

Greenhouse Gas Emissions – Lowering Humber’s Carbon Footprint

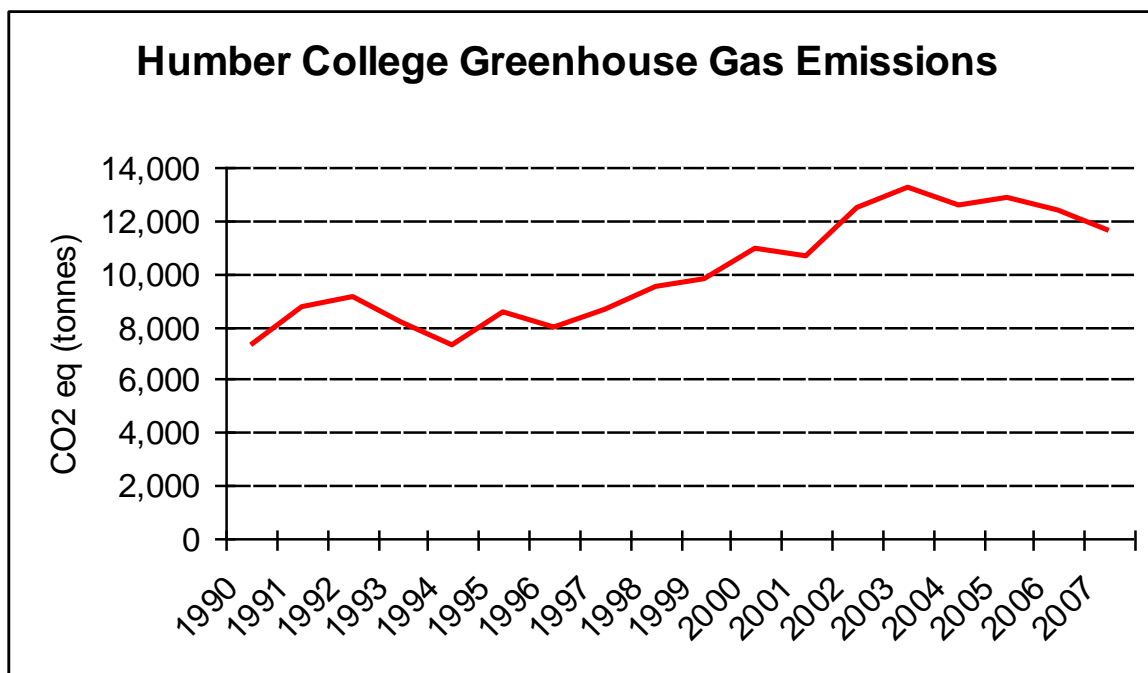
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Introduction

Humber has been a leader in energy efficiency in the province for many years since the first energy efficiency projects were completed in the early 1990’s. Facilities Management has been tracking our greenhouse gas emissions for 10 years and even earned a Gold Level reporting award from the federal government. However the carbon emissions issue is rapidly changing and it is time for a review of Humber’s emissions and future plans.

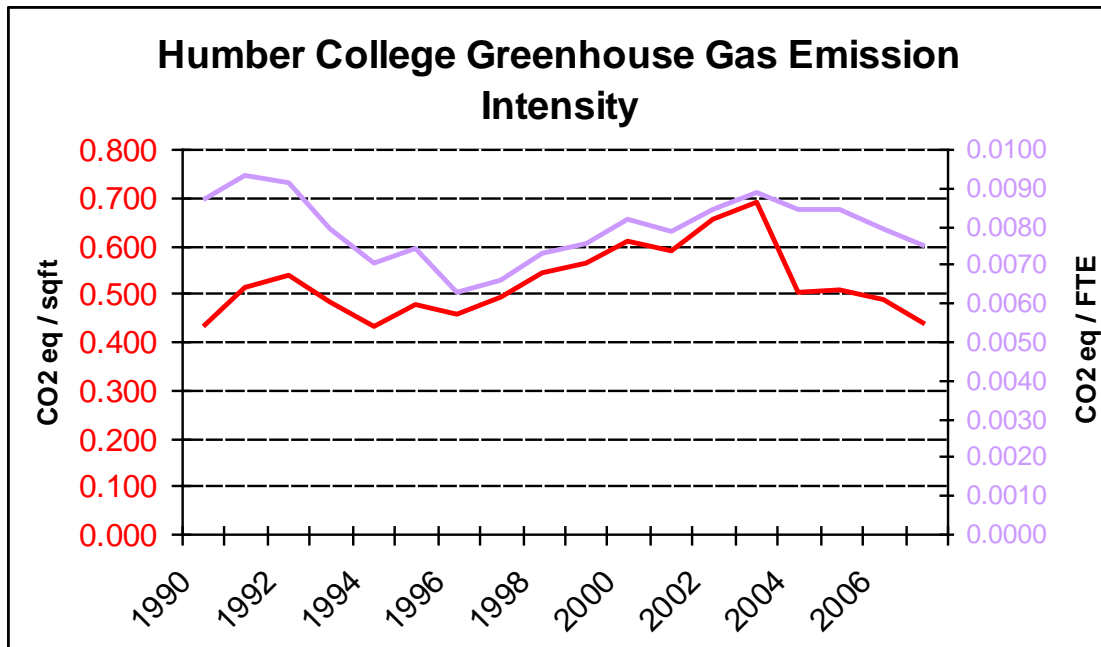
All the greenhouse gas emissions in this report are calculated using a methodology published by the CSA’s Climate Registry. It includes the direct emissions from the natural gas we burn, and the indirect emissions from the electricity we use which is supplied by the provincial grid. At this time they do not include college vehicles, water use, CFC’s, air travel or waste produced.

Current Emissions



Humber is very lucky to have over 20 years of energy data available so we can go back and track emissions over time. It's very clear that there has been a general upward trend over time because of significant growth both in square footage and students. Absolute greenhouse gas emissions at Humber are currently up 59% from the 1990 Kyoto baseline (compared to the target to be down 6%).

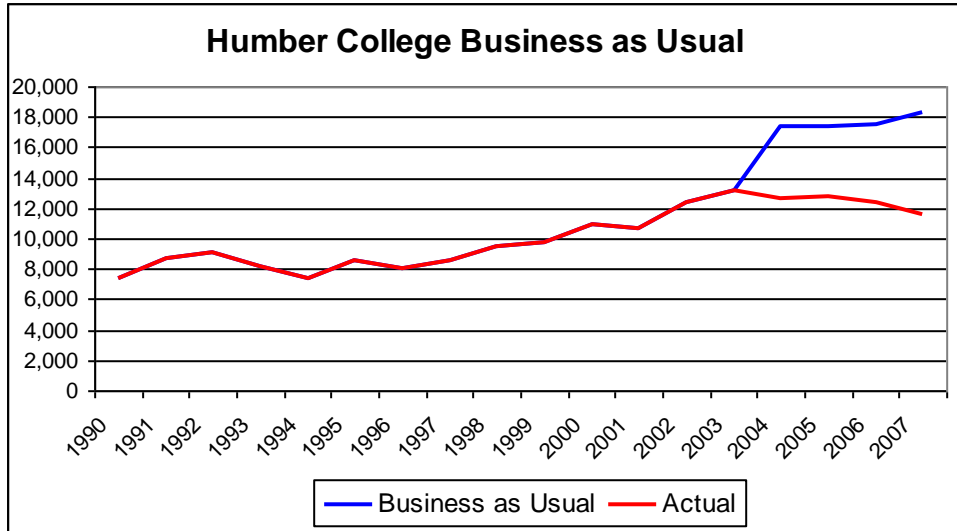
Things don't look quite so dire when we look at the energy intensity per square foot or per student, which corrects for College growth. The decline in both of these indices is completely due to the energy efficiency projects undertaken over the years.



Past successes

The graph below shows where Humber's greenhouse gas emissions would have been if we hadn't implemented the many energy efficiency projects over the past years. Instead of being 59% over 1990 levels we would be 250% over. Projects that have contributed to these savings are:

- the new ultra-efficient North Campus chiller plant (the most efficient in Canada), including the elimination of the powerful greenhouse gas CFC's.
- high efficiency lighting upgrades, motion sensors
- building automation for tighter control
- variable speed drives
- boiler replacements
- energy efficient new construction including heat recovery on the residences, the Guelph-Humber Biowall, Thermodeck in Bldg B.



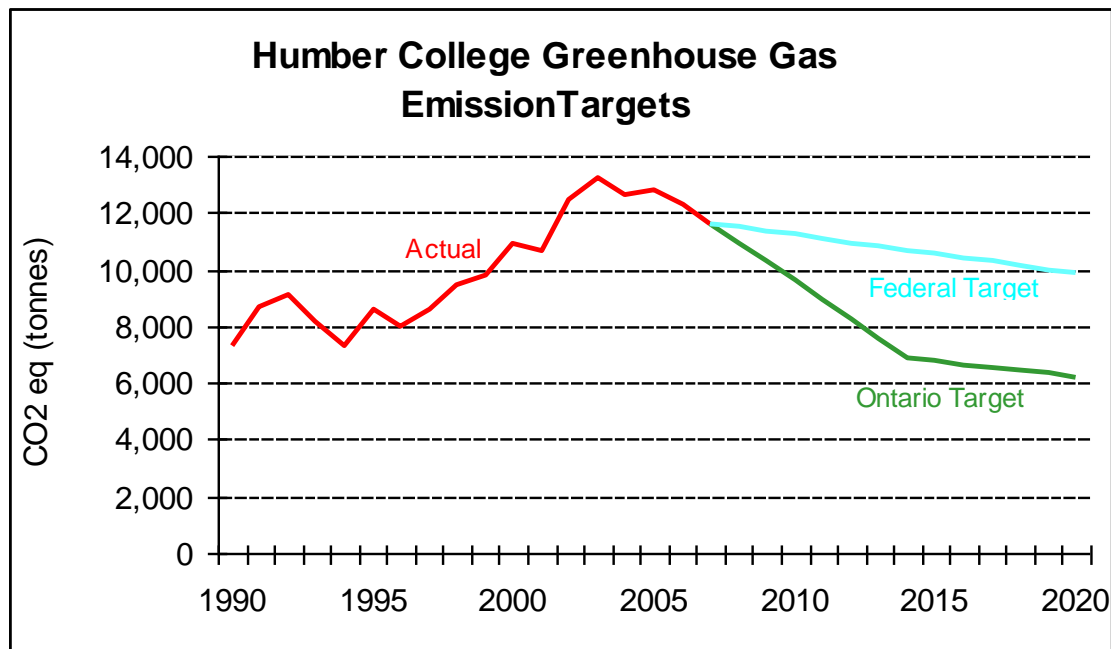
Targets

There are many different targets currently being used by different jurisdictions.

Kyoto – 6% below 1990 levels by 2008 - 2012

Ontario - 6% below 1990 levels by 2014, 15% below by 2020, 80% by 2050

Federal - -20% below 2006 levels by 2020, 60% below by 2050



British Columbia has recently introduced targets 33% below 2007 levels by 2020, 80% below by 2050. This ends up being somewhere between Ontario and Federal targets, but

the interesting part is the legislation mandates colleges to be carbon neutral by 2010, and implements a carbon tax.

A brief look at the graph shows that it is clearly going to be very challenging for Humber to meet any of these targets. In our opinion, however, it is not impossible.

Short term targets can be met through energy efficiency reductions of about 6% per year. Where it gets tricky is that any increases from new construction will have to be offset by savings in the existing buildings.

Things we can do

Building on our past successes, there are many things that we can do to reduce our carbon footprint. The various ways to reduce greenhouse gas emissions can be broken down into three categories:

1) Energy Efficiency

Humber has already invested significant time and money in reducing our energy use through energy efficiency, primarily to save money on our utility bills. There is another benefit however, in that the energy that we do not use does not cause emissions. Projects we have implemented in the past are saving about 9,000 tonnes of CO₂ a year as compared to a business as usual scenario. However, with a \$5 million annual energy budget there is always room for more improvement, and these measures have the significant benefits in that they pay for themselves through lower energy bills.

Easily obtainable

These are the types of projects that we have a pretty good handle on now. They use existing technology, and in many cases are already in the planning stages. Examples:

- upgrades to the gym lighting
- VAV conversions of North Campus constant speed systems
- Kitchen hood controls
- Operational adjustments
- Improvements implemented when areas renovated

Harder to obtain

These savings are definitely technically feasible. They involve complicated projects in the HVAC system. With some specialized engineering help we can get at these savings.

Aggressive conservation

Projects that fall into this category are much harder to obtain. While they use existing technology, they involve major renovation and disruption to the buildings and have much longer financial paybacks. However, they have huge potential for energy reduction.

Examples would include:

- redesign the lighting system in the entire College. Includes new light fixtures, dimming ballasts, new control systems.

- Converting buildings serviced by rooftop units to chilled water supplied by the Central Plant

Changes in technology in the future may make these or other projects more financially attractive.

2) Renewable Energy

Renewable energy is great for lowering greenhouse gas emissions because it produces power with zero emissions. Unfortunately renewable energy is still very expensive, although that may change in the future. Solar hot water heating can sometimes be cost efficient and small photovoltaic or wind demonstration projects may be worth doing, but we are talking quite small reductions to our carbon footprint, perhaps 1%. The other option is to buy a greater portion of our electricity from renewable energy projects. This has much larger potential, but at a high annual cost. General discussions with our electricity provider suggest that we could purchase all of our electricity from renewable energy sources for about a \$500,000 a year premium.

Changes to the provincial energy mix

Perhaps the biggest unknown that we have no control over, is how much CO₂ is produced by the provincial electricity energy grid. As the province shuts down coal fired power plants by 2014 and brings more nuclear and renewable energy online Humber's greenhouse gas emissions should drop. We have not yet been able to quantify the impact, but think it is significant.

3) Offset Credits

The quickest and easiest way to meet targets is to buy emissions credits. Emission credits come from large scale projects that have been done somewhere in the world such as large scale energy efficiency, landfill gas capture, or tree planting. These carbon offsets are verified by an established procedure, and then sold. The going price for such offsets is \$10 - \$15 / tonne, meaning that Humber could become carbon neutral for \$120,000 to \$180,000 per year.

Over 500 college and universities across North America have signed the "American College & University Presidents Climate Commitment to Carbon Neutrality". (www.presidentsclimatecommitment.org). It's very good and would be a great start for an action plan.

Recommendations

- Adopt a target for GHG emission reductions that is at least as aggressive as that of the provincial government.
- Sign the “American College & University Presidents Climate Commitment to Carbon Neutrality”.
- Expand monitoring and calculations to include an inventory of all College greenhouse gas emissions including vehicles, air travel, waste reduction,
- Develop a complete plan within one year to achieve these targets including efficiency, renewable energy and offsets. Consider how College growth is going to impact this plan.
- Track progress annually and report publicly.
- Define minimal standards for new construction energy efficiency. It is possible to build a new building that uses 70% energy than our existing buildings.
- Explore curriculum links.