

Bellevue College

Carbon Emission Audit,

June 2005-June 2008

April 2009

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with input from the BC Environmental Advisory Committee

Introduction

In spring of 2007, Bellevue College President B. Jean Floten became a charter signatory to the American College and University Presidents Climate Commitment (ACUPCC). The PCC is a commitment by higher education to provide leadership in the reduction of greenhouse gas emissions by reducing emissions and striving for carbon neutrality. (More information on the PCC can be found on their website at < <http://www.presidentsclimatecommitment.org/> >).

As a part of the commitment, Bellevue College conducted an internal Carbon Emissions Audit for the three years during which data was available – the 2005-6 through 2007-8 academic years. Our data shows a slight total increase in output over this three-year period with emissions peaking in 2007-8 at 36,185 metric tones of carbon dioxide (mTCO₂) equivalent (Table 1). (Data is reported in equivalencies in order to account for other greenhouse gases, such as methane, NO₂ and CFC's.) This total includes both direct and indirect emissions by the college from energy use, transportation, waste production, agriculture and refrigerant use. In addition, carbon credit subtracted from the total for any energy credits and forest preservation (a relatively minor component for BC at this time). Not surprisingly, being a commuter college, BC's major contribution came from student and staff transportation. Electrical and natural gas use made up the second largest contribution to emissions, and the remaining categories were relatively minor. The next section of the study summarizes the details behind these results and appendices discuss the source of the data and provide guidelines for future campus carbon auditors.

Table 1. Bellevue College annual carbon emissions

Academic year	Total mCO₂ Emissions
2005-6	33,946
2006-7	35,713
2007-8	36,185

Summary of the Data

Introduction

In order to better understand the meaning of the data, emissions are divided up into three major protocol scopes: Scopes 1, 2, and 3 (Table 2, Figure 1). Individual scopes will be discussed in detail below, but it is important to note that over 75% of BC's carbon emissions fall under Scope 3 (Figure 2).

Table 2. Emission Scopes	
<u>Scope 1</u>	Direct Campus Emissions Scope 1 emissions are direct carbon emissions from the campus and include stationary energy sources (natural gas, oil burning, etc.), college fleet emissions (patrol cars, athletic vans, etc.), agricultural sources (emissions from fertilizer, animal waste, etc.) and refrigerants (CFCs, HCFCs, etc.).
<u>Scope 2</u>	Indirect Emissions- Purchased Energy Scope 2 emissions include purchased electricity and steam (where the carbon emissions are indirectly occurring at a distant power plant).
<u>Scope 3</u>	Indirect Emissions - Transportation & Waste Disposal Scope 3 emissions are related to the energy consumed by the people and materials that are transported to and from campus. For BC, this mainly includes emissions from the commuting of students and staff to and from the campus and air travel miles to and from conferences and events. In addition, it also includes emissions from solid waste that is transported to the landfill.

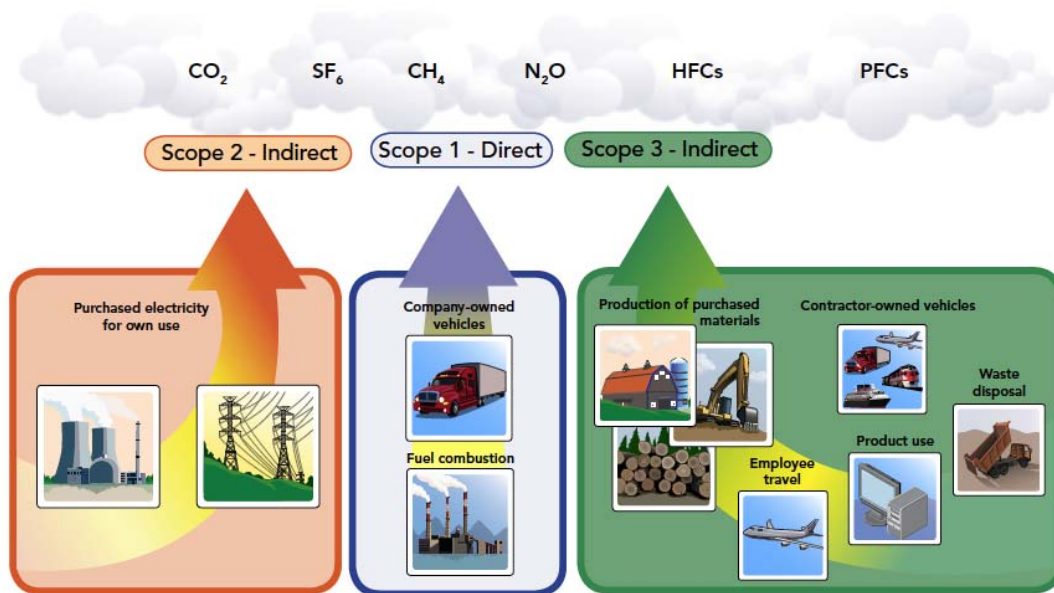


Figure 1. Greenhouse gas protocol scopes from *Getting to Zero: Defining Corporate Carbon Neutrality* (Clean Air-Cool Planet and Forum for the Future, 2008).

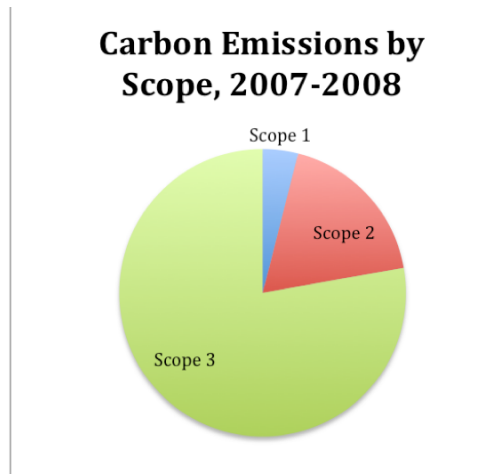


Figure 2. BC's carbon emissions by scope for the 2007-8 academic year.

Scope 1 Emissions: Direct Campus Emissions

Scope 1 emissions are direct carbon emissions from the campus and include stationary campus energy sources (natural gas, oil burning, etc.), college fleet emissions (patrol cars, athletic vans, etc.), agricultural sources (emissions from fertilizer, animal waste, etc.) and refrigerants (CFCs, HCFCs, etc.). BC's Scope 1 emissions are summarized on Table 3.

Table 3. Bellevue College annual Scope 1 carbon emissions

Academic year	Scope 1 Emissions (mTCO ₂)				
	Total	Campus Energy	Fleet	Agriculture	Refrigerants
2005-6	1,358	1,208	56	1	93
2006-7	1,382	1,229	59	1	93
2007-8	1,441	1,281	65	1	93

Scope 1 constitutes the lowest emissions by Bellevue College, accounting for 4% of total emissions in 2007-8. Within Scope 1 campus stationary energy sources, used mostly for heating buildings, is the largest contributor to carbon emissions. For BC, this is primarily natural gas emissions, which were over 99% of all campus stationary energy sources in 2007-8. The rest of the energy generated on campus is through the use of a small amount of propane and diesel fuel for backup generators.

Contributions from refrigerants is based on purchases of CFC's over the past three years and averaged for that time period. It does not account for any leaks from personal refrigeration units in offices or vending machines, although it is thought that their contribution would be minor.

BC's fleet consists of maintenance and public safety vehicles, as well as 2 athletic vans. The fleet also includes several electric vehicles that are included in the Scope 2 total.

Nitrogen oxides released from nitrogen fertilizers are a negligible contribution to greenhouse gas emissions.

Scope 2 Emissions: Indirect Emissions- Purchased Energy

Scope 2 emissions include purchased electricity and steam (where the carbon emissions are indirectly occurring at a distant power plant). BC's only contribution in this category is in the form of purchased electricity from Puget Sound Energy (PSE) (Table 4). The breakdown of the source of PSE's electrical production (as obtained from the state's annual "Fuel Mix Disclosure Report for 2007") is dominated by hydropower (42% in 2007), coal (37% in 2007), and natural gas (19% in 2007) (Figure 2). Although PSE's use of a significant amount of coal adds to our emissions in this scope, total carbon output is greatly reduced by the large percentage of hydropower in the mix.

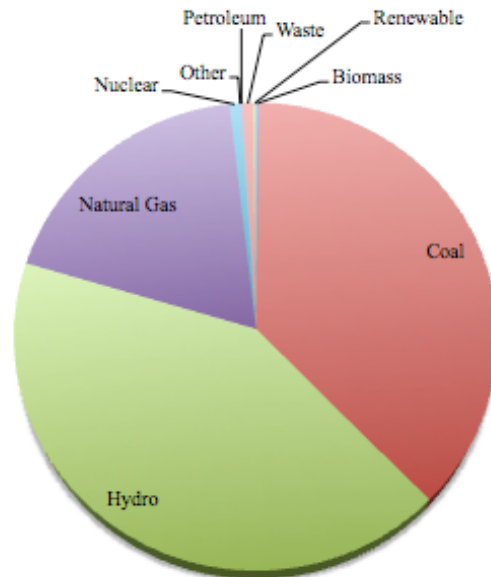


Figure 2. Puget Sound Energy fuel mix for 2007.

Table 4. Bellevue College annual Scope 2 carbon emissions

Academic year	Scope 2 Emissions (mTCO ₂)		Electricity Use (kWh)
	Total	Electricity	
2005-6	5,216	5,216	9,582,117
2006-7	6,499	6,499	12,746,117
2007-8	6,642	6,642	11,938,131

Purchased electricity constitutes 18% of BC's carbon emissions, and the sheer size of our total electricity use (almost 11.8 million kWh in 2007-8) make energy conservation a great way to reduce carbon emissions and save money (in 2007-8 electricity was almost 2% of the operating budget of the campus). The significant decrease in electricity use in 2007-8 is believed to be due to better management of the HVAC system. However, note that although our electricity usage went down from 2006-7 to 2007-8, our emissions went up. This is a direct result of an increase in coal usage in the PSE energy mix (from 34% to 37% of the total mix).

Scope 3 Emissions: Indirect Emissions - Transportation & Waste Disposal

Scope 3 emissions are related to the energy consumed by the people and materials that are transported to and from campus. For BC, this mainly includes emissions from student and staff commuting and air travel miles to and from conferences and events. In addition, it also includes emissions from solid waste that is transported to the landfill and the methane that it produced upon decay (but not recyclables, even though there is some emissions from the transport of these additional waste materials). Technically, Scope 3 would include the carbon emissions produced by the production and transport of all materials (paper, furniture, food, etc.) that are consumed on campus. However, the carbon emissions report does not require that we account for these, as the reality of calculating their impact is prohibitive at this time. It should be noted that although they are not included, BC purchasing staff makes every effort to purchase materials that are produced locally, in an effort to reduce Scope 3 emissions.

Table 5 clearly illustrates that Scope 3 constitutes Bellevue College's largest contribution to greenhouse gas emissions (78% of the total 2007-8 emissions). These emissions are primarily from student (64% of the total 2007-8 emissions) and employee (11% of the total 2007-8 emissions) commuting. This is not surprising, considering that we are a "commuter college" and is clearly the major area we need to address in order to reduce our emissions. (Note that values for commuting in 2005-6 and 2006-7 are based on average practices from the 2007-8 transportation survey and therefore, have limited meaning in looking at trends.)

Air travel contributes almost 3% of our emissions and solid waste production is a relatively small contribution.

Table 5. Bellevue College annual Scope 3 carbon emissions

Academic year	Scope 3 Emissions (mTCO₂)				
	Total	Student Commuting	Faculty/Staff Commuting	Air Travel	Solid Waste
2005-6	27,372	22,410	3,931	971	60
2006-7	27,831	22,728	3,931	1,111	62
2007-8	28,215	23,272	3,931	948	65

Offsets: Renewable Energy Credits, Composting & Forest Preservation

Offsets that are included in this section of the report include the carbon sequestered by forest preservation, carbon “recycled” using compost generated on campus, and purchased energy credits. At this point, BC’s offsets are minor. They include 31 mTCO₂ sequestered by the 7.64 acres of forest on the northwest side of campus (west of the athletic track) and purchased energy credits. In 2008, BC signed a 2-yr plan to purchase 408,681 kWh of wind energy credits a year from Renewable Choice Energy as part of the S-Building LEED certification. Half of this amount (204,340 kWh) was applied to the 2007-8 academic years, which includes the first half of 2008. Recent student sustainability efforts may help to increase purchased credits in the future.

Table 6. Bellevue College annual carbon offsets

Academic year	Emission Offsets (mTCO ₂)		
	Total	Forest Preservation	Energy Credits
2005-6	(31)	(31)	(0)
2006-7	(31)	(31)	(0)
2007-8	(145)	(31)	(114)

Conclusions

Bellevue College’s largest contribution to greenhouse gas emissions is the result of our being a commuter college, with 75% of our carbon dioxide emissions coming from student and employee commuting (Table 7 and Figure 3).

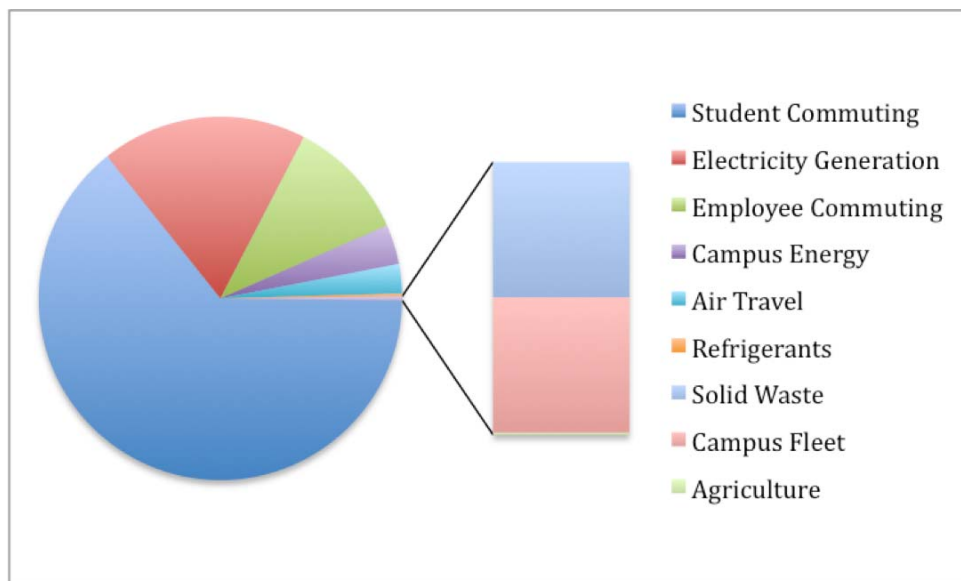


Figure 3. Bellevue College’s carbon emissions for the 2007-8 academic year.

Table 7. Bellevue College emissions breakdown for 2007-8, from highest to lowest contribution.

	Scope	Emissions (mTCO ₂)	Percent total
Student Commuting	3	23,272	64%
Electricity Generation	2	6,642	18%
Employee Commuting	3	3,931	11%
Natural Gas	1	1,281	4%
Air Travel	3	948	3%
Refrigerants	1	93	<1%
Solid Waste	3	65	<1%
Campus Fleet	1	65	<1%
Agriculture	1	1	<1%

Although there are more assumptions involved in the data collected from years prior to 2007-8, the overall trend of emissions at BC seems to be relatively steady over the past three academic years. A significant portion of the increase over the three-year time period is the change in emissions from electricity use (both from increased use, as well as an increase in the percent of coal in PSE's energy mix). There has probably also been an increase in the emissions from commuting, but as noted, this is not well represented with the data available. Unless reduction measures are taken immediately, we expect to see an increase in 2008-9 emissions as a result of the opening of the new S- Building on campus in 2009.

Bellevue College's emissions are very similar to other community colleges in our area when calculated per student and/or per square footage of building space (Table 8 and Table 9).

Table 8. Bellevue College's carbon emissions per community member, square footage and operating budget.

Academic year	Equivalent CO ₂ Emissions			
	per student	per community member	per sq. ft.	per operating budget \$
	(mTCO ₂)	(mTCO ₂)	(kgCO ₂)	(kgCO ₂)
2005-6	2.71	2.35	45.6	0.57
2006-7	2.80	2.43	46.8	0.58
2007-8	2.78	2.42	47.6	0.55

Table 9. Bellevue College’s carbon emissions compared to other Washington colleges in 2007/8. (Numbers in parenthesis are total after current offsets are taken into account.)

Source: President’s Climate Commitment Web Site (<http://acupcc.aashe.org/>)

	Equivalent CO₂ Emissions		
	Total	per Student	per sq. ft.
<i>Community Colleges</i>	(mTCO₂)	(mTCO₂)	(kgCO₂)
BC	36,183	2.8	48
Centralia CC	18,428	2.7	63.3
Lane CC	61,654	5.6	55.2
Olympic CC	12,463	2.7	27.3
Portland CC	48,449	2.1	24
<i>4-yr Colleges</i>			
Central	20,133	2.7	6.7
Eastern WA	47,611	5.2	18.4
Evergreen	22,112	5.7 (2.8)	13.7 (6.7)
PLU	7,891	2.2	6.1
Seattle U	36,568	5.0 (4.9)	18.3 (17.7)
UW Bothell	5,215	3	17.6
UW Seattle	198,015	5.1 (4.7)	9.2 (8.4)
Whitworth	16,560	7.9	22.6
WSU	130,334	6.1 (5.9)	12.6 (12.3)
WWU	35,812	2.9 (1.8)	11.5 (7.4)

Initial carbon reductions should focus on those areas with the largest impact – transportation and electricity use (however, other areas should be considered whenever possible). In addition, BC currently has very few carbon offsets, providing another area for major gains in reducing our net carbon output.