

Clarkson's Race to Zero - Climate Action Planning

Clarkson's Sustainability Mission:

We strive to educate the leaders of tomorrow who embrace the concepts of sustainability and have the skills and sense of professional and personal responsibility to shape a sustainable future. This requires the entire Clarkson University community to work together across organizational boundaries as new behaviors, processes and innovative technologies are embraced, thereby diminishing the University's environmental footprint and improving the wellbeing of individuals, our community and the fiscal health of our institution.

Climate Commitment

To align with the Second Nature Carbon Commitment¹ signed by President Collins, October 2015, the Clarkson University Potsdam Campus will:

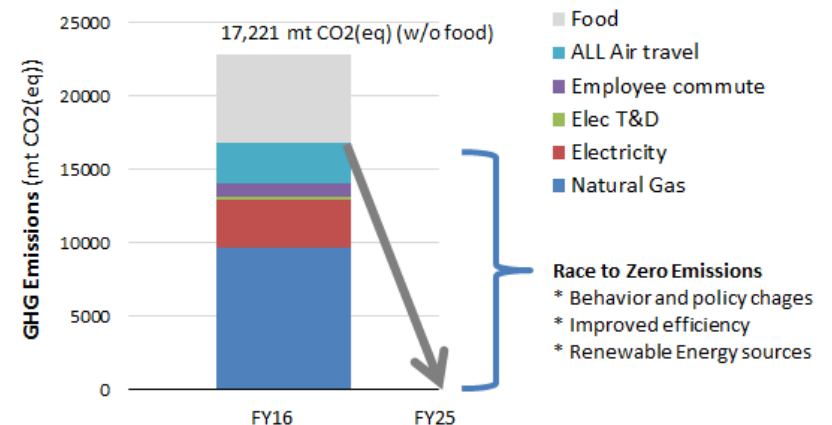
- **Race to Zero - we will work across all university departments to achieve Climate Neutrality by 2025**
- Include climate neutrality and resilience in curricular and co-curricular activities for all students
- Expand research in climate neutrality and climate resilience
- Define resilience thresholds for our community and plan to always meet these thresholds

Clarkson's Race to Zero initiative addresses the climate neutrality aspects of the climate commitment. It provides an aspirational goal to reach net zero GHG emissions by 2025. The plan will be reviewed and goals reviewed every three years. This climate action plan engaged the Clarkson community in identifying goals, projects and priorities. Commitment requirements are included in Attachment A.

Current GHG Emissions

A GHG Inventory has been conducted for years since 2005. In FY15, we emitted 17,221 metric tons (mt) carbon dioxide equivalents (CO₂(eq)). Emissions from our food consumption are highly uncertain and are included only to illustrate their importance and need to address at some point in the future, they are not considered in the Race to Zero presented here.

FY16 emissions represent a steady decrease since our highest emissions in 2010 (20,883 mt CO₂(eq)). This 17.5% decrease, which resulted even in a time of substantial growth in building area, employees and students, results from substantial efforts to improve energy use efficiency and change our electricity sources. Continuing these efforts will help, but we will always need to heat buildings and support students and employees travel. Eventually investing in carbon offsets that result in carbon dioxide sequestration will be needed to balance our emissions.



¹ Second Nature Climate Commitment
<http://secondnature.org/wp-content/uploads/2015/09/Carbon-Commitment-Second-Nature.pdf>

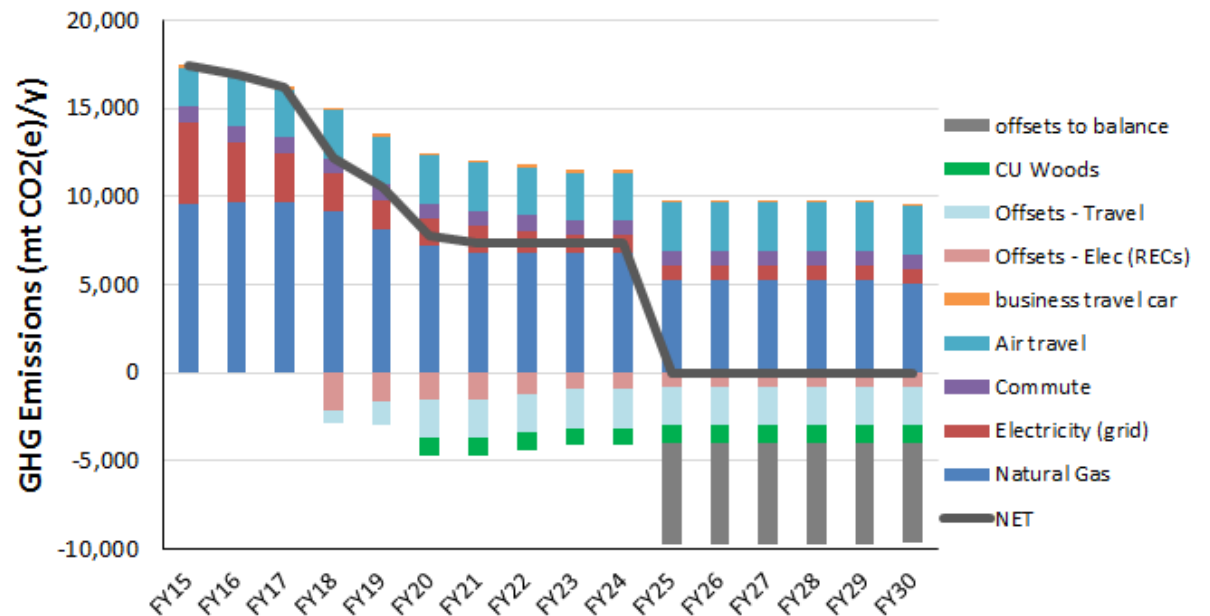
Race to Zero Climate Action Plan

Overall Strategies

- Include climate & energy concepts in more curricular and research activities
- Understand our energy and water use across campus (metering and analysis)
- Change decision processes for personnel, procurement and capital projects to consider sustainability impacts and environmental costs
- Implement deep retrofits to increase the efficiency of space, energy and water use
- Develop creative financing approaches to prioritize and fund energy saving projects
- Increase use of renewable energy resources (with RECs (renewable energy credits) for all electricity)
- Invest in carbon offsets to balance remaining GHG emissions

This plan is aggressive and aspirational. Throughout the committee work to develop this plan, data defining how we use energy was limiting. Thus, a high priority for this plan is further metering of energy use to identify priorities for energy system upgrades. Given the aspirational tone of this plan, it will be reviewed every three years by a team from the ISE, FAS, and CFO offices to assess progress and redefine priorities.

Race to Net Zero GHG Emissions by 2025 (example)





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TO: Clarkson University Campus Community

FROM: President Anthony G. Collins

SUBJECT: Approval of our Clarkson Climate Action Plan

DATE: April 21, 2017

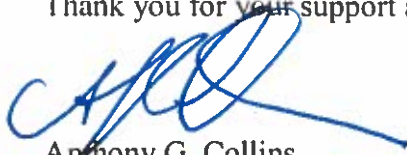
I am pleased to announce that I have approved the Clarkson Potsdam Campus' Race to Zero Climate Action Plan (CAP) and look forward to working with all of you to help support the initiatives required to meet our goal of achieving net zero greenhouse gas emissions by 2025. This CAP was developed by the Institute for a Sustainable Environment with active support from the facilities, finance, student life and other departments in response to the Climate Commitments that I signed on behalf of our Potsdam campus in April 2014 and October 2015. Our students' voices and ideas were integrated into this plan through a series of open workshops and tabling events.

Approving this aspirational plan, helps us set priorities and criteria for many construction and energy projects to assure that we select options that will reduce our electricity and heating fuel use through highly efficient mechanical equipment, smart control systems and human behavior that values conservation. Recent and current renovation projects and the installation of additional electric meters are already moving our campus in the direction needed to meet the Race to Zero goals. The human element of this plan will require all of us to consider sustainability within our jobs and campus life, for example, as we travel, turn unused equipment off, or choose the goods that we purchase. A fundamental precept to our plan is that the greater our commitment to creating an energy efficient campus, the less we have to rely carbon offsets to get us to carbon neutrality.

In addition to my approval of this plan, I will ask the Board of Trustees in May to endorse the plan. We will review and update the plan every three years to assess progress and learn as we move forward to a goal of climate neutrality in 2025. Greenhouse gas inventory and climate action planning for the CRC campus will be forthcoming.

The Race to Zero Climate Action Plan is available at http://www.clarkson.edu/green/assessment_and_planning/index.html.

Thank you for your support and enthusiasm for this plan.



Anthony G. Collins
President

Specific Goals and Strategies²

A. Business, Cultural and Learning Environment

Goal A.1: Fundamentally change campus culture by growing sustainability initiatives and problem solving across campus and the community

Performance indicators: number programs/events developed, number participants, sustainability literacy

Key Partners: HR, ISE, Safety, Student Life

Strategies	Cost ³	Priority (Urg./Imp.)	Time Horizon	Impact on GHG emissions	Comments / Next Steps
Strategy 1: Tie sustainability efforts to job evaluations for all employees	0	M	FY18	L	Integrate with on-going discussions as service, diversity & inclusion added to evaluation
Strategy 2: Involve students in sustainability project strategies, project development, implementation and project assessment	\$\$	H	on-going	L	Identify data, projects and interested faculty/staff; Include sustainability in core curriculum; Support faculty to increase the number of sustainability classes and research projects.
Strategy 3: Educate and motivate the campus to encourage energy saving behaviors	\$\$	H	on-going	M	Example - Smart Housing - 20% savings with Feedback and/or Motivation Establish incentives for conservation (e.g., car pooling) Continue Sustainable Office Certification program
Strategy 4: Encourage and celebrate students, staff and faculty who increase efficiency and sustainability	\$	M	on-going	L	Components included with Office Certification program, Sustainability prize for research at SURE / RAPS
Strategy 5: Provide leadership to our broader community in support of climate policies and actions.	\$	H	on-going	L	Continue to support to federal, state and local initiatives that reflect our climate commitments by signing and providing time for climate actions
Strategy 6: Increase the percentage of classes and research projects that address climate mitigation or adaptation	\$	H	on-going	L	Fundamentally impacts student education Inventories of classes and research projects currently maintained for STARS Need workshops and resources to further support development

² These goals and strategies focus primarily on the carbon commitment aspects of our Sustainability Plan, although it is recognized that there is overlap among sustainability theme areas. Additional documents will address other key areas (solid waste, materials use, grounds, education & research, resilience, etc.).

³ \$ - \$1,000s; \$\$ - \$10,000s; \$\$\$ - \$100,000s; \$\$\$\$ - \$1,000,000s

Goal A.2: By 2021, include sustainability considerations in all investment and expenditure decisions

Performance Indicators: Policies developed and approved; # training program & participants; investment holdings
 Key Partners: Finance, facilities, Aramark, ISE

Strategies	Cost	Priority (Urg./Imp.)	Time Horizon	Impact on GHG emissions	Next Steps/Comments
Strategy 1: Implement policies to require life-cycle cost-benefit analysis including environmental and social impacts as part of major campus investments or expenditure decisions	\$	H	Start FY18	M	Identify and edit appropriate sections in OM; Create related guidance documents; provide workshops to build capacity within the purchasing system
Strategy 2: Increase our investment of endowment in sustainable businesses that are ready to lead this country (and the world) to a cleaner future.	\$	M		L	Work with investment managers to understand our portfolio Increase \$\$s in Aperio Explore the divestment of endowment funds from coal or all fossil fuels
Strategy 3: Reinvest savings from energy projects into new clean energy projects		H+	FY18	H+	Establish green revolving loan fund or other mechanism to return some of the financial benefits of this plan into further progress to meet the goals
Strategy 4: Advance sustainable food systems that provides fresh, healthy and local food	\$\$	H	FY19	M	Work with Cornell Cooperative Extension and their proposed food hub to promote local agriculture development and access to local food inventories
Strategy 5: Ensure that there are sufficient and trained human resources in FAS to complete energy work	\$\$	H/H	FY19	1300 mt/y; (10% elec, 10% NG)	Continue to use students (e.g., GIS), Hire Energy Manager

Goal A.3: By 2025, use carbon offsets to provide economically viable means of achieving net zero GHG emissions

Performance Indicators: emissions offset, # students and faculty engaged
 Key Partners: Finance, DAR, CUSB, ISE, MUST (Uganda)

Strategies	Cost	Priority (Urg./Imp.)	Time Horizon	Impact on GHG emissions	Next Steps/Comments
Strategy 1: By 2020, Offset all travel emissions through innovative, peer-reviewed carbon projects that provide hands-on opportunities for students.	\$\$	M	FY17 - 20	2000 mt/y	Develop internal program for contribution to Uganda micro-finance tree project and/or local reforestation project for offsets. (\$30k; ~\$15/mt CO2); (up to 30% of emissions allowed)
Strategy 2: Offset all remaining emissions by developing or supporting carbon offset projects that are third party verified by 2025.	\$\$	H	FY20-25	Critical, high impact for C-neutrality	Integrate students in projects to the extent possible

					Develop carbon sequestration through Land Trust protection of local lands
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B. Physical Environment

Goal B.1: Provide 100% of our electricity needs from local and renewable resources by 2018

Performance Indicators: % Renewable energy (w/RECs), % Renewable energy (w/o RECs), % Fossil fuels in electricity mix, \$/kWh each source
 Key Partners: Finance, facilities

Strategies	Cost	Priority (Urg./Imp.)	Time Horizon	Impact on GHG emissions	Next Steps/Comments
Strategy 1: Invest in local, renewable electricity generation	\$\$\$	H	done(11/14) done (6/15) FY17 FY19 FY17 FY17	~600 mt/y ~650 mt/y ~470 mt/y	Install 2 MW solar PV on site (✓) Purchase from P'dam Hydro (✓) Continue to monitor, resolve REC issue Consider additional rooftop solar Lyon's Falls/ Blue Mnt Power hydro w/ RECs Consider Azure Mtn. Power

Goal B.2: Decrease natural gas used for building heating and hot water by 35% by 2025

Performance Indicators: % buildings with effective Temp control; set points; campus NG use (mmBtu/y)
 Key Partners: Finance, facilities, ISE

Strategies	Cost	Priority (Urg./Imp.)	Time Horizon	Impact on GHG emissions	Next Steps/Comments
Strategy 1: Replace most critical inefficient heating systems	\$\$\$	M/H	FY18 FY20 FY21 FY22	1,500 mt/y (est. 16% NG saved)	Meter to help identify priorities, Projects planned: Foster House, Rowley, TH Apts AG, IRC, ERC Camp, CH Holcroft, Cheel
Strategy 2: Control building temperature and airflow for energy savings and reasonable human comfort.	\$\$	H/H	FY17 - 23	1400 mt/y (est. 15% NG)	Chiller optimized; Fund Controls Plan; Engage Campus Community
Strategy 3: Improve weatherization in all campus buildings	\$\$\$\$	M/H	FY21 - 25	400 mt/y (est. 4% NG)	Identify priorities, capital needs <should be higher time priority>
Strategy 4: Increase the use of natural systems that use ambient conditions to condition buildings	\$\$	L/M	FY25	200 mt/y (est. 2% NG)	Trial Projects (Passive Solar/Thermal Solar for HW)

Potential utility cost savings = ~\$475,000/y at 35% reduction (avg. from FY15 and FY16 expenses)

Goal B.3: Reduce electric energy consumption on campus by 35% by 2020 (45% by 2025) through substantial increases in efficiency and conservation.

Performance Indicators: # and load of equipment identified for upgrade, kWh/y (by building and total)
 Key Partners: Facilities, Finance, ISE

Strategies	Cost	Priority (urg./ imp.)	Time Horizon	Impact on GHG emissions	Next Steps/Comments
Strategy 1: Replace inefficient building HVAC and lighting systems	\$\$\$\$	H	FY15 FY17-19 FY16 FY17	~650 mt/y * (11+% elec)	Implement district cooling (chiller) for academic buildings (✓) Meters to increase our understanding and quantification of current electricity use to prioritize other projects FY16 lighting upgrades (alumni gym, walker, BH Snell) (✓) outside LEDs installed \$130k (✓) Res. Hall - hallway lighting
Strategy 2: Improve control systems across campus to turn things off or down whenever feasible	\$\$\$	H	FY18 FY22	550 mt/y* (est. 5% elec) (est. 5% more)	EMS upgraded and improved in current maintenance plan
Strategy 3: Renovate or build new buildings in ways to greatly reduce energy needs <note, also benefits Goal B.2>	\$\$\$	M	FY17 FY18 (ice) FY18	500 mt/y* (est. 3%elec) (est. 5% elec) (est. 1% elec)	meters installed and interpreted, building use efficiency increased; SC - Trane identified problems - retro-commissioning & equip. metering needed Cheel: ice will be a big savings(so is kitchen) expect at least 20% savings on ice, (~10%of building= ~5% baseline) ERC: not a huge user Consider employing advanced yet natural / passive systems throughout

* GHG savings not realized with concurrent increased renewable electricity

Potential utility cost savings (@\$0.07/kWh) = \$660k/y for 35% electricity savings, \$850k/y for 45% electricity savings

Goal B.4: Incorporate visions of a low-carbon and resilient future into the campus master plan

Performance Indicators: space utilization metrics, bike storage and miles of paths, % carpool registered vehicles, self-reported commuting behavior, acres woods managed & CO2 sequestered

Key Partners: Facilities, Safety, ISE, Finance, HR

Strategies	Cost	Priority (urg./ imp.)	Time Horizon	Impact on GHG emissions	Next Steps/Comments
Strategy 1: Use building space to provide flexibility and growth without expanding our physical footprint	\$\$\$	H/H	2025 (policy)	??	Understand how buildings currently used, what needs really are
Strategy 2: Improve walking and biking facilities and incentives (2% commute)	\$\$	M/L	2020	20 mt/y	Form Committee, Develop Policy/Plan, Implement Projects
Strategy 3: Develop (parking) policies to reduce single occupancy vehicle use (10% commuting emissions)	\$\$	H/M	2020	200 mt/y	Develop Policy/Plan
Strategy 4: Value, quantify and manage carbon sequestered in our wooded acres.	\$	M/M	2020	~1000 mt/y	Define suitable programs for management (needs to meet "additionality" criterion)
Strategy 5: Move FAS to the hill	\$\$\$\$			low	

Known Actions to Meet Net Zero Target by 2025 <EXAMPLE only, numbers are uncertain>

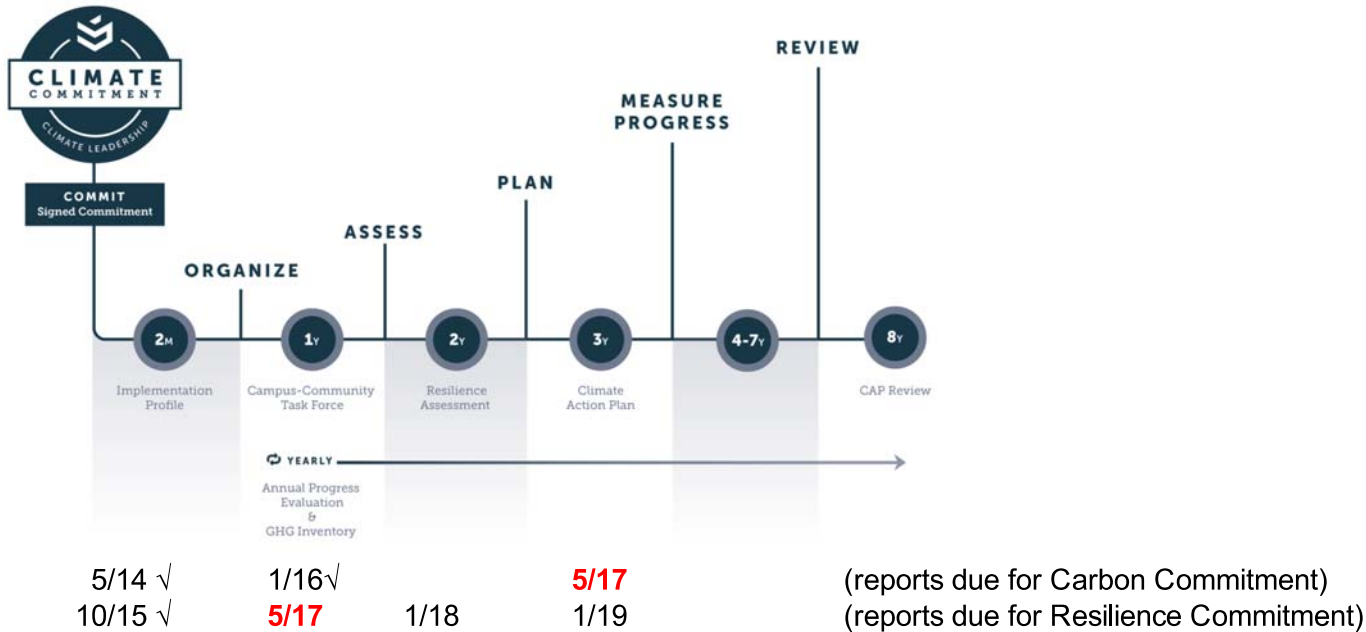
Implementation Schedule

Timeline		Action	GHG Savings (relative to 2015 baseline)	Cost	Assumptions / Comments
2015	Solar PV		3.2%		from FY16 actual data
2016	Potsdam Hydro		3.7%		from FY16 actual data
2017	Chiller		4%	\$\$\$	11% elec. savings - from first few months actual data
2018	Electric Meters/Controls		2%	\$\$\$	5% elec savings
	Chiller optimized		4%	\$	5% ea. elec, NG savings
	Start Carbon offsets for air travel		4%	\$\$ *	33% offset
	Buy hydro+RECs to offset remaining electric emissions		12%	\$\$*	balance of electricity, cost will decrease with time as efficiency increased
	Subsidized alternatives to commuting		<1%	\$\$ *	5% reduced commute miles (???)
2019	Add Energy Manager position		9%	\$\$\$ *	assumes 10% save each elec, NG use
	Increase Carbon offsets for air travel		8%	\$\$ *	66% offset
2020	ERC Renovation		<1%	\$\$	many unknowns, assume 1% elec
	Temperature controls throughout		5%	\$\$\$	10% NG savings
	Air travel offsets up to 100%		12%	\$\$ *	
	Increase subsidies for alternatives to commuting		<1%	\$\$ *	5% more reduced commute miles
	Begin counting CU woods for C-sequestration		5.5%	\$\$	fee for forestry study, implement
2021	Weatherization		3%	\$\$\$	many unknowns
2022	Cheel Renovation		6%	\$\$\$	many unknowns, assume 5% elec, 5% NG savings
2023	Additional savings from Electrical Controls		3%	\$	
2025	SC renovation		7%	\$\$\$\$\$	many unknowns, assume 3% ea. elec, NG savings
	Heating system upgrades		9%	\$\$\$	many unknowns, assumes 16% NG savings, but very important - consider doing earlier (may be double counting with renovations)
	Offset balance of emissions to meet net zero		29%	\$\$ *	

\$ - \$1,000s; \$\$ - \$10,000s; \$\$\$ - \$100,000s; \$\$\$\$ - \$1,000,000s

* annual cost

Attachment A: Requirements for Climate Action Plan



Details -

<http://secondnature.org/climate-guidance/sustainability-planning-and-climate-action-guide/building-blocks-for-sustainability-planning-and-climate-action/carbon-management-greenhouse-gas-mitigation/>

Within three years of the implementation start date complete the Plan, (also reflecting joint community-campus components), which will include:

- A target date for achieving carbon neutrality as soon as possible
- A target date by which defined thresholds of resilience will be met
- Interim target dates for meeting milestones that will lead to carbon neutrality and increasing resilience
- Mechanisms and indicators for tracking progress (including those that cut across campus-community boundaries)
- Actions to make carbon neutrality and resilience a part of the curriculum and other educational experiences for all students
- Actions to expand research in carbon neutrality and resilience

Review, revise if necessary, and resubmit the climate action plan not less frequently than every five years