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Climate Action Plan 2020



The University of British Columbia (UBC) is developing a new Climate Action Plan to further reduce greenhouse gas emissions on the Vancouver Campus.

In 2010, UBC established some of the most aggressive greenhouse gas (GHG) emission targets in North America. Five years later, UBC has realized a 30% reduction in its greenhouse gas emissions from a 2007 baseline, despite an increase in both building space and student enrollment.

Building on this success, we are now developing the UBC Climate Action Plan 2020 (CAP 2020), which will outline a series of actions UBC could take towards achieving a 67 per cent GHG emissions reduction below 2007 levels. Consultation on the CAP 2020 began in summer/fall 2015, with engagement with key staff, researchers and external collaborators, and with a call for ideas to UBC researchers and the broader campus community.





Now, after evaluating ideas received and doing further technical and feasibility analysis, we are consulting the campus community on actions and options UBC could pursue in the CAP 2020 towards achieving the 67 per cent goal.

Share Your Input: March 14 - 27 (*now closed)

Our campus community has great capacity for innovation and creativity, join the conversation and share your thoughts on actions and options for how UBC could further reduce its GHG emissions.

From March 14 - 27 there were two ways to participate, online and in person at one of six [public open houses](#).

The information included here provides you with an overview of UBC's [successes to date](#) in climate planning, [choosing the path forward](#), the [analysis that was applied](#) to the proposed actions and options gathered through stakeholder feedback and public consultation, the proposed actions and options related to [energy supply](#), [energy use in buildings](#), [UBC's fleet](#), [individual behaviour](#) and other [complementary opportunities](#), in addition to a summary of the [process and timeline](#), and [consultation information](#). We have also included links to [climate change](#) and [climate action planning resources](#) that may be of interest to you.

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Success to Date

UBC is committed to climate action to mitigate climate change, demonstrate its leadership in research, innovation and learning, reduce operational costs, manage risk and create sustainable solutions for the University.

UBC's commitment to climate action is first and foremost about being an exemplary global institution and reducing the environmental effects of climate change locally and globally.

In line with this commitment, UBC's Board of Governors approved the [UBC Climate Action Plan in 2010](#) to achieve the following GHG reduction targets against a 2007 baseline for the Vancouver campus:

- 33% reduction by 2015
- 67% reduction by 2020
- 100% reduction by 2050



Achieving the 2010 Target

The series of actions taken over the past 5 years have resulted in a total reduction in GHG emissions of 30% as of the end of 2015 below 2007 levels.

We are expecting to reach the 33% reduction target by end of 2016, which is a significant achievement given the increase to both campus floor space and student enrolment since 2007. (When this growth is factored in, the reduction in GHGs is 40%.)

This success was achieved primarily through three major projects:

- Converting the [Academic District Energy System](#) from steam to hot water.
- Building the [Bioenergy Research and Demonstration Facility \(BRDF\)](#) to provide renewable heat and power.
- Optimizing academic building performance, reducing energy use and improving behaviour change programs through the [Building Tune-Up Program](#)



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Choosing the Path Forward

We are now developing the Climate Action Plan 2020, which will define the actions UBC could take over the next 5 years and beyond towards achieving a 67 per cent GHG emissions reduction below 2007 levels and ultimately a 100% reduction by 2050.

As outlined in the [20-year Sustainability Strategy](#), sustainability is integrated across all campus operations and infrastructure. As a University our focus has shifted from limiting the damage from climate change to the creation of net positive outcomes in environmental, social and economic terms. To support this, a strong emphasis on human and environmental wellbeing is built directly into our operational mandate..

Choosing the path to further emissions reduction

For UBC, achieving a 67 per cent GHG emissions reduction below 2007 levels means eliminating 20,000 tonnes of CO₂ (tCO₂e) by 2020. At the same time, UBC will continue to grow and therefore the actual reductions we need to achieve will be even larger

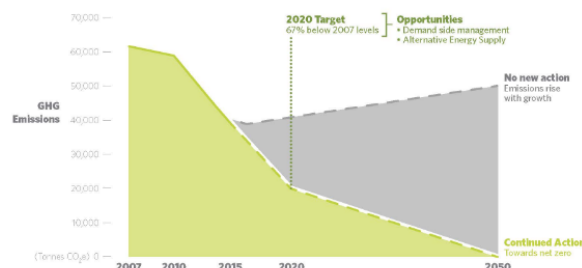
After engaging key staff, researchers, external collaborators and the campus community through a [series of workshops and public consultation in 2015](#), key areas for reductions have been identified, including:

- Energy supply
- New and existing buildings
- UBC-owned vehicles
- Individual behaviour
- Complementary Opportunities (such as recycling on campus, commuting and business travel)

What if no new actions are taken?

If UBC takes no new actions to continue reducing the university's GHG emissions, they will begin to rise steadily after 2016 as the campus grows into the future. The graph (below) shows the two possible paths forward. To ensure that we continue to reduce our GHG emissions, and meet our 2020 target, further action is needed.

UBC CAP 2020 Challenge



It is important to note that the costs associated with our emissions, or our carbon liability, may continue to rise if no new actions are taken. The Province of BC requires all public service organizations to [achieve carbon neutrality](#) in their operations. As a public service organization, UBC is required to pay \$55/tonne (a combination of \$30 carbon tax and \$25

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for public sector carbon neutrality). Therefore, reducing our emissions will also help reduce our carbon-associated costs.

The provincial Climate Leadership Team has [recommended future increases to the carbon tax](#) (of \$10 per tonne per year) which would increase UBC's annual carbon costs by over \$500,000 , however the provincial government has not yet announced its decision.



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Evaluating the Proposed Actions + Options

As a rapidly growing, research-intensive institution, UBC is working on finding innovative ways to reduce GHG emissions and conserve energy.

Our efforts focus on implementing and enabling infrastructure that allows us to test new ideas, enhance our energy conservation and efficiency, and incorporate the use of renewable energy sources. All options are considered within the lens of minimizing operational costs while addressing the urgent need to mitigate climate change.

Over 95% of UBC's GHG emissions are the result of operating our buildings, primarily through the burning of natural gas for heating. The graph (below) shows the sources of UBC's emissions, and includes the [District Energy System](#).

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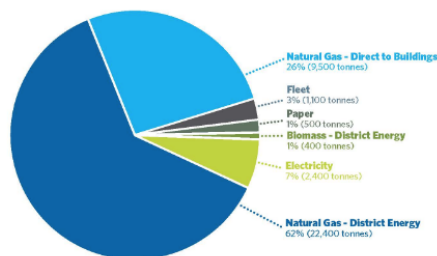
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URC Emissions Sources - 2016 Forecast



A GHG is any gas in the atmosphere that absorbs infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, GHGs are responsible for the greenhouse effect, which ultimately leads to global warming.

Addressing our 2020 reduction target means focusing primarily on buildings and energy supply. However, the scope of potential options and actions includes the following opportunity areas:

1. Energy supply
2. New and existing buildings
3. UBC-owned vehicles
4. Individual behaviour
5. Complementary Opportunities (such as staff and faculty travel, solid waste, commuting, building lifecycle and paper)

What we've heard

A series of workshops with key staff, researchers, and external collaborators generated a list of actions and options that the University could take towards achieving a 67% reduction in GHG emissions based on 2007 levels:

- Energy use in buildings: including building design and site location, mechanical systems, equipment, maintenance, operations and occupant behaviour.
- Energy supply: finding alternatives to fossil fuels or non-renewable fuels used to supply our buildings and District Energy System on campus.
- UBC's vehicle fleet: reducing the amount of fossil fuel used to run UBC-owned vehicles.

including research and operational vehicles

- Individual behaviours: looking at the role individuals play in reducing GHG emissions in labs, offices and student residences.

In addition to this list of actions and options, a public consultation with the wider UBC community took place that generated an [extensive list of ideas](#).

How we evaluated these ideas

Ideas and proposals that were collected throughout the workshop and public call for ideas were assessed against the following evaluation criteria:

- Alignment with existing UBC plans, policies and guidelines
- Impact on GHG and energy reductions toward achieving the 67% reduction target and 100% 2050 target
- Economic performance: such as having a strong business case, the cost of energy involved, operational savings, and avoided costs
- Having an acceptable level of risk: such as technically, with factors associated with fuel supply, public acceptance, political, and health
- Being within UBC's jurisdiction and control
- Ease of implementation: such as affordability, financing, lack of barriers, regulatory approvals required, and factors related to external dependencies
- Research and innovation or partnership opportunities
- Other co-benefits: such as the impact on reducing water consumption, and community building

See [a summary chart of the analysis done](#) for each of the options.

Energy supply options, which met the above criteria, proceeded through a more detailed financial modelling analysis, including value of capital investments and analysis of energy pricing fluctuations and carbon tax changes. Further detailed financial modelling will be undertaken before recommending any capital investments on energy supply options.

Other complementary opportunities

We recognize that there are other areas that can result in GHG emission reductions, such as business travel, commuting, and the handling of food waste.

Complementary opportunities are reductions in areas that do not directly contribute to how UBC accounts for and calculates its GHG reduction numbers. Where possible, the emissions are estimated and reported in our annual GHG inventory, and, in many cases, these opportunities allow students, staff and faculty to play a direct role in reducing emissions, and may involve activities that extend well beyond the boundaries of the campus.

Policy considerations

UBC's climate action planning takes into account local, provincial, national and global policy frameworks and initiatives. There are currently provincial and national climate policies that are pending which UBC must take into account in determining which actions and options to pursue in the CAP 2020, particularly around energy supply.

Provincial Context

As a public institution, UBC is committed to ensuring that our operations are run responsibly and in compliance with provincial legislation on climate action. Under the [Provincial Greenhouse Gas Reduction Targets Act](#) and the [Carbon Neutral Government Regulation](#), UBC is required (as are all public sector organizations) to be carbon neutral in our operations. Currently, to achieve carbon neutrality, UBC purchases offsets every year for the GHG emissions that remain after our reduction efforts.

The provincial carbon tax also has a significant impact on the financial feasibility of our energy and emissions strategies. The provincial Climate Leadership Team has [recommended future increases to the carbon tax](#) (of \$10 per tonne per year) which would increase UBC's annual carbon costs by over \$500,000, however the provincial government has not yet announced its decision.

National Context

The federal government is currently pursuing a national carbon pricing strategy, in collaboration with the provincial governments.




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
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Options: Energy Supply



Energy supply options involve finding alternatives to fossil fuels or non-renewable fuels used to supply our buildings and District Energy System on campus.

The greatest area of opportunity for reducing supply side GHG emissions is replacing or reducing the amount of natural gas used to heat and operate our buildings.

As a result of a technical and financial evaluation of a wide range of energy supply options including solar, geothermal, waste heat recovery, wind and others, three options were selected as potentially financially viable for UBC to pursue in the CAP 2020 process:

- 1. Renewable Natural Gas:** Purchasing Renewable Natural Gas (RNG) does not require any capital project on UBC campus as it would be sourced through an existing channel, however it would be dependent on the amount of RNG supply available, the contracted fuel price and the future carbon pricing.
- 2. Biomass Expansion:** This option would allow for a tripling of the thermal capacity of the existing [Bioenergy Research and Demonstration Facility \(BRDF\)](#), from 6 megawatts (MW) to 18MW. It offers significant GHG reductions, though not large enough to meet one of its targets fully on its own. Increasing the capacity of the BRDF also has the most promising financial performance. While requiring a significant capital investment, the project would build upon the existing infrastructure including the hot water district energy system, and also utilize the existing BRDF facility.

Fuel and Carbon Pricing Considerations

Reducing campus energy consumption not only reduces GHG emissions but also reduces energy bills, and the amount of carbon offsets and carbon tax that we are required to pay. Currently, UBC is paying \$55 per tonne of GHG emissions which translates into a substantial amount paid towards carbon offsets and carbon tax annually. Even though UBC has achieved sizable savings in this area, there is still room to further reduce the amount of carbon offset and carbon tax we are paying. Reducing the University's reliance on carbon-based fuels can also lessen the potential impact of rising carbon prices, as recommended by the Province of BC's [Climate Leadership Team](#).

Under present assumptions, RNG will likely only be financially competitive if the carbon tax increases. The BC Climate Leadership Team has recommended increasing the tax starting in 2018, however the Provincial Government is undertaking public review of their Climate Action Plan recommendations and it is not clear as to when a decision on the carbon tax will be finalized and implemented.

Each type of alternative fuel supply, such as RNG or biomass, comes with its own risks, such as long-term price (RNG and Biomass are relatively young markets with limited financial performance history). However, keeping the status quo also entails risk. With a heavy dependence on natural gas for heating, UBC is exposed to the volatile price fluctuations that have occurred in the past and have had significant impacts on UBC's energy budget. Diversification of energy supply is one strategy to mitigate the volatility of any one supply source.

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Future considerations

In assessing energy supply options, it is important to consider the best investment in moving toward the 67% reduction and beyond toward the 2050 target of zero emissions. In the longer term (post-2020), additional options such as solar or heat recovery may become more viable. Unfortunately, these options have limited capacity to reduce GHG emissions in the short-term (ie., by 2020), they will likely need to complement options such as biomass and RNG, to keep UBC on its GHG reduction track toward zero emissions in 2050.

The CAP2020 can also be a vehicle to stimulate innovation and research opportunities in new areas, such as carbon capture or development of new energy technology. Research partnerships and potential funding will continue to be explored although these research projects will most likely not have impact on the 2020 reduction targets, but will be essential if UBC is to achieve its 2050 aspirations.

Actions

The primary opportunities identified, on the energy supply side, for further GHG reductions are substituting additional alternative energy sources for natural gas, and connecting more buildings that currently have direct gas connections to the district energy system in the longer term.

Immediate actions proposed for energy supply include:

- undertaking a more detailed study of the biomass expansion option;
- continuing to pursue RNG availability and pricing; and
- further assess the financial risk exposure towards future increases in carbon pricing and its impact on options analysis.



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Actions: Energy Use in Buildings



With nearly 400 institutional and residential buildings on campus, thermal energy for buildings is the largest component of UBC's carbon footprint.

Given the growth of student housing and athletic facilities on campus, the proportional share of energy and emissions is growing relative to core academic buildings and presents a significant opportunity for additional operational savings and GHG reductions. Additionally, the evaluation of existing buildings actions demonstrates that GHG reductions can be further achieved through existing programs and resources.

Renovations of existing ancillary buildings also provide significant opportunities to do upgrades (lighting, heat recovery units, high efficiency fans, occupancy sensors, high efficiency fixtures and fittings, appliances) where there is both a savings in operations costs and reduction in GHGs.

The opportunities and proposed actions targeted to new buildings are recommended to address the significant growth across campus and are projected to result in a significant reduction in GHGs in the longer term and reduce the total cost of ownership.

Existing Buildings - Opportunities and Actions

The key opportunities and actions that have been identified for existing buildings include:

- Using existing space more efficiently to avoid construction of new additional space.
- Optimizing building management systems to align with building occupancy schedules.
- Focusing on ways to reduce energy consumption within other large and energy intensive buildings. In particular, focusing on waste heat recovery, optimizing heat transfer and buildings that are not connected to the new [District Energy](#) hot water heating system.
- Reducing the amount of heat required for a building through envelope enhancements, low grade and waste heat recovery and utilization of high-efficiency mechanical equipment.
- Continuing with building recommissioning (tune-ups) which have resulted in significant reductions in operational costs and GHGs by making building systems function and perform more efficiently
- Updating existing processes: including manuals and support that with training/capacity building that addresses sustainability objectives which improve building operational efficiency, reduced costs and GHG emissions
- Targeting improved energy management performance in ancillary buildings, outside the academic core of campus, through re-commissioning building mechanical systems to occupancy schedules, lighting controls, etc.

New Buildings - Opportunities and Actions

The key opportunities and actions that have been identified for new buildings include:

- Developing a Green Building Plan that identifies measures that reduce energy and

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emissions while reducing the total cost of ownership through the operational life of buildings;

- Developing Net Positive Buildings Pathways with a comprehensive roadmap toward net positive design using whole building energy modelling for various building types in 5-year steps
- Addressing the Performance Gap between a new building's 'designed' or modelled performance and the actual performance. This is impacted by end-user requirements, user demands, building occupancy and constrained budgets.
- Enhancing [UBC's Technical Guidelines](#) – which are the code of quality and performance for the design, construction and renovation of University-owned institutional buildings – from a performance lens would ensure it aligns to sustainability policies.



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Actions: Fleet



Though UBC's fleet has a relatively small impact on overall GHG emissions, vehicles are a highly visible part of UBC's operations.

More efficient fleet management has the potential to reduce departmental costs and to support innovation such as charging and fueling systems.

Through a wide range of strategies, UBC Building Operations has achieved the only [E3 Fleet Platinum rating](#) in Canada, and has reduced the GHG emissions of UBC's fleet by 43% between 2007 and 2014.

Actions

- Explore a low-emissions car sharing program for UBC-owned vehicles (for operations and academic uses)
- Explore a strategy to promote electric vehicles and/or generate revenue using distributed charging stations
- Explore a bicycle or e-bike share program for on campus travel (i.e., for staff & faculty).
- Develop a business case and implementation strategy for centralizing procurement and management of more UBC vehicles.
- Continue to increase the efficiency of UBC's fleet through procurement of right sized, high efficiency, and alternate fuel vehicles and motorized equipment



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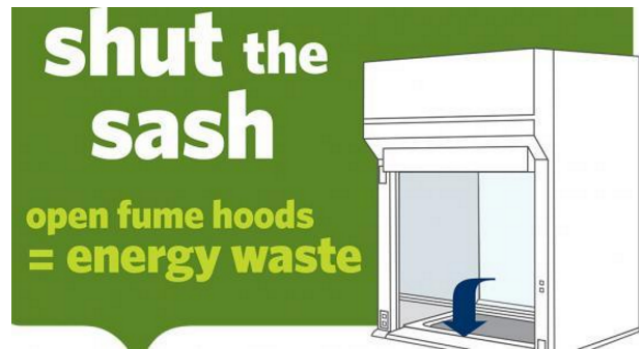
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Actions: Individual Behaviour



Individual behavior within buildings is a major contributing factor in energy conservation and GHG reductions.

Behavior change through engagement programs presents a significant opportunity to build on existing foundations of UBC research and programs with limited program costs and minimal capital costs. Existing programs also leverage the knowledge and expertise of faculty, creating opportunities for students to mobilize as agents of change with support and guidance from staff.

UBC has developed a number of behavioral change initiatives including the award-winning Sustainability Coordinator Program, Green Labs, Sustainability in Residence and are currently scoping a Green Office program.

Behavioral change programs are difficult to quantify in terms of direct impact, and evidence from other programs indicate that there is a large range of reported savings. UBC annual energy costs amount to over \$20 million per year. Setting a conservative target of reducing overall energy consumption by 1% across the campus, for example, would result in a \$200,000 in savings.

Key opportunities and actions include:

- Leveraging the Existing Sustainability Committee to help advance behavioral change, seek strategic guidance and support, develop program materials, update program design and provide implementation guidance to achieve targeted results.
- Developing an Energy Bonus / Incentive Program to achieve energy conservation and reduce carbon.
- Developing behavioral programs to reduce peak demands through educating occupants as to how their behaviors and actions can shift through temperature adjustments, and reducing use of non-essential equipment and lighting.

Opportunity areas:

- labs (e.g. fume hoods, hot water use, water cooling)
- offices (e.g. heating, windows, thermostats)
- student residences (e.g. heating, hot water use)



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Actions: Complementary Opportunities



Complementary opportunities are voluntary emission sources over which UBC has influence, but which UBC has no direct control over, such as transportation to and from campus.

Complementary opportunities are emission reductions in areas that do not directly contribute to UBC's corporate GHG inventory. Where possible, the emissions are estimated and reported in our annual GHG inventory, and, in many cases, these opportunities allow students, staff and faculty to play a direct role in reducing emissions, and may involve activities that extend well beyond the boundaries of the campus.

Actions

A list of potential areas of opportunity include:

- Reducing commuting emissions: explore and promote apps to facilitate car sharing & mode shifting, and continue to develop on-campus student, staff and faculty housing
- Exploring opportunities to reduce business travel emissions: research and collect data on business travel, and evaluate options including virtual meetings infrastructure and incentives
- Reducing solid waste emissions: continue implementation of the [Zero Waste Action Plan](#) and associated engagement program
- Exploring food opportunities: continue to explore opportunities to address carbon reduction related to food
- Researching future options including carbon capture, storage and utilization



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The process to develop the Climate Action Plan 2020 began in May 2015 and will conclude in June 2016, when the CAP 2020 is presented to the Board of Governors for approval.



The process to develop the CAP 2020 is taking place in 5 distinct steps with multiple opportunities for input from the campus community.

Phase 1: Review – Summer 2015

- preliminary technical analysis based on our performance to date

Phase 2: Innovate – Early Fall 2015

- engaging key staff, researchers, and external collaborators in a series of four idea generating workshops (behaviour change, UBC-owned vehicles, energy supply, and energy use in buildings)
- an early call for proposals to the UBC research community (August-September 2015)
- broader call for ideas to the campus community (September 2015)

Read the [Phase 1 public consultation summary report](#) of what we heard during the four workshops.

Phase 3: Evaluate – Fall 2015/Winter 2016

- preliminary evaluation of ideas received in Phase 1
- further evaluation of potential actions to include in the Plan.

Phase 4: Integrate – Winter/Spring 2016 (Current Phase)

- consultation with students, faculty, staff, neighbourhood residents, and external stakeholders on proposed actions and options
- developing a draft Plan
- presentation of draft Plan to UBC Board of Governors for approval (targeting April 2016)

Phase 5: Adopt – Summer 2016

- adoption of UBC Climate Action Plan 2020.

Project Governance

The Climate Action Plan 2020 process is being led by Campus + Community Planning, in collaboration with UBC Energy & Water Services. Staff from both groups sit on the project team and seek guidance from a Steering Committee that includes representatives from the following:

- Campus + Community Planning
- UBC Properties Trust
- Infrastructure Development
- Building Operations
- Energy + Water Services
- Student Housing and Hospitality Services
- Risk Management Services

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
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Public Consultation - Submit Your Ideas!

Our campus community has great capacity for innovation and creativity, please share your ideas on how UBC could continue reducing its GHG emissions.

Online Consultation – March 14 -27 (*now closed)

From March 14 - 27 we asked for input from the campus community on what actions and options UBC could pursue towards a 67% reduction in GHG emissions from 2007 levels, particularly around:

- energy supply
- energy use in new and existing buildings
- UBC-owned vehicles
- Individual behaviour change
- Complementary opportunities (such as recycling on campus and transportation)

Public Open Houses

Come visit us at the Climate Action Plan 2020 Public Open Houses, here's where we will be:

- Tuesday, March 15, 2016**
11:00am – 1:00pm.
Martha Piper Plaza
- Wednesday, March 16, 2016**
11:00am – 1:00pm.
I.K. Barber Learning Centre, 2nd Floor Lobby
- Thursday, March 17, 2016**
11:00am – 1:00pm.
AMS Student Nest, Upper Agora
- Tuesday, March 22, 2016**
11:00am – 1:00pm.
Pharmaceutical Sciences Building, Atrium
- Wednesday, March 23, 2016**
11:00am – 1:00pm.
Centre for Interactive Research on Sustainability, Lobby
- Thursday, March 24, 2016**
Time: 11:00am – 1:00pm.
Fred Kaiser Building, Atrium

Consultation Summary Reports

This is the third and final phase of public consultation with the campus community. This past summer, we also held four workshops with key internal stakeholders and subject matter experts.

- Phase 1 Consultation Summary Report
 - Appendix II
 - Appendix III
 - Appendix IV
 - Appendix V - Workshop Summary

Questions about the consultation process?

Please contact Gabrielle Armstrong, Senior Manager, Public Engagement, at gabrielle.armstrong@ubc.ca or at 604-822-9984.

The Climate Action Plan 2020 consultation incorporates the established Campus +

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



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Climate Change and Climate Action Planning Resources

Here are some additional resources on UBC's current climate action initiatives and studies.

General Climate Change Information Resources:

- BC Provincial Government
- BC Climate Action Toolkit
- US Environmental Protection Agency
- Rocky Mountain Institute and AASHE Accelerating Campus Climate Initiatives

General UBC Resources:





- UBC 20 Year Sustainability Strategy:** Provides a long-term strategic direction for sustainability at Vancouver campus, including reaching the 2010 CAP targets.
- UBC Climate Action Plan (2010):** UBC's climate action vision to 2050 and action plan to meet the 2015 GHG reduction target.
- UBC Vancouver Campus Plan:** Provides a cohesive framework for the campus' current and future development and guides decision-making for the next 20 years.
- Annual Sustainability Reports:** Provide an overview of sustainability activities and highlight achievements at UBC's Vancouver campus.
- Carbon Neutral Action Reports:** Required under the province's [carbon neutral regulation](#), track UBC's actions and progress towards carbon neutrality and achieving the goals of UBC's [Climate Action Plan](#).
- SEEDS Program Library:** Digital repository for all SEEDS student reports resulting from collaborations between students, UBC staff and are guided by faculty to produce recommendations that advance sustainability in campus operations. [Energy Supply](#)
- Energy and Water Services** and [UBC Sustain](#) websites provide information on energy supply projects
- Alternative Energy Supply Study:** Email climate.assistant@ubc.ca for a copy of the study.
- Energy Conservation Projects:** Review energy conservation projects being led by [Energy and Water Services](#).

New Buildings:


- Technical Guidelines:** These serve as the code of quality and performance for the design, construction and renovation of University-owned institutional buildings, including LEED Requirements.
- UBC LEED Implementation Guide:** Optimizes the LEED process and provides UBC-specific guidance for us to achieve our sustainability goals.
- Also see the [UBC Sustain](#) website.


Behaviours

- UBC Sustain Website** provides information on programs and resources for students, staff, and faculty members to help us reach our climate and energy goals.



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