



Yale's Greenhouse Gas Reduction Strategy

...creating a sustainable future

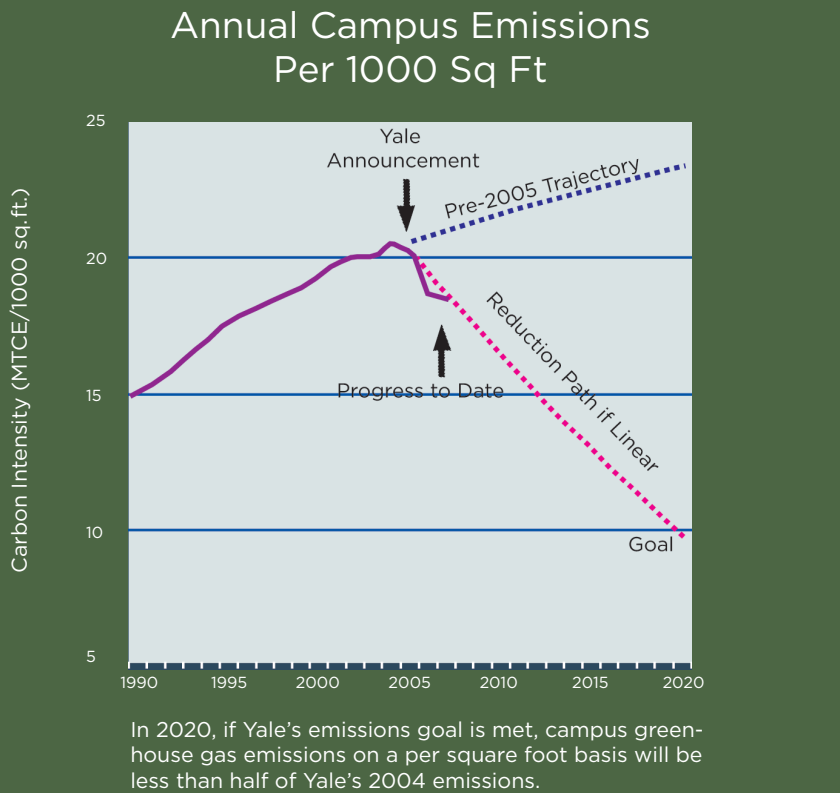
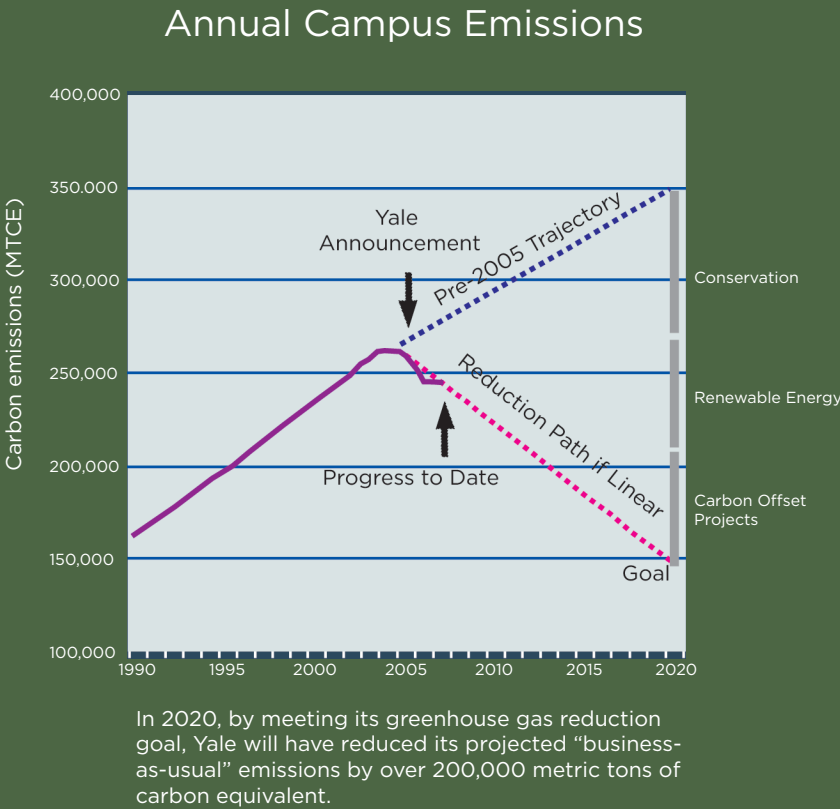
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Yale University has a long tradition of leadership in the consequential societal issues facing each generation. In keeping with this tradition, Yale University is committed to developing and implementing best practices for a sustainable campus. A primary component of Yale’s Sustainability Strategic Framework is a greenhouse gas reduction goal. This goal has guided the development of an aggressive and informed response to perhaps the most challenging issue facing our world today: *global warming*. The challenge facing Yale is the same as the challenge facing the industrialized world: to drastically reduce emissions while also planning for future growth and development. We hope that by openly sharing our continued efforts, including our goal, lessons learned, strategies and results, Yale’s actions will lead to similar commitments to greenhouse gas reductions by other institutions of higher learning nationally and globally.

Yale University is committed to the goal of reducing greenhouse gas emissions to **10% below 1990 levels by the year 2020⁽¹⁾** – a **43% reduction from 2005 levels**. At the same time Yale has plans to expand from the current 13.5M gross square foot campus by nearly 15% by 2020 while bringing old buildings up to modern standards. Yale’s greenhouse gas emissions reflect two on-campus power plants⁽²⁾ and purchased electricity. Our emission standards currently do not reflect transportation or travel though this is under analysis for 2008.

(1) This is consistent with the Climate Change Action Plan adopted by the New England Governors and Eastern Canadian Premiers. By comparison, the Kyoto Protocol prescribes a reduction to 7% 1990 levels by 2012.



Yale’s priority is to achieve greenhouse gas reductions via implementing initiatives on its campus and owned land, with the balance of planned reductions being achieved via partnering with outside entities. Our strategy is organized by energy conservation, renewable and clean energy technology and investments in carbon offsets. Currently it appears that as much as half of all reductions will be achieved on Yale’s campus and land. As new, cleaner technologies emerge in this expanding industry, we hope to increase this percentage significantly.

Energy conservation and alternative energy projects requiring significant capital investment by the University are evaluated on the basis of **“resulting carbon reduction per operating dollar incurred.”** Projects yielding the largest return are undertaken first so that emission reductions can be achieved as quickly as possible.

The Greenhouse Gas Reduction Strategy is ambitious and it impacts all parts of the Yale campus. Meeting our goal will require the active participation of all of Yale’s community, faculty, students, and staff. Current information regarding Yale’s progress can be found at www.yale.edu/sustainability.

Yale’s strategy is to achieve greenhouse gas reductions in the following ways:

STRATEGY	GOAL	ACHIEVED TO DATE
Conservation <i>i.e. existing buildings, more efficient on campus production & distribution of energy</i>	(71,000) MTCE ⁽³⁾	(42,607) MTCE
• Sustainable construction of new buildings	(9,000) MTCE	(932) MTCE
Renewable energy	(60,000) MTCE	(635) MTCE
Direct participation in carbon offset projects	(63,000) MTCE	
Total Reduction by 2020	(203,000) MTCE	(44,174) MTCE [21% complete]
Projected 2020 GHG Emissions if no action taken	350,000 MTCE	
GHG Emissions in 2020	147,000 MTCE	

(2) Yale University operates two power plants, the Central Power Plant, a cogeneration facility that can supply 18 megawatts of electricity, 340,000 pounds per hour of steam and 14,600 tons of chilled water to the Central and Science Campuses; and, the Sterling Power Plant, a thermal energy facility that can supply 350,000 pounds per hour of steam and 19,900 tons of chilled water to the Yale School of Medicine and the Yale-New Haven Hospital.

(3) MTCE = “Metric Tons of Carbon Equivalent”, the international standard of measure of greenhouse gas emissions.

(4) LEED = Leadership in Energy and Environmental Design; CI = Commercial Interior.

Progress To Date

STRATEGY	IMPLEMENTED AND IN PROGRESS	IN DESIGN
Conservation & Community Engagement	<ul style="list-style-type: none"> • Reduced air change rate in labs • Recommissioned HVAC systems in 90 buildings • Occupancy sensors tied to lighting in all residential college common spaces and at 85 buildings total • Programmable thermostats at all “small buildings” not tied to central control system • Window replacement at Calhoun College & Strathcona • Campus-wide set-point adjustments • 10% reduction in energy use [2006 & 2007] in the residential colleges was rewarded with the purchase of <i>10,000 mwh of renewable energy certificates</i> offsetting 2/3 of their electrical energy use for the year • A total of 5000 compact fluorescent bulbs have been distributed to undergraduate students in the residential colleges • More than 2500 students signed an Yale Energy Pledge to reduce energy use • Heat recovery systems installed at some lab buildings 	<ul style="list-style-type: none"> • Students are preparing to reduce energy use by another 5% in the FY’08 • 2000 additional compact fluorescent bulbs will be distributed to students in the residential colleges • A new Sustainability Leaders Program is being developed to target staff and faculty in their work places
Sustainable Design & Construction	<ul style="list-style-type: none"> • At the Medical School two full floor laboratory renovations are complete and achieved a LEED-CI⁽⁴⁾ Gold and Silver rating; two full floor laboratory renovations anticipate Gold ratings • Seven (7) LEED rated buildings completed or in construction; 1 Certified, 2 each of Silver, Gold, & Platinum • Kroon Hall, the new building for the School of Forestry and Environmental Studies, is expected to use 65% less energy than a comparable academic building 	<ul style="list-style-type: none"> • At the Medical School five major renovations are being designed to meet the LEED-CI Gold rating • All new buildings and major renovations are considered for LEED rating with target reductions in energy use of 30% • Adoption of a revised, more stringent Sustainable Building Design and Construction guideline is being considered
Campus Energy Production & Distribution	<ul style="list-style-type: none"> • Increased efficiency of chilled water flow via elimination of previously undetected constriction • Reduction in winter chilled water production • Consolidation of electrical loads optimizing transformer utilization 	<ul style="list-style-type: none"> • Installation of 14.2 MW cogeneration plant at Sterling Power Plant, the Medical Center power plant
Renewable Energy & Alternative Fuels	<ul style="list-style-type: none"> • 250 kilowatt fuel cell • 40 kW photovoltaic installation of Divinity School • Yale Shuttle Fleet running on an ultra low sulphur diesel and 20% biodiesel blend [80,000 gallons] • A 100kW photovoltaic installation at Kroon Hall will provide additional reduction in carbon emissions • Ground source heat pumps are being installed on two buildings currently under construction 	<ul style="list-style-type: none"> • Hybrid, clean fuel and reduced mpg vehicle standard • Thin film photovoltaic array to be installed on campus building • Two types of micro-wind demonstration projects

