Report on Greenhouse Gas Emissions during Fiscal Year 2012

Summary: As of FY12, Williams is nearly 97% of the way toward reaching our greenhouse gas emissions goal of 10% below 1990's level by 2020. Between 1990 and 2005 Williams emissions had increased from 22,670 to 33,000 metric tonnes, about 46%. Since that time a variety of strategies have been employed to reduce greenhouse gas emissions associated with campus operations.

These emissions were approximately 20,400 metric tonnes eCO_2 in 1990/91. They increased to approximately 33,000 metric tonnes in FY05 due to added buildings and increased energy use in existing buildings. Concerted efforts to reduce energy consumption and emissions starting in FY07 have lowered annual emissions to 20,803 tonnes in FY12.

Emissions in FY12 were down approximately 12% from the previous year and 37% from peak emissions in FY05. See Figures 1 and 2 and Table 1. Figure 1 breaks emissions down by sector, including cogenerated electricity in the total electricity emissions. In Figure 2, Scope 1 includes all direct emissions from the central heating plant and other campus boilers (including cogenerated electricity). Scope 2 includes indirect emissions from purchased electricity, and Scope 3 includes other indirect emissions (mostly from car travel by faculty, staff and students). Williams does not include air travel in our Scope 3 calculations at this time.

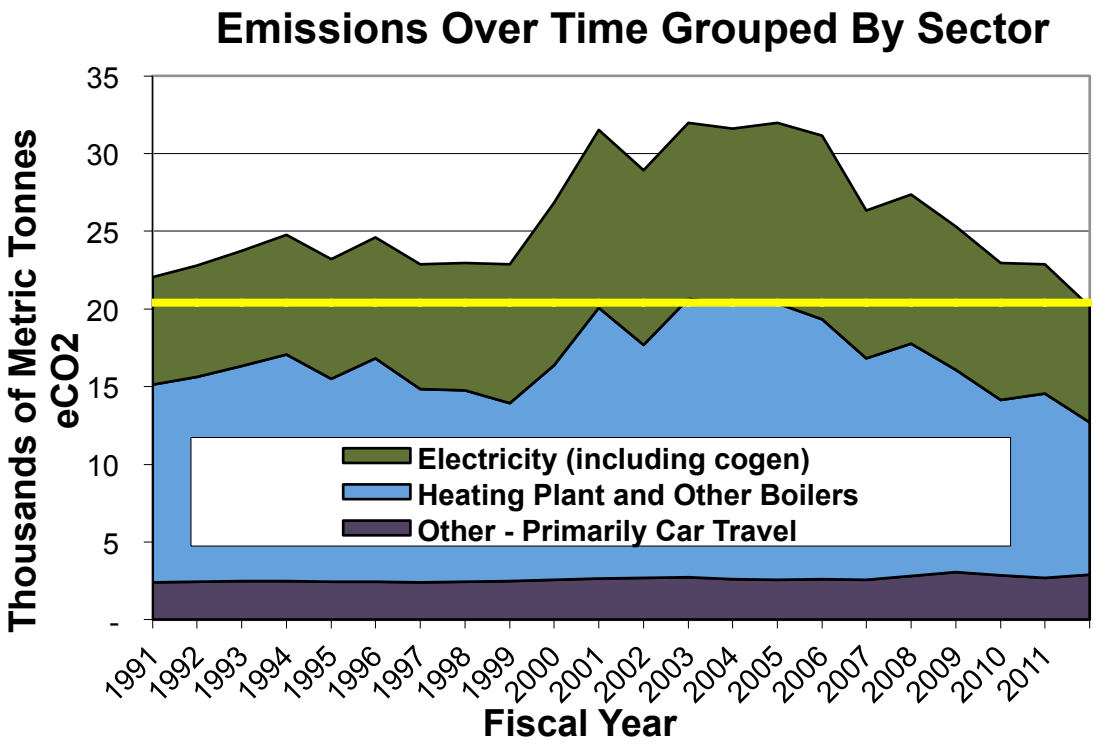

Figure 1: Greenhouse Gas Emissions from fiscal year 1991 through 2011

Note: Greenhouse gas emissions calculations do not include energy and emissions associated with off campus properties such as faculty/staff housing and commercial rentals properties or properties located outside of Williams. Greenhouse gas emissions associated with good and services purchased by the college, other than electricity and fuels consumed on campus.

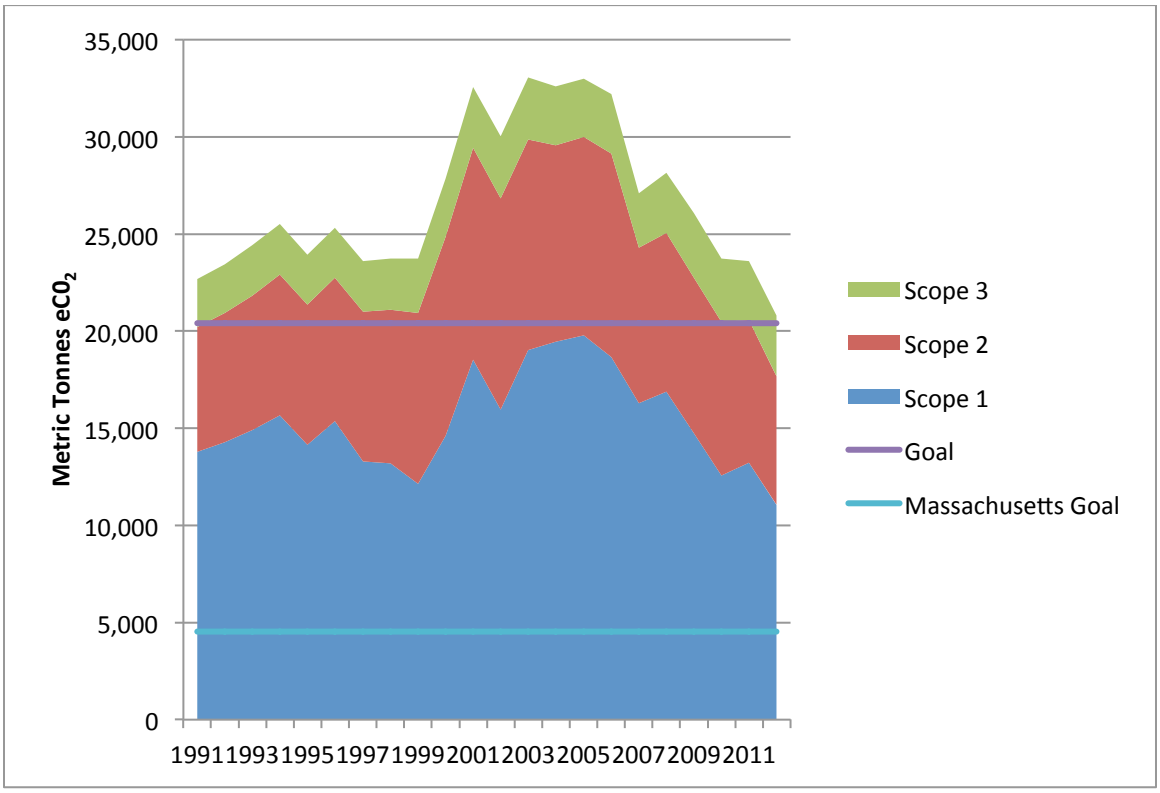

Figure 2: Greenhouse gas emissions by scope from fiscal year 1991 to 2011

Fiscal Year	Total Emissions (metric tonnes $eC0_2$)	% Decrease from Previous Year	% Decrease from Peak in FY05
2005	33,000		
2006	32,195	-2.4%	-2.4%
2007	27,108	-15.8%	-17.9%
2008	28,165	3.9%	-14.7%
2009	26,079	-7.4%	-21.0%
2010	23,737	-9.0%	-28.1%
2011	23,600	-0.6%	-28.5%
2012	20,803	-11.9%	-37.0%

Table 1: Total emissions and percentage decreases by fiscal year

Figure 3, Emissions and Effects of Actions on Business as Usual, (below) highlights the results of emissions reduction initiatives. The solid black line (above the yellow wedge) is our best estimate of what emissions would have been had we not taken action – our "business as usual." Each wedge represents the effects of a different category of initiatives. Actual emissions are indicated by the solid pink line.

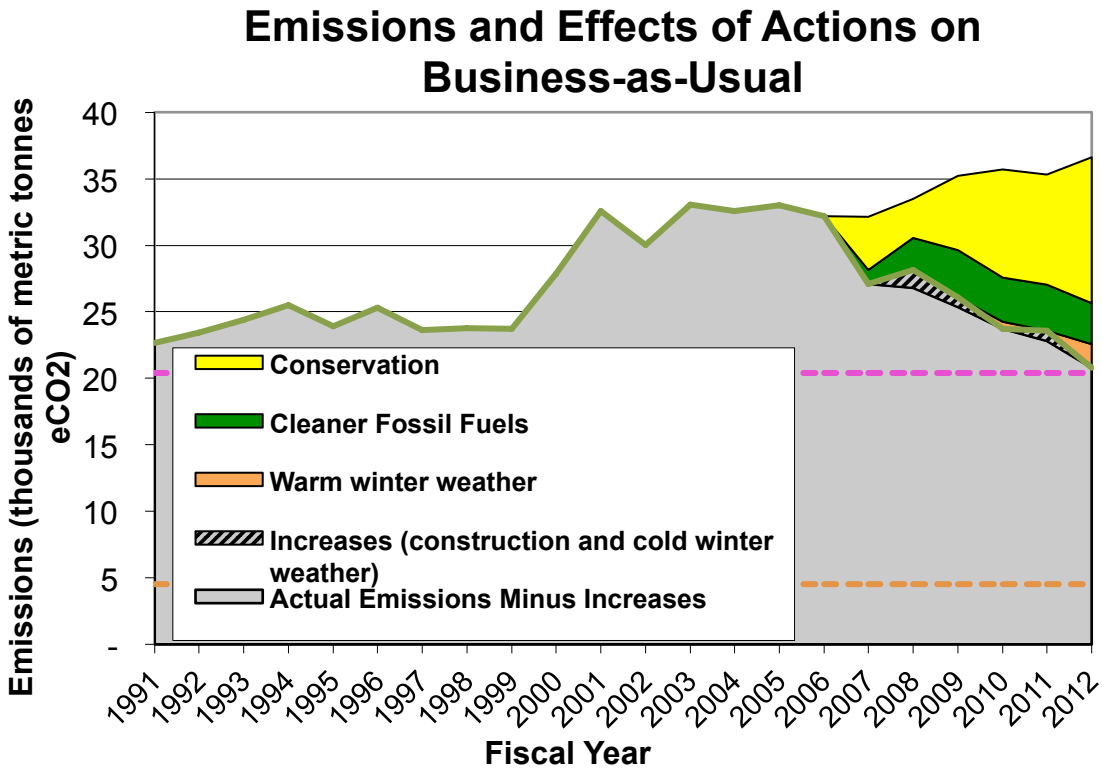

Figure 3: Emissions from Fiscal Year 1991 to 2011, showing effects of reductions measures on business-as-usual.

Fiscal Year	Total Emissions (metric tonnes $eC0_2$)	Business as Usual emissions (metric tonnes $eC0_2$)
2007	27,108	32,605
2008	28,165	32,999
2009	26,079	34,694
2010	23,737	34,815
2011	23,600	34,997
2012	20,803	35,510

Table 2: Total emissions and Business as Usual Emissions by fiscal year

Sources of Reduction:

1. **Conservation Projects (yellow):** In FY12, energy conservation measures accounted for approximately 70% of total emissions reductions. Total campus energy use has decreased 26% from the peak in FY05 even though the campus building footprint has grown. Investment in energy conservation projects such as lighting, insulation, motors, building controls and operational changes have resulted in these savings.

2. **Cleaner Fossil Fuels (green wedge):** Using more natural gas at the central heating plant accounted for approximately 19% of total emissions savings in FY12 while the switch to B10 oil accounted for 0.4%.
    a. **Use of additional natural gas at the heating plant:** The central heating plant can burn natural gas or residual oil. Natural gas emits about 35% less greenhouse gas per heating unit than residual oil, but is often more expensive and has other environmental impacts. In FY12, 99% of heating fuel used was natural gas, compared to 43% in FY07.
    b. **Use of B10 instead of distillate oil (home heating oil):** Most buildings on campus are heated by steam supplied by the central heating plant. Some buildings that are far from the center of campus have their own individual boilers, and many buildings have small boilers to provide hot water during the summer when the heating plant is shut down. All of the individual boilers normally burn distillate oil. In FY12, Williams burned B10 in all of those individual boilers during some months of the year. B10 is a 10%/90% mix of biodiesel and distillate oil. It can be burned in place of distillate oil with no changes in equipment, though it does cost more than ordinary distillate oil and tends to require more frequent filter changes.
    c. **Renewable energy accounts for less than 1%.** Williams has two photovoltaic installation – a 5 kW system at Morley Science Center and a 27 kW system at the Library Shelving Facility. In addition, solar hot water system are located at Susie Hopkins, Lambert House and Fort Hoosac.

3. **Warm winter weather (pink):** In FY12, warm winter weather accounted for approximately 6% of total emissions reductions.