Climate Action Plan Assessment 2017

Background

Elon University believes that one of the most pressing issues facing students, indeed all citizens, today is global environmental change or climate change. It is imperative for students to understand this change and how they can be good stewards of this earth so that the mission of producing "global citizens and informed leaders motivated by concern for the common good" is accomplished. This belief and vital mission led to the development of the Environmental Advisory Council and Sustainability Master Plan. To guide the University's work toward the 2037 carbon neutrality goal set forth in the Sustainability Master Plan, a Climate Action Plan (CAP) was developed in the spring of 2010.

The plan included a projection for future emissions and outlined strategies and goals to reduce carbon emissions from the 2008 baseline year. Using FY 2008 as a baseline, emission reduction targets were identified: 5% reduction by 2015 and 18% reduction by 2020. At the time the plan was developed meeting the identified goals resulted in remaining emissions that would need to be offset in 2037: 27,668 metric tons of carbon dioxide equivalent (MTCDE), which is equivalent to the emissions from about 3.1 million gallons of gasoline. Based on estimates in 2010, it would cost Elon approximately $1.71 million to purchase carbon offsets[1] for the remaining emissions in 2037 to reach carbon neutrality. An annual offset purchase will be necessary to maintain carbon neutrality. The annual cost to offset emissions post 2037 will depend upon actual yearly carbon emissions and the cost of carbon.

Current Status

Since FY 08, Elon has been in a period of exceptional campus growth, which exceeded several of the factors built into the projection for future emissions in the 2010 CAP. Despite this growth, progress was made toward minimizing emissions increases. Energy efficiency and conservation efforts, such as LED lighting and efficient mechanical systems, resulted in the University's energy consumption per square foot (BTU/SF) decreasing 16%, while net GHG emissions per 1,000 square feet decreased 19.7% (Figure 1). Even with this progress, the initial interim emission reduction target (5% reduction by 2015) was not met. The FY 16 GHG Inventory indicated net emissions have increased 13.5%. While some of this increase can likely be attributed to improved data, the majority of this increase is from actual increases in emissions (e.g., increased energy consumption, additional travel).

To help determine a path forward, the projection for future emissions (from the 2010 CAP) was updated utilizing experienced trends from eight years of GHG Inventory data and the reduction goals identified in the 2010 CAP. This projection resulted in remaining emissions of 26,671 MTCDE to offset in 2037 to reach carbon neutrality. While this estimate is slightly lower than the 2010 projection due to the impact of experienced trends, it indicates the importance of achieving the identified reduction goals. If reduction goals are not met, the amount of emissions to offset will be greater than the estimated 26,671 MTCDE.

Initiatives underway that contribute toward these reduction goals include but are not limited to the operational dashboard system being implemented by the Physical Plant, which will improve the ability to measure, monitor and control utility usage (electricity, natural gas and water); the annual energy efficiency projects that take place during the summer; Elon's Green Building Policy; the expanding composting program; the use of electric and bio-fueled vehicles; and the ride-sharing program. The solar

[1] A carbon offset is a reduction of carbon dioxide or removal of carbon dioxide equivalent GHG emissions that is used to counterbalance or compensate for ("offset") emissions from activities elsewhere. Carbon offsets can be generated in a number of ways, including tree plantings, renewable energy projects and energy efficiency projects.

farm at Loy Farm does not currently impact Elon's GHG emissions because the University does not own the solar farm. If Elon owns the solar farm in the future, it could contribute approximately 2,100 MTCDE toward the reduction goals. The Sustainability Master Plan (SMP) was updated in spring 2015 with a focus on the following 10 years. It includes objectives directly and indirectly related to carbon reduction and achieving these will contribute toward Elon's carbon neutrality goal.

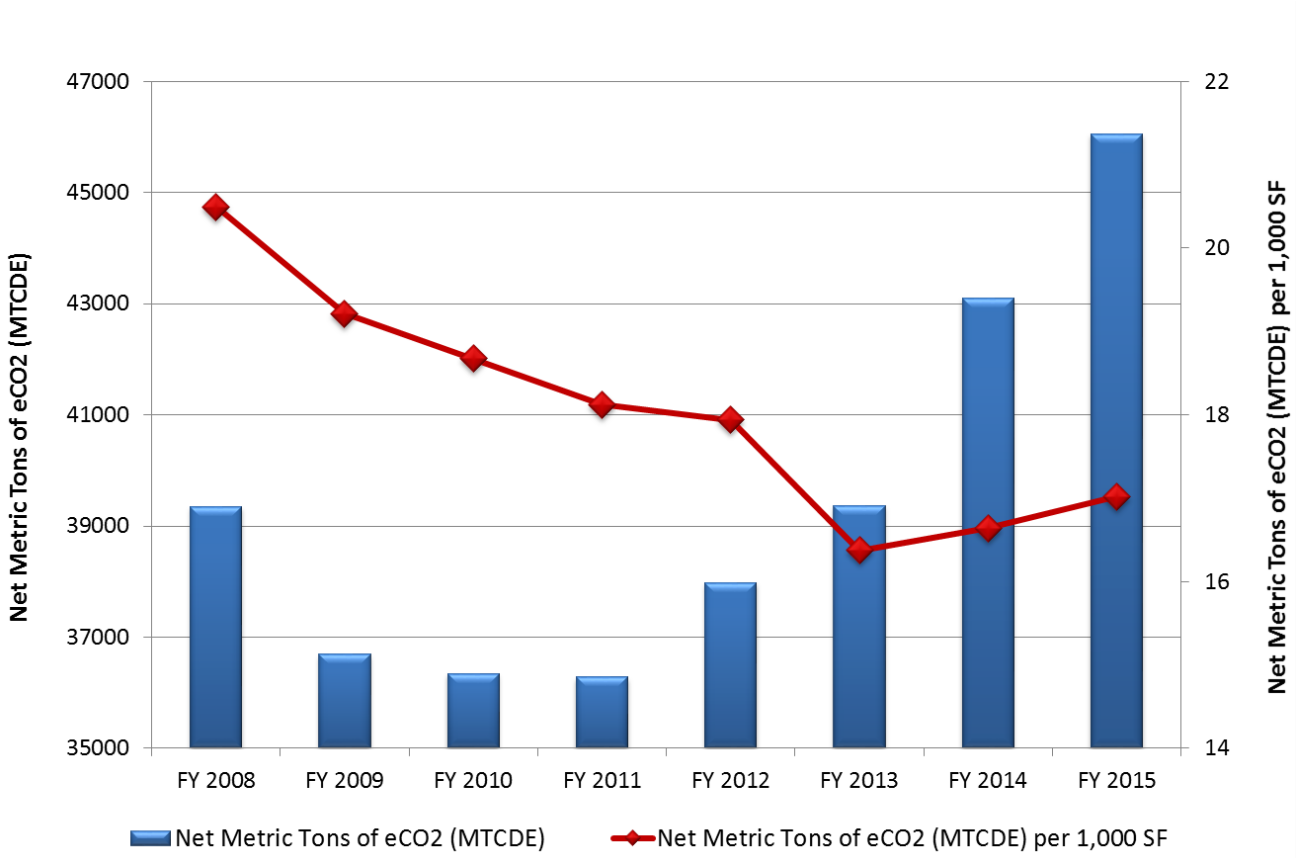

Figure 1: GHG Emissions per 1,000 SF

Next Steps

As the University continues its work toward carbon neutrality, the following elements will be essential:

- Continue to work toward reduction goals established in the 2010 CAP
  - Maintain and expand (where appropriate) the initiatives referenced above
  - Research additional opportunities to reduce emissions
- Focus on the SMP objectives with direct carbon impact
  - Reduce total energy consumption per gross square foot compared to a 2005 baseline
  - Increase the percentage of campus energy consumption that comes from non-fossil fuel sources, such as solar and geothermal
  - Expand and improve the campus' physical infrastructure that supports alternative transportation and student, faculty and staff safety
  - Assess the University's Sustainability Design Standards and Green Building Policy at least every five years to ensure the University's new construction and renovation projects are high-performance, sustainable facilities

    - Reduce waste and increase the yearly waste diversion rate (i.e., reduce the percentage of waste sent to the landfill)
    - Reduce total potable water consumption per gross square foot compared to a 2005 baseline
- Assess projects that could contribute to carbon reduction (e.g., energy efficiency/conservation, renewable systems, etc.) within a new or existing facility or on their own (e.g., solar farm) with the following metrics: project cost ($), project yearly MTCDE reduced or avoided, project savings ($) (with and without cost of carbon), project ROI (with and without cost of carbon)

Cost of Carbon

There are several options for the cost of carbon and there is no definitive way to know what the actual cost will be in 2037. Given this, it is recommended that two cost of carbon figures be utilized when assessing projects: one based on the estimated cost to purchase carbon offsets in 2037 ($19/MT eCO_2) and another based on the social cost of carbon in 2037 ($55/MT CO_2, based on 3% discount rate).[2] The cost to purchase carbon offsets is based on high-quality, verified offsets with co-benefits. The social cost of carbon reflects the net damages additional CO_2 will have on society in that particular year.[3] It is a comprehensive way to assess the impact of additional CO_2 emissions. While it may not actually cost $55/MT CO_2 to purchase a carbon offset in 2037, this figure puts into perspective the actual cost of additional carbon emissions to society.

Utilizing the two cost of carbon figures above, it will cost $506,752 to purchase offsets for the estimated amount of remaining emissions (26,671 MTCDE) should all of the 2037 reduction goals be met. The social cost of those remaining carbon emissions in 2037 is $1,466,913. If the 2037 reduction goals are not met, the remaining emissions associated with those goals will also need to be offset in 2037 to achieve carbon neutrality. Maintaining carbon neutrality will require an annual offset purchase.

[2] Interagency Working Group on Social Cost of Carbon, United States Government, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (May 2013, Revised July 2015), 13.

[3] Committee on Assessing Approaches to Updating the Social Cost of Carbon, Board on Environmental Change and Society *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update* (National Academies of Sciences, Engineering, and Medicine, 2016), 3. https://www.nap.edu/read/21898/chapter/3