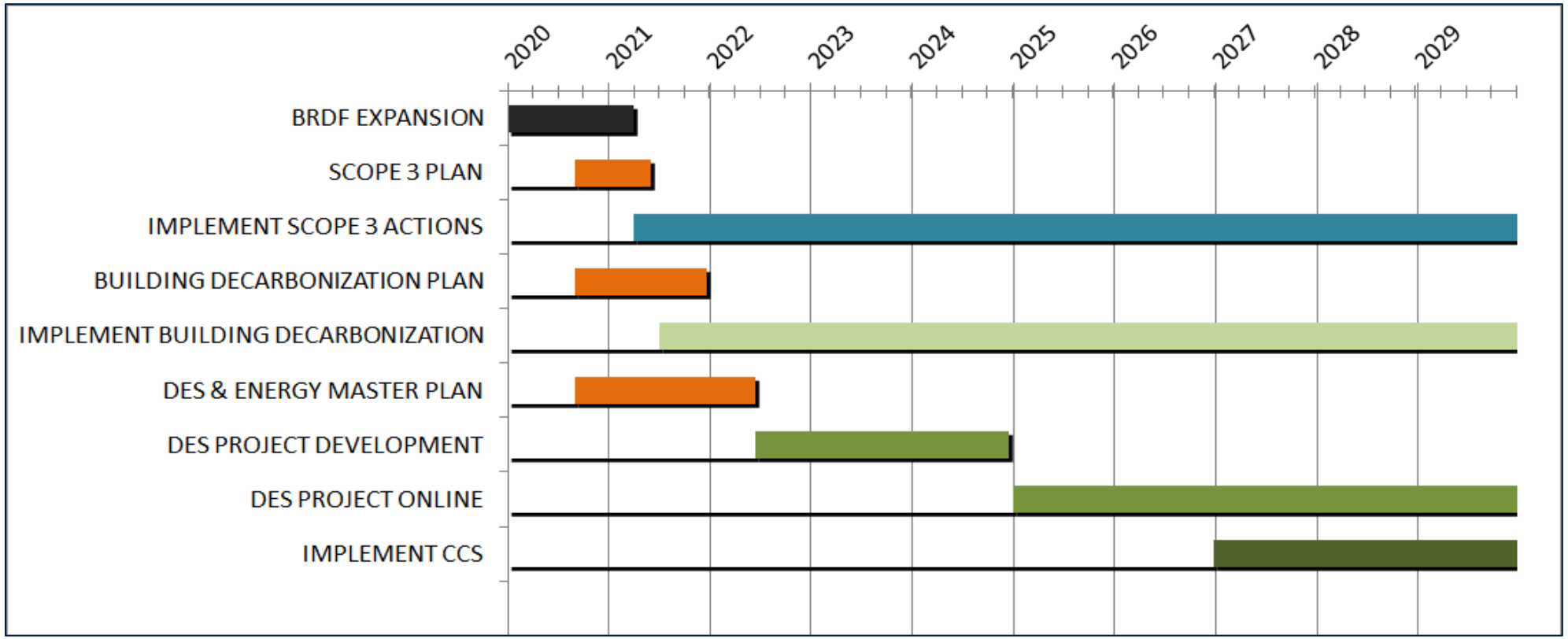
- **Internal Carbon Pricing**
  - Pilot a carbon proxy price in lifecycle cost analysis assessments for several energy projects and develop guidance to help operationalize the carbon proxy price approach at UBC.

IMMEDIATE ANALYSIS AND COSTING TIMELINE & APPROACH



- Costing for operations & infrastructure investments developed over next 12-18 months
- Addressing Climate Emergency directives will challenge UBC, but we have proven deep reductions can be achieved successfully, and external drivers will make it easier
- For extended emissions, preliminary scoping is done and will need to be refined as the policies and programs are scoped in more detail.

OVERALL CAP2030 IMPLEMENTATION TIMELINE



- Extended Impact emissions actions can proceed starting in 2021, scaled to available resources
- DES decarbonization & building energy supply investigations will continue into 2022, followed by development of new projects - e.g., new supply, energy storage

NEXT STEPS

1. Work to fold in Board and executive feedback into refinement of CAP 2030 plan development
2. Continue to advance resourcing strategy in partnership with SDS
3. Continue on advancing and refining CAP Draft Plan and Priority Implementation Strategy for presentation to BoG in Fall 2021 (Phase 1)
4. With the emerging results of the technical and financial analysis, work with the UBC Executive to help determine an optimized pathway to achieve targeted reductions and report findings in a Phase II CAP2030 Report to Board in 2022.

CLIMATE ACTION PLAN 2030
OKANAGAN CAMPUS

Emerging Directions and Draft Targets

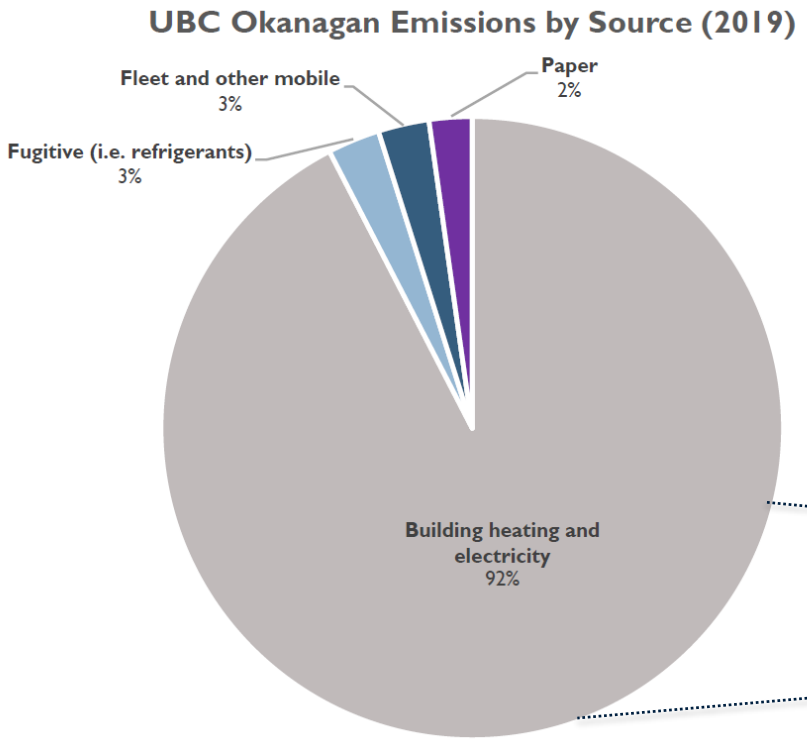
FEBRUARY 2021

APPROACH

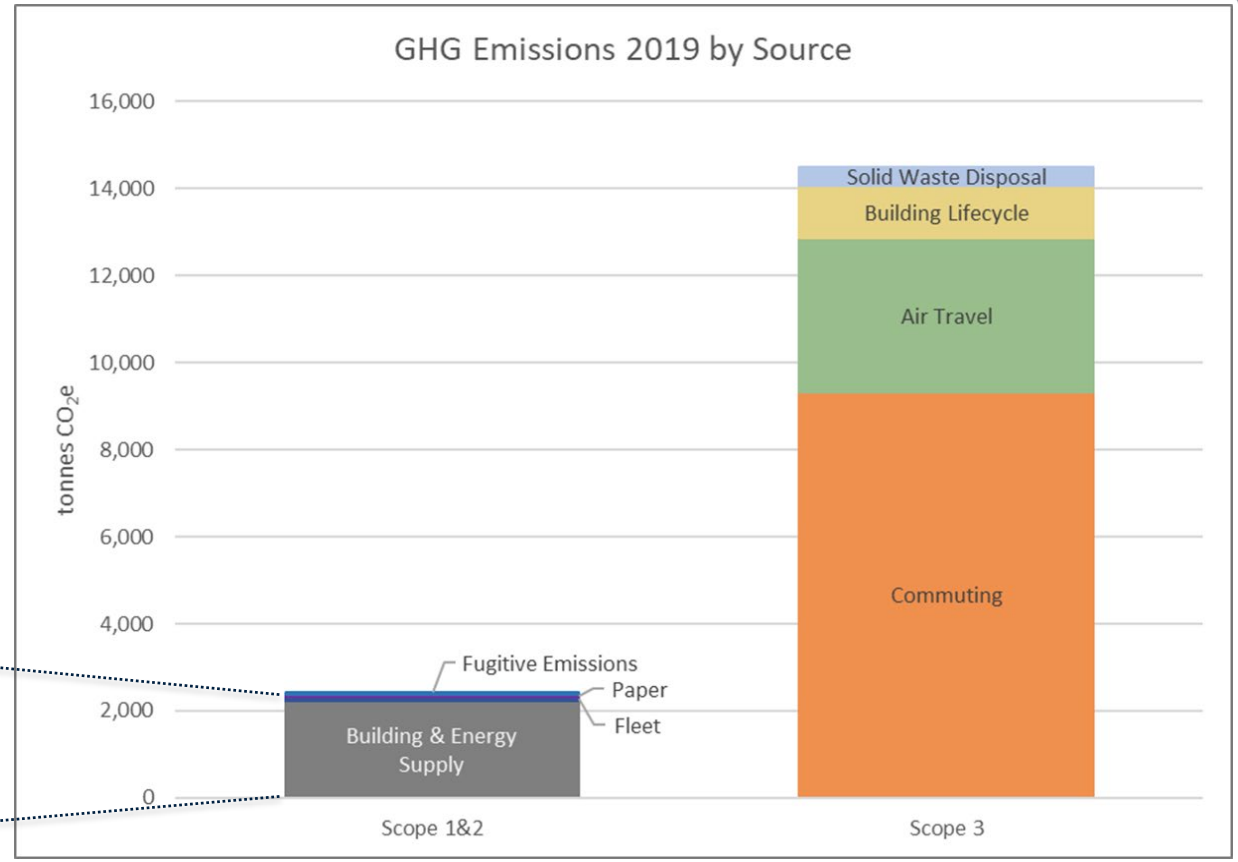
CAP 2030 THEMES	SCOPE	GHG IMPACT	CLIMATE EMERGENCY	UBCV CAP	UBCO CAP	LEVEL OF UBCO STAFF / CONSULTANT RESOURCING
Energy Demand Existing Buildings	1 2 3	●●●●●	●●●●●	✓	✓	Fully Resourced
Energy Supply	1 2 3	●●●●●	●●●●●	✓	✓	Fully Resourced
Commuting	1 2 3	●●●●●	●●●●●	✓	✓	Fully Resourced
Food	1 2 3	●●●●●	●●●●●	✓	✓	Active Group in Place, adding Consultant support
Business Air Travel	1 2 3	●●●●●	●●●●●	✓	✓	UBCO Faculty Reps
Coms & Engagement	1 2 3	●●●○○	●●●●●	✓	✓	Existing Program Requires Update
New Buildings	1 2 3	●●●●●	●●●●●	✓	○	New Area for UBCO Staff Engaged
Embodied Carbon	1 2 3	●●●○○		✓ (pilot)	○	No UBCO WG Capacity
Fleet	1 2 3	●○○○○		✓	○	No UBCO WG Capacity
Waste, Materials, Paper	1 2 3	●○○○○	●●●●●	✓	○	Emerging Area for UBCO
Financial Tools	1 2 3	●●●●●		✓ (pilot)	○	No UBCO WG

EXISTING SITUATION: TOTAL GHG EMISSIONS BY SOURCE

CAMPUS OPERATIONS (SCOPE 1 & 2)



EXTENDED IMPACT (SCOPE 3)



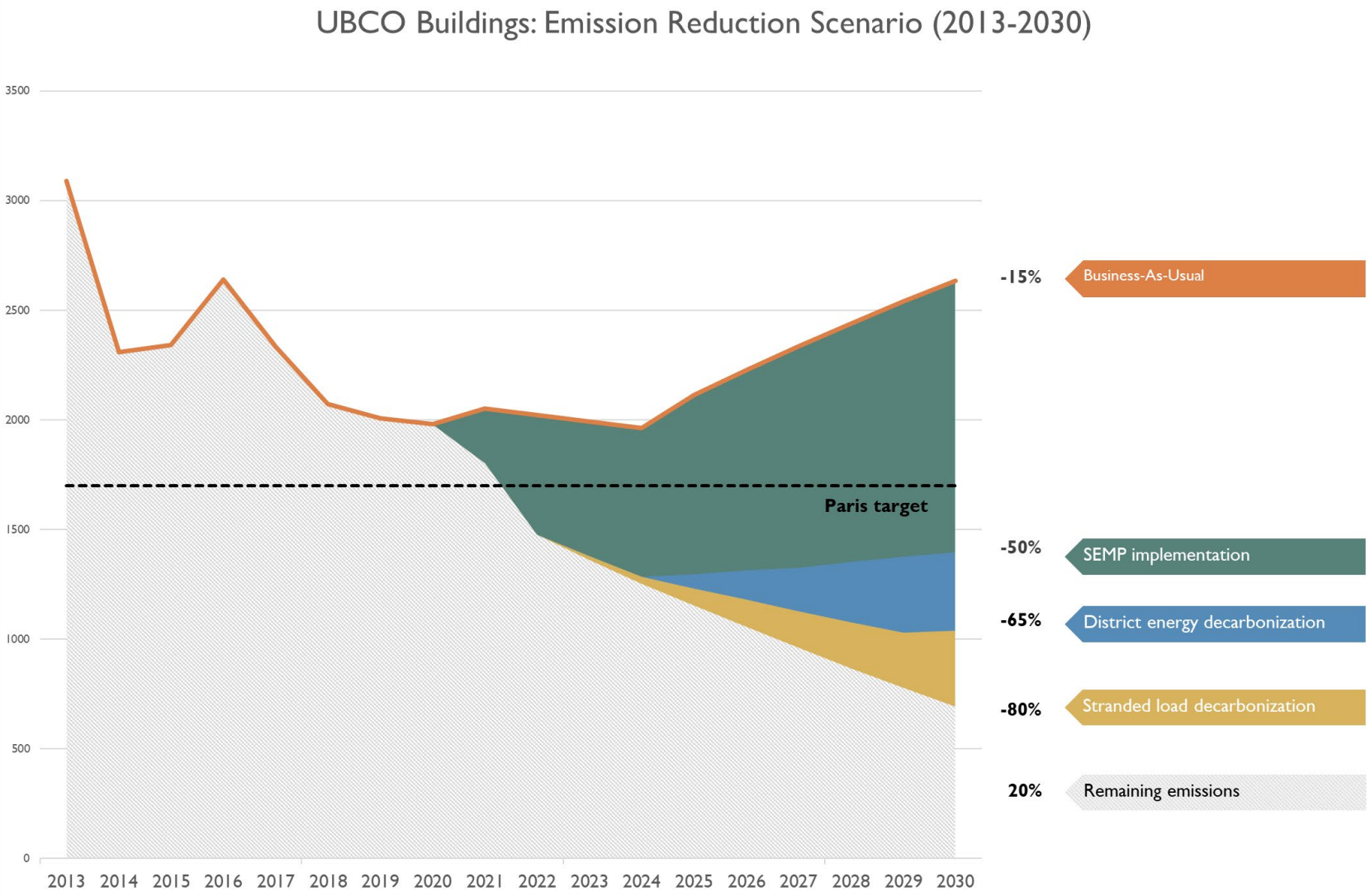
GOALS & ACTIONS – CAMPUS OPERATIONS EMISSIONS

- **Existing Buildings – Strategic Energy Management Plan (Demand side)**
  - **TARGET: 50% emission reduction by 2030 from 2013 baseline**
    - Actions – immediate: provide recurring funding to support continued plan implementation ($200k per year)

- **Energy Supply - Low Carbon Energy Strategy (Supply Side)**
  - **TARGET RANGE: 65% to 80% emission reduction by 2030 from 2013 baseline** through de-carbonization + implementation of Strategic Energy Management Plan
  - **Realistic target: 65% emission reduction by 2030 from 2013 baseline.**

    - **Actions:** Immediate: complete concept design of all phases by March 2021. Implement first phase (initial investment $2-3M) before March 2022.
    - Review and revise relevant UBCO performance targets (climate specific) and guidelines to ensure alignment with low carbon energy strategy.

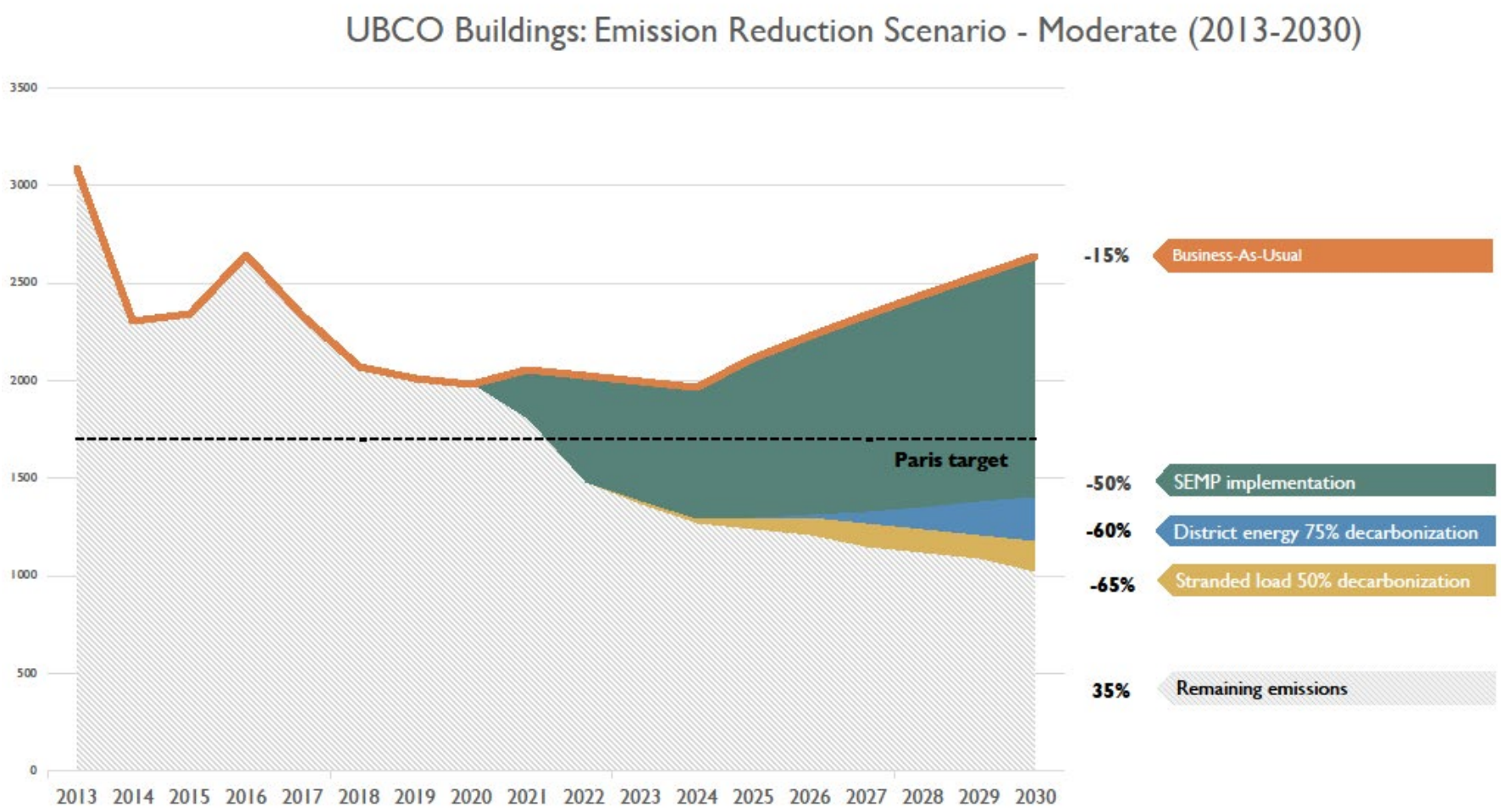
POTENTIAL EMISSION REDUCTIONS – OPERATIONS SCOPE 1 & 2



- **Aggressive target 80% emission reduction by 2030** tested through combined low carbon energy demand and energy supply strategies. Requires significant levels of investment

** Assumes constant emission factor for electricity 2020 onward. Assumes gradual decrease in natural gas emission factor to meet -15% by 2030, in line with provincial CleanBC commitment.*

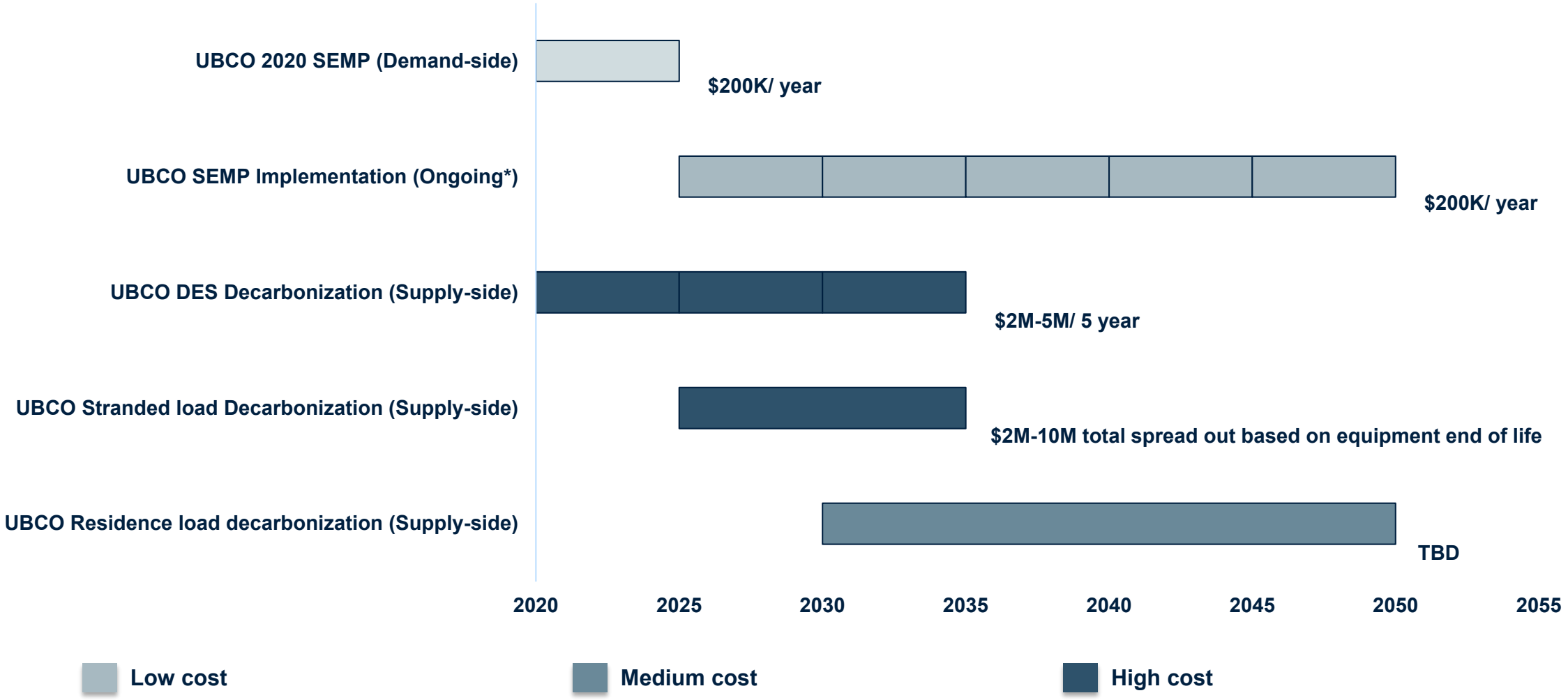
POTENTIAL EMISSION REDUCTIONS – OPERATIONS SCOPE 1 & 2



** Assumes constant emission factor for electricity 2020 onward. Assumes gradual decrease in natural gas emission factor to meet -15% by 2030, in line with provincial CleanBC commitment.*

- **Realistic target 65% emission reduction by 2030.**
- Targets to be refined through further energy supply analysis early 2021

POTENTIAL IMPLEMENTATION TIMELINE – SCOPE 1 & 2



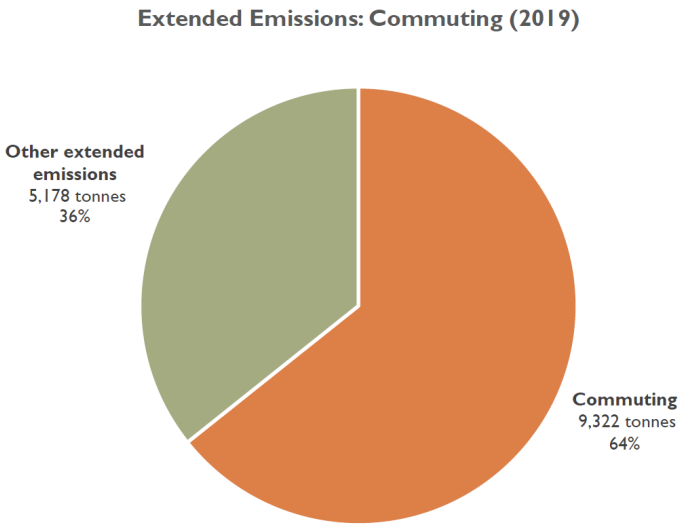
* Ongoing strategy includes Energy conservation measures (demand-side), Recommissioning (RCx), Monitoring-based commissioning (MBCx), Fault detection and diagnosis (FDD) etc.

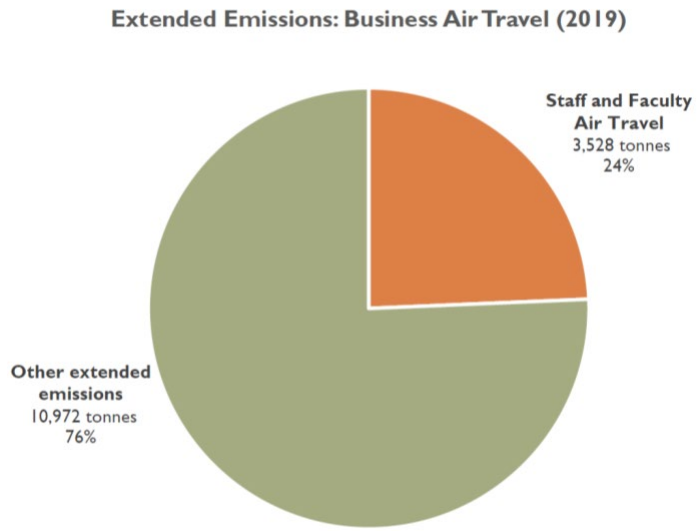
EXTENDED IMPACT EMISSIONS (SCOPE 3)

- **COMMUTING TARGET:** By 2030, achieve a 50% to 60% reduction in GHG emissions related to staff, faculty and student commuting

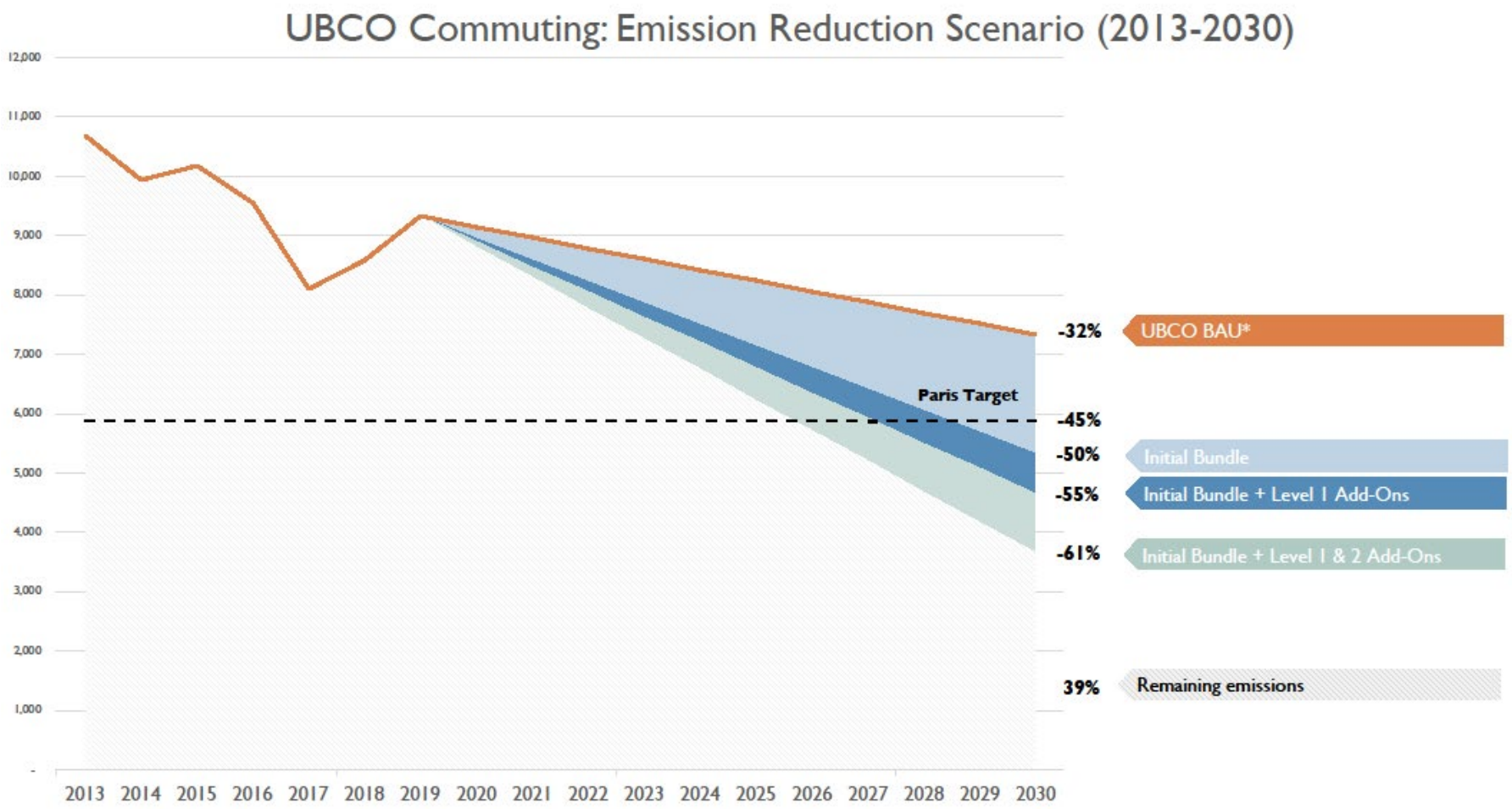
- **BUSINESS AIR TRAVEL TARGET:** By 2030, achieve a 50% GHG reduction associated with Business Air Travel Emissions from pre-COVID levels.

- **FOOD SYSTEMS TARGET:** By 2030, develop a climate-friendly food system to reduce food system-related GHG emissions by 50%; target 80% climate-friendly food menus in 2025.





POTENTIAL EMISSIONS REDUCTIONS – COMMUTING EMISSIONS (SCOPE 3)



** UBCO BAU assumes the implementation of BC Transit's Low Carbon Fleet Program and the Provincial Zero Emissions Vehicle Regulation (with 30% of new vehicle sales to be ZEV by 2030).*

- Initial bundle of highly feasible actions may achieve or exceed 45% reduction by 2030 (Paris 1.5 degree reduction target), if fully implemented

FINANCIAL IMPLICATIONS & RESOURCING

Campus Operations Emissions (Scope 1 and 2)

Strategy/Action	Current Status / Development Phase	Initial Investment Required	Total Investment Required 2020-2030	2030 GHG Savings rel. to 2013
SEMP	Implementation	$200k/yr	$2M	50%
75% District Energy Decarbonization	Concept Design complete by March 2021	$2-3M	$4-8M	60%
50% Stranded Load Decarbonization	Timing aligned with end of life equipment replacements	TBD	$2-5M Note 1	65%

Note 1: The UBCO High Level Net Zero Carbon Energy Strategy indicated overall capital and operating cost reductions would be achieved by connection of loads to the District Energy System. Costs listed would offset costs to routine capital budget for required equipment renewal. Project priority to be determined by relative business case.

FINANCIAL IMPLICATIONS & RESOURCING

Extended Emissions (Scope 3)

- CAP resource needs will be assessed in light of other demands
- Extended emission reduction actions will leverage existing resources in high impact areas as first priority
- Additional resources will be required to support capacity building, change management, engagement and campaigns to support reductions in air travel and low carbon food systems.
- External / partnership funding opportunities will be pursued:
    - Federal Climate Action & Awareness Fund for Community-Based Climate Action Projects
    - FortisBC Partnership
- Next phase of UBCO CAP will refine recommendations, implementation pathways and resource requirements.

NEXT STEPS FOR UBC-O CAP 2030

1. Continue on advancing and refining UBCO CAP2030 Draft Plan and Priority Implementation Strategy for presentation to BoG in Fall 2021
2. Complete findings from the Low Carbon Energy Strategy with recommendations and supporting financial business case
3. Draft detailed action plan and initiatives to address Extended Impact Emission sources for commuting and food systems
4. Continue to refine the proposed CAP 2030 budget FY 2021-22 as part of the Universities' budget review process