Austin College
2016
Climate Action Plan

Former Austin College President Oscar Page signed the American College and University Presidents Climate Commitment (now the Second Nature Carbon Commitment) during 2008. The college's initial climate action plan was prepared in 2010. This is an update to that plan.

History of Austin College Greenhouse Gas Emissions Reductions, Improvements in Energy Use Efficiency, and Associated Cost Savings

The centerpieces of the 2010 plan were a five-year shift to wind-generated electricity and a target of 2% reduction in energy consumption per year.

Our shift to wind-generated electricity is almost complete, with almost all campus electricity use offset by purchases of renewable energy credits. We estimate that 97% of campus electricity use was offset with REC purchases as of FY 2015, and anticipate reaching 100% within a year (Table 1).[1]

We have not met our targeted reduction in energy consumption, partly due to the construction of a large new LEED Gold Certified science building, the IDEA Center. However, our electricity and natural gas consumption per square foot of building space have declined by 24% and 18% respectively since 2004 (Table 1).

The shift to wind-generated electricity has cost about $10,000 per year for renewable energy credit purchases. However, that is only some 2% of what we are saving due to energy conservation. Since 2004 the college has increased its energy efficiency so much that, without those improvements, the FY 2015 cost of electricity and natural gas would have been $430,000 higher. During the period 2005-2015 improvements in energy efficiency and conservation saved the college some $3,300,000 (Tables 1 & 2, Figure 1).

As a consequence of the shift to wind-generated electricity, infrastructure and operating efficiency improvements, and, to an unknown extent, encouragement of energy conservation behaviors, the college's greenhouse gas emissions declined 36% in just six years from 2008 through 2014, despite a simultaneous 18% increase in the square footage

[1] We purchased enough RECs for FY 2015 to offset all electricity charged to the college, but overlooked a small amount of electricity directly billed from the utility to students who live in the college's "village" houses during the school year. The village houses account for about 4% of the total campus indoor square footage. In the future we will estimate the village's school year consumption based on standard EPA kWh/sq. ft. values and purchase the corresponding number of RECs.

of campus buildings. Our greenhouse gas emissions per square foot of buildings declined 49% from 2008 to 2014 (Tables 1 & 2, Figure 2).

Neither changes in enrollment or annual weather variation can account for the reductions in energy use per square foot since 2004 (Figures 3 & 4).

2016 Climate Action Plan

Our revised climate action plan is based on three key elements: continued purchase of renewable energy credits to offset 100% of electricity consumption; an annual target of 0.75% reduction in electricity and natural gas consumption; and purchase of an incrementally increasing number of carbon offsets beginning in fiscal year 2025 to achieve carbon neutrality in fiscal year 2035.[2]

We will strive to meet annual goals for energy reduction through infrastructure upgrades, further operational efficiency improvements, and continued efforts to avoid energy waste and encourage energy conservation. Annual reductions of 0.75% in energy consumption will almost certainly require investments in capital equipment such as recent investments in LED lighting.

We also hope to document and increase carbon sequestration in our composting program and at our tallgrass prairie restoration, but these have severely limited potential to offset the college's greenhouse gas emissions. Presently we compost wood chips with plant material from food preparation waste. This operation produces roughly 20 m^3 of compost per year. Expansion of that operation to include post-consumer food waste would increase compost production approximately 10x to roughly 200 m^3 per year. While this would be a substantial amount of compost, it would represent sequestration of less than 1% of our 2014 greenhouse gas emissions.[3]

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[2] As of 2014 the college's annual greenhouse gas emissions were just under 9,000 MT eCO_2. With current carbon offset prices of some $8 per ton, the college could achieve carbon neutrality for approximately $70,000 per year, or about 15 cents per student per day.

[3] Assuming a compost density of 400 kg/m^3 and organic carbon content of 18%, 200m^3 of compost production per year would amount to almost 15,000 kg of carbon sequestration per year. If the raw materials in our compost were not composted the wood chips would likely decompose aerobically and the food waste anaerobically. Assuming the input ratio of food waste to wood chips is 1/15, production of 55 MT of compost would represent about 1 MT of avoided methane and 14 MT of avoided carbon dioxide. Further assuming relative global warming potentials of carbon dioxide to methane of 1/30, this volume of compost would represent sequestration of approximately 14 + (1x30) = 44MT eCO_2 per year. As of 2014 the college's annual net eCO_2 emissions were approximately 8,885 MT.

The college operates a 100-acre tallgrass prairie restoration on a former farm with depleted soil organic matter. To date high variability among measurements has obscured any temporal trend in soil organic matter associated with prairie restoration. Moreover, assuming characteristic carbon sequestration rates for well-managed grassland, carbon sequestration at the prairie could offset only about 1% of our current greenhouse gas emissions.[4]

This 2016 plan will be shepherded by the Director of the Center for Environmental Studies and the Director of the Physical Plant with the assistance of the Environmental Sustainability Advisory Committee.[5] College faculty, staff, and students will generate proposals for reductions in greenhouse gas emissions. The Environmental Sustainability Advisory Committee recommends promising proposals for adoption by the college administration.

This plan will be reevaluated during fiscal year 2021.

References Cited:

Conant, R.T., Paustian, K., and Elliott, E.T. (2001) Grassland management and conversion into grassland: effects on soil carbon. *Ecological Applications*, 11:343-355.

Conant, R.T. (2010) Challenges and opportunities for carbon sequestration in grassland systems: A technical report on grassland management and climate change mitigation. Food and Agriculture Organization of the United Nations (FAO), Integrated Crop Management Vol. 9. ISSN 1020-4555, http://www.fao.org/fileadmin/templates/agphome/documents/climate/AGPC_grassland_webversion_19.pdf, accessed 24 February 2016.

[4] Conant et al. (2001) estimate that well-managed grassland can sequester 350 kg of carbon per hectare per year. The Sneed prairie is approximately 40 hectares. Therefore, prairie restoration at the Sneed property has potential to sequester on the order of 14 tons of carbon per year. Oxidation of 14 tons of carbon would produce about 45 tons of CO_2. Therefore, carbon sequestration at the prairie has the potential to offset approximately 14/8885, or less than 1% of our eCO_2 emissions.

[5] The Environmental Sustainability Advisory Committee is composed of the directors of the Center for Environmental Studies (chair) and the physical plant, one additional faculty member, one additional staff member and the student co-chairs of Austin College Thinking Green.

Table 1. Changes in college greenhouse gas emissions 2008-2014. Prior to 2011 all renewable energy credits were purchased within our electricity contract. A separate price for those renewable energy credits cannot be calculated. The annual cost of renewable energy credits increases as the % of electricity offset increases, but fluctuates further with because the market price for renewable energy credits varies from year to year. Other empty cells denote undetermined values. The 80% and 97% values for electricity offset in FY 2014 and 2015 are reduced by 3% from the 2010 climate action plan goals due to exclusion of electricity consumption directly billed to students living in the Village housing during the school year. Prior to FY 2014 the villages were not college property.

Fiscal year	Renewable energy credits purchased	Approximate % of electricity offset by renewable electricity credits	Cost of renewable energy credits	Greenhouse gas emissions (MT eCO_2)	% reduction in greenhouse gas emissions from 2008 baseline
2008	650	4.7		13,965	0%
2009					
2010	2012	15		12,246	12%
2011	4293	32	$7,031		
2012	6338	49	$7,947	10,653	24%
2013	9134	66	$10,638		
2014	12674	80	$19,220	8,885	36%
2015	14776	97	$10,082		

Table 2. Cost savings associated with increased energy efficiency

Fiscal year	Indoor build-ing sq. footage billed to college	Elec-tricity use MWh	Elec. Effic-iency MWh/ 1000 sq. ft.	Electricity cost	Savings due to elec. Effic. vs. 2004 effic.	Natural gas use MMBtu	Natural gas cost	Gas use effic-iency MMBtu/ 1000 sq. ft.	Savings due to gas use effic. vs. 2004 effic.	Total gas & elec. Savings due to increase effic.
2004	704821	14688	20.8	$755,247	$0	50,350	$259,970	71.4	$0	$0
2005	760271	14228	18.7	$877,185	$99,567	48,779	$299,523	64.2	$33,970	$133,537
2006	760271	14049	18.5	$1,013,164	$129,411	37,993	$372,652	50.0	$160,056	$289,467
2007	760271	14041	18.5	$1,013,927	$130,140	45,239	$275,282	59.5	$55,205	$185,345
2008	785002	13718	17.5	$1,161,302	$223,522	46,602	$355,875	59.4	$72,362	$295,884
2009	785002	13181	16.8	$1,180,939	$284,674	48,317	$355,273	61.6	$57,065	$341,739
2010	785002	13412	17.1	$1,282,114	$281,658	49,818	$342,997	63.5	$43,099	$324,757
2011	785002	13416	17.1	$1,283,640	$281,526	47,518	$278,911	60.5	$50,243	$331,769
2012	785002	12935	16.5	$1,235,710	$327,043	45,379	$212,484	57.8	$50,097	$377,140
2013	785002	13839	17.6	$1,259,549	$229,300	54,994	$203,371	70.1	$4,008	$233,308
2014	928507	14847	16.0	$1,216,862	$368,970	53,663	$210,925	57.8	$49,786	$418,756
2015	928507	14775	15.9	$1,230,293	$380,856	54,210	$250,417	58.4	$55,984	$436,840

Figure 1. Annual savings due to improvements in electricity and natural gas use efficiency relative to fiscal year 2004 efficiency. The low outlier of FY 2013 is presumably due to increased energy consumption during the final year of construction of the IDEA Center.

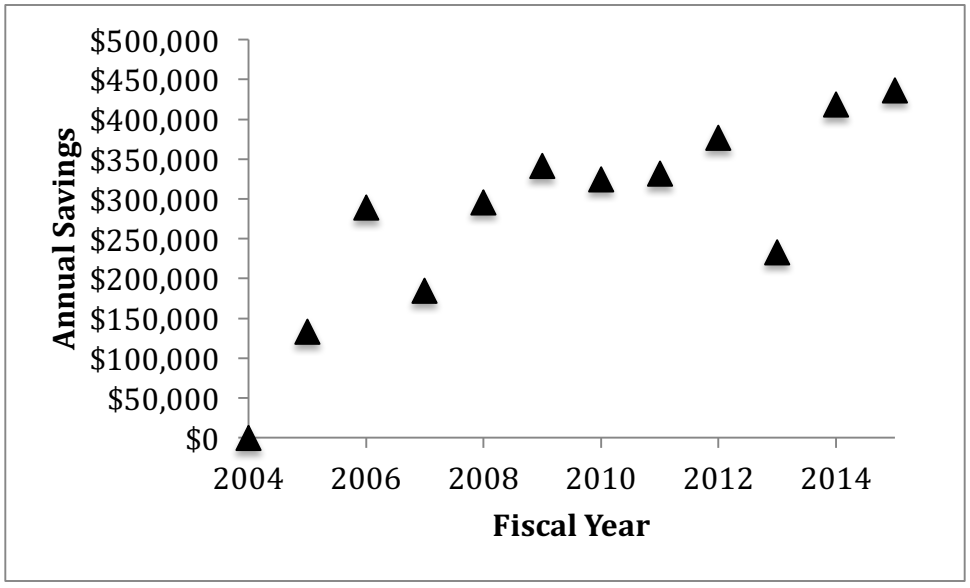

Figure 2. Reduction in Austin College greenhouse gas emissions (metric tons of carbon dioxide equivalent, MT eCO2) from 2008 to 2014.

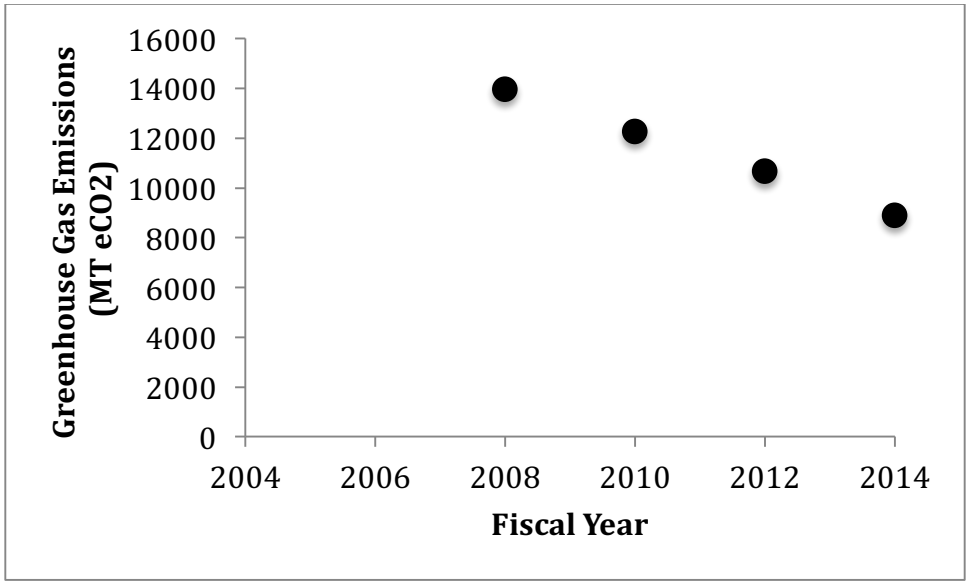

Figure 3. Cumulative number of heating degree days (diamonds) and heating plus cooling degree days (squares), Sherman Texas. Data courtesy of www.weatherdatadepot.com. Balance point 65°F.

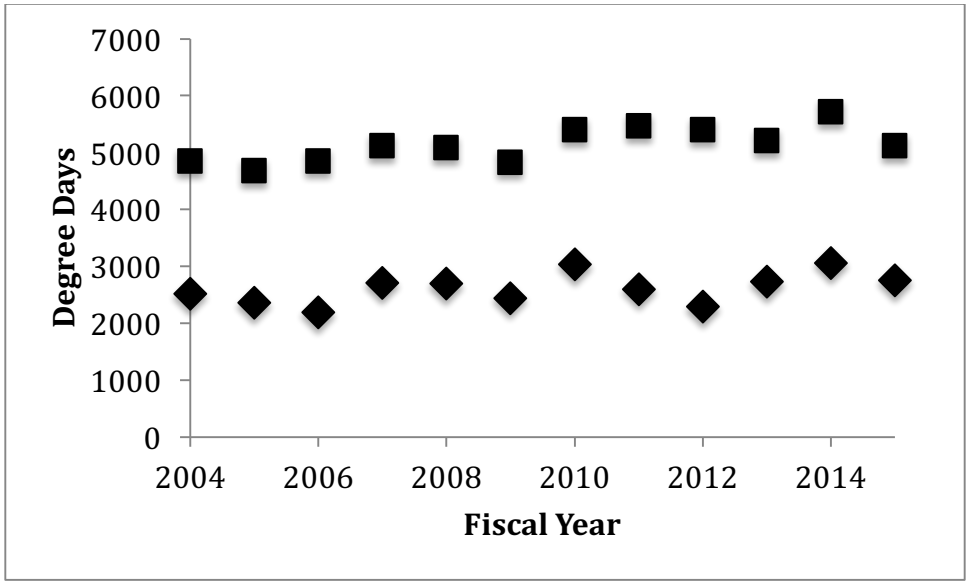

Figure 4. Equivalent full time enrollment (squares) and number of residential students (diamonds).