2010-2015

UNIVERSITY OF BRITISH COLUMBIA **VANCOUVER CAMPUS**

a place of mind

Climate Action Plan

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The Sheltair Group (now Stantec) assisted in the development of the Climate Action Plan.

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Vision for Climate Action

The Climate Action Plan (CAP) is intended to guide UBC Vancouver in its ongoing transition toward a low carbon future[1]. It sets out the following vision:

Confronting the challenge of climate change, the University of British Columbia will advance solutions on campus that eliminate emissions, will accelerate efforts to respond to the impacts of climate change, and will partner locally and globally to demonstrate leadership and accountability to future generations.

In pursuit of this vision, UBC will:

- **Become a net positive energy producer by 2050.** We will go beyond carbon neutral through aggressive conservation, deployment of renewable technologies and by re-designing how we conduct our business.
- **Partner for change.** We will drive technological and behavioral change through innovative research and teaching and by using our global profile to establish partnerships that allow us to learn and share solutions with others.
- **Use the campus as a living laboratory.** We will use our unique position – as an educational and research institution, a landowner, a tenant, a utility, a community, a forester, and a farmer – to provide integrated learning opportunities that result in the development and implementation of climate change solutions.
- **Account for the full costs of our decisions.** We will incorporate consideration of social, environmental and economic impacts in our decision making to increase the resiliency of our communities and lead change towards a sustainable, low carbon future.

[1] UBC recognizes that mitigation and adaptation efforts are complementary elements of a comprehensive response to climate change. A companion document to this plan, *"UBC and Climate Change,"* presents an overview of projected climate-related impacts at the UBC Vancouver Campus, and identifies recommendations for further action. Moving forward, efforts will be made to align UBC's mitigation and adaptation responses to climate change. UBC Okanagan is also developing a parallel plan to guide mitigation efforts on its campus.

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The Challenge

For many years there has been increasing evidence that emissions of carbon dioxide and other GHGs are destabilizing the Earth's climate and impacting the ecology of the planet. Conclusions of the 2007 Intergovernmental Panel on Climate Change (IPCC) are that human-caused contributions are *"more likely than not"* and the expectation is that the human-caused impact in the future is *"virtually certain."*

The Greenhouse Gas Reductions Target Act (GHGRTA) set province-wide targets for British Columbia (Figure 1). The GHGRTA requires government agencies and public sector organizations like UBC to become 'carbon neutral'[2] in their operations by 2010. To comply with this legislation UBC must report its GHG emissions profile annually and provide progress updates on efforts to reduce emissions. Currently, this reporting must include scope 1 and 2 emissions, as well scope 3 emissions associated with paper consumption for all UBC campuses. The Climate Action Plan addresses a portion of these requirements, including scope 1 and 2 emissions, and paper consumption from operations on the Vancouver Campus. However, the CAP goes beyond the reporting requirements to demonstrate leadership in areas where UBC is not currently liable – travel, procurement and food.

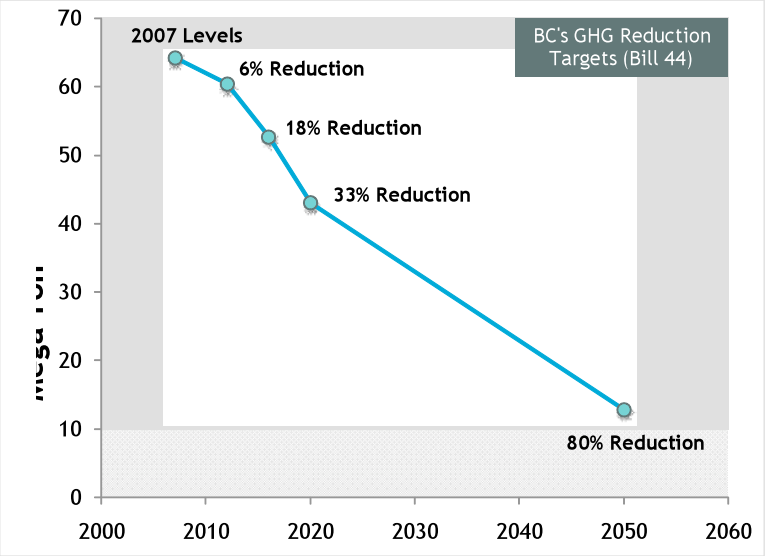

Figure 1: Province of BC GHG Emissions Reduction Targets

Achieving deep emissions reductions is no small challenge for a research intensive institution like UBC. At UBC Vancouver, research facilities consume approximately three times more energy than office buildings. Further, UBC Vancouver is expected to grow in order to meet its goal of housing 50% of students on campus. While this is intended to reduce emissions associated with commuter travel, it will inevitably increase building energy consumption on campus. To reconcile the seemingly conflicting goals of growth and GHG emissions reductions, UBC will need to focus on decoupling energy from GHG emissions through a clean, renewable energy supply.

[2] Under Bill 44, "carbon neutral" means implementing measures to reduce emissions and purchasing offset credits to net the remaining emissions to zero.

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Our Response

UBC has been at the forefront of climate research for decades – advancing global knowledge and understanding of the need for action. This has also given momentum to UBC's efforts at a local scale, on the Vancouver. More than a decade of action on sustainability preceded the 2008 development and signing of the *University and College Presidents' Climate Statement of Action for Canada*[3], which committed UBC to establishing GHG emissions reduction targets and developing a plan to reduce emissions. The Climate Action Plan delivers on this commitment by:

- Articulating a Vision for Climate Action;
- Establishing an energy and emissions baseline;
- Setting out targets for 2015, 2020 and 2050;
- Developing actions to achieve the targets, and;
- Outlining an implementation and management framework to guide UBC in its climate action efforts.

[3] http://www.sustain.ubc.ca/pdfs/climate_action_statement.pdf

UBC's history of action produced some early results which highlight that it is possible for UBC to achieve its growth targets AND its GHG emissions reduction targets. In a period of intensive growth for UBC Vancouver, the **ECOTrek** program – an energy and water conservation retrofit of nearly 300 Core Academic buildings – resulted in substantial savings in energy consumption and reductions in water consumption and GHG emissions (Table 1).

Table 1: Energy and Emissions from Core Academic Buildings

	1990	2007	Change (%)
Floor Space (square meters)	546,471	735,379	+ 35 %
Student Enrollment (full-time equivalent)	25,440	37,589	+ 48 %
Energy Consumption (GJ)	1,334,854	1,396,677	+ 5 %
Water Consumption (m^3)	4,804,207	2,530,882	- 47 %
GHG Emissions (tonnes of CO_2e)	51,801	48,808	- 6 %

Before ECOTrek, Core Academic buildings accounted for 82% of institutional energy use (while comprising 58% of floor space). By tackling energy use in Core Academic buildings, ECOTrek addressed the majority of energy consumption at UBC Vancouver.

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Energy and Emissions Inventory

UBC's 2008 GHG emissions, expressed in tonnes of carbon dioxide equivalents (CO_2e) per year and categorized according to scope,[4] are shown in

Table 2**.**

The GHG emissions inventory indicates that the majority of campus emissions arise from the operation of campus buildings. The bulk of these emissions occur at the steam plant where natural gas is consumed to make steam for the district energy system.

UBC wants to take action beyond the regulatory requirement and so has inventoried (or estimated) a number of scope 3 emissions. These provide insight into the "induced" impact that UBC has in the economy as a result of it activities. These particular scope 3 emissions have been identified by either the TAC (Technical Advisory Committee), the Stakeholder Working Groups or participants in the visioning sessions.

The inventory shown applies solely to the UBC Vancouver Campus. Additional UBC facilities will need to be inventoried in order to fulfill provincial reporting requirements.

Scope	Component [a]	GHG Emissions (tonnes of CO_2e/year)	Offset Purchase Required?	Carbon Tax paid on this emission?
1 & 2	Core Buildings	46,400	Yes	Natural Gas
	Ancillary Buildings [b]	13,500	Yes	Natural Gas
	TRIUMF [c]	530	Yes	No
	Fleet	1,500	Yes	Gasoline and Diesel
3	Paper	850	Yes	No
	Staff and Faculty Travel [d]	13,600	No	No
	Solid Waste[e]	1,800	No	No
	Commuting [f]	29,100	No	No
	Building Lifecycle [f]	10,200	No	No
Total Emissions Eligible to be Offset [g]		62,780		

Table 2: UBC Vancouver Campus GHG Emissions Inventory (2008)

[4] Scope 1 or direct sources are those owned or controlled by UBC. Scope 2 or indirect sources account for emissions from the generation of purchased energy. Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions.

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The Cost of Inaction

Taking action is often envisioned as being expensive – adding costs to UBC's operations. In fact, UBC will be required to spend extensive sums in the coming years just to maintain the status quo, including:

- Estimated capital costs of approximately $18 million will be required in the next few years to maintain and upgrade the boiler plant, and steam and electricity distribution systems. This is money that will have to be spent if no action is taken.
- The cost of purchasing fuel for the next 25 years is in the range of $100 million.[5]
- The cost of paying the provincial carbon tax and procuring offsets for the next 25 years – UBC's carbon liability – has a net present value of $50 million.

Achieving the defined GHG emissions reduction targets reduces the carbon liability to $23 million (net present value over 25 years).

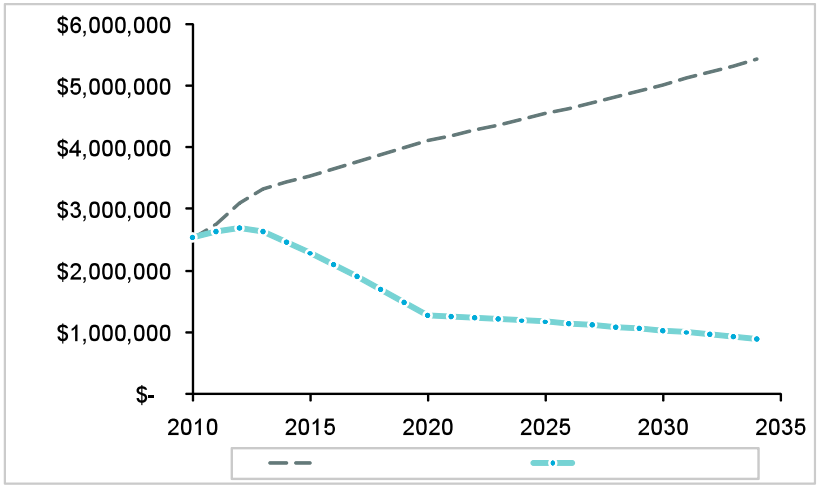

Figure 2: Forecasted Expenditures for the Carbon Tax and Offset Liabilities

The implication is clear – the **status quo is already expensive!** Taking action now provides an opportunity to avoid some of these costs and divert the funds towards making a transition to an energy efficient, low carbon future.

[5] Capital costs from the Alternative Energy Study Project.
Energy NPV is for 25 years, discounted at 6%. The energy costs are using 2008 consumption levels and costs only and do not include forecasted growth or price changes or cost to operate facilities. These values are provided for demonstration purposes only. Carbon NPV based on forecasted BAU emissions.

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Targets and Actions

The following greenhouse gas (GHG) emissions reduction targets underscore UBC's commitment to climate action:

- **33% below 2007 levels by 2015**
  This target will be achieved through aggressive demand-side management activities; conversion from a steam-based to a hot water heating system; implementation of a biomass gasification cogeneration system (i.e. UBC Bioenergy Research and Demonstration Project); fleet management activities, including a transition to a low emission fleet, and; behaviour change initiatives.

- **66% below 2007 levels by 2020**
  The conversion to a sustainable energy system on campus is well underway and energy use is becoming 'decoupled' from GHG emissions through the deployment of renewable technologies. This target will be met through fuel switching from natural gas to renewable sources.

- **100% below 2007 levels by 2050**
  Scope 1 and Scope 2 GHG emissions from campus activities have been eliminated through the implementation of a carbon neutral energy supply. Residual emissions have been negated through the export of energy to a portion of the UBC community resulting in a **net positive** campus.

The 2020 and 2050 targets are ambitious and have impacts beyond the campus boundaries. They rely on behaviours, technologies and market conditions that may not exist today. Thus UBC will review the 2020 target as 2015 approaches.

Working Groups made up of staff, faculty and student representatives were formed in a number of **key action areas,** including:

- Campus Development and Infrastructure
- Energy Supply and Management
- Fleets and Fuel Use
- Travel and Procurement
- Food
- Transportation

The Climate Action Plan outlines the full set of actions developed by the Working Groups.

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Implementation

The resources required to implement the majority of the actions in the CAP will be prioritized through existing budgets and staff resources. A few key strategies – those that will greatly assist UBC in meeting its targets – will require substantial capital resources for implementation. These strategies and their estimated total costs for implementation are shown in Table 3.

Table 3: Estimated Total Costs for Key Emissions Reduction Strategies

GHG Target	Key Strategies	Estimated Total Costs ($)*
33% below 2007 by 2015	Continuous commissioning program for core academic buildings	$ 3.25 million
	Behaviour change initiatives	n/a
	Convert existing district energy system from steam to hot water	$ 40 million
	Implement biomass gasification cogeneration system (UBC Bioenergy Research and Demonstration Project)	$ 26 million
	Fleet management activities, including:	
	• Incremental costs of transitioning to a low emission fleet	$1.5 - $1.8 million
	• Equipment to track vehicle usage (telematics)	$300,000
	• Infrastructure for electric and natural gas powered vehicles	$500,000
	Reduce GHG intensity of electricity generation (provincial action)	n/a
66% below 2007 by 2020	Fuel switching from natural gas to renewable sources	$ 30 million
100% below 2007 by 2050	Further fuel switching from natural gas to renewable sources	
	Export of energy to the UBC community creates offsets and results in UBC becoming a "net exporter" of energy	$30 million
		~ $ 130 million

* UBC's investment share of the estimated total costs of key strategies varies by strategy. Estimated total costs are in thought to be in the order of magnitude of $130 million; however, further work will need to be done to refine these costs estimates.

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