Examining universities’ sustainability progress

Author: Mario Fichtner

On behalf of the Sustainability Office at the University of Canterbury, New Zealand
Introduction

Sustainability in universities is beginning to thrive and bring about economic, as well as environmental and social benefits. Three prestigious universities: Stanford, Brown and Yale, as well as other universities, are analysed and their sustainable progress is charted in four ways: Waste reduction, energy and carbon reductions, and their food policies. These universities were chosen not only because they are actively pursuing sustainability but are also are academically renowned. All three universities were placed in the top 86 higher education facilities by the Academic Ranking of World Universities 2010 (Academic Ranking of World Universities 2011), while a recent business-school ranking, performed by the Aspen Institute, ranked Stanford (1st) and Yale in the top 10 (Bloomberg Business Week, 2007).

Stanford University

Stanford is one of many universities making a sustainable change. This sustainable transition began in 1993 and continues strongly today. For ensuring a smooth transition towards a more sustainable university, Stanford now has 13 full-time employees dedicated to sustainability and has created a Department of Sustainability and Energy Management to implement policies on sustainability (The College Sustainability Report Card 2009). Ten sustainability working teams have also been convened to address all the major elements of sustainability. By having this in place, the university has also been able to implement and achieve remarkable results. These achievements are highlighted in numerous policies and changes.

Waste reduction

The University’s initial goal was to increase Stanford’s rate of waste diverted from landfill to 75% (Stanford University 2011). In 2008 alone, the Waste Reduction and Recycling Program diverted more than 14,500 tons of materials from landfills, including:

- 4,758 tons of construction and demolition debris reused or recycled
- 5,872 tons of organic material composted or reused
- 902 tons of glass, metal and plastic recycled
- 2,950 tons of paper recycled
- 202 tons of electronic waste recycled or reused (Stanford University 2011).
Since the diversion scheme came about, Stanford is making great progress. They have increased their landfill diversion rate from 30% in 1994 to 64% in 2008. While also continually improving collection activities, identifying new markets for waste materials and recyclables, and raising awareness so that their philosophy of “reduce, reuse, recycle and compost” becomes a habit (Stanford University 2011).

**Energy savings and carbon reductions**

With the help of the Sustainability Working Group Stanford’s sustainable progress is far reaching. The University’s energy retrofit program has delivered an estimated cumulative savings of over 240 million kilowatt-hours of electricity since it began in 1993—roughly equivalent to 15 months of the university’s current use—and has prevented 72,000 metric tons of carbon dioxide equivalent emissions (Stanford University 2011).

Stanford has also completed a long-term campus greenhouse gas (GHG) emissions and energy reduction model. Efficiency measures include full energy metering for all buildings, use of efficient gas-fired cogeneration for all the university's energy, and solar photovoltaic panels on a number of campus buildings, including the president's house (The College Sustainability Report Card 2009).

A direct example of their energy saving is the university’s chemistry building. By making energy saving changes this led to a 35% drop in electricity use, 43% cut in steam use and 62% fall in chilled water use. The project also reduced the building’s carbon dioxide emissions by 762 metric tons per year and cut its energy costs by 46% in the first 12 months (Stanford University 2011).

Overall Stanford University’s energy saving program has been a major success. In 2008 Stanford saved an estimated 71,800 million British thermal units (Btu) of energy (enough to power more than 680 homes for one year), air emissions were reduced (including carbon dioxide and methane) by 5,075 tons of carbon dioxide equivalent, waterborne waste by 19 tons, while 22,564 trees were saved helping eliminate the need for 832 tons of iron ore, coal and limestone (Stanford University 2011).
Food Policies

Stanford takes pride in providing fresh and healthy food to its students and staff. Through their purchasing priorities the university supports community-based farms and businesses. This helps prevent excessive use of pesticides, antibiotics and hormones, reduce energy and water use and waste runoff, and provides fresh, ecologically sound and healthy meals (Stanford University 2010B).

Stanford’s sustainability procurement policies have achieved remarkable results to date:

- About 40% of Stanford Dining produce is organic or regionally grown (within 400 kilometres of the university).
- Stanford Dining’s partnership with the Agriculture and Land-Based Training Association (ALBA Organics) helps support about 30 small, organic farmers to grow organic produce for Stanford Dining.
- The campus Community Farm and over 10 community herb-and-vegetable gardens provide organic herbs and produce to dining halls and row houses. The Farm Educator on campus teaches students hands-on organic farming techniques in these spaces.
- Stanford Dining held a Sustainable Seafood Week in November 2008 which showcased sustainable seafood and brought experts into the dining halls to educate students about the state of the oceans and fisheries. In 2008, 74% of Stanford Dining’s seafood was in the Best or Good Category of the Seafood Watch Card and in the near future the goal is 100%.
- The student-run Stanford Produce Stand provides local and organic produce, some of which is grown on campus, to the community every Friday.
- In 2008, Stanford composted just over 1300 tons of food waste. All dining halls and row houses and at least 8 cafes compost food waste on campus.
- Roughly 37,854 litres of waste oil from dining halls and cafés is converted to biodiesel fuel each year.
- The university encourages suppliers to offer environmentally-friendly alternatives, where available, at a competitive price.
- Stanford also serves grass-fed local beef, cage-free eggs, and milk from a local dairy (Sustainable Stanford 2011).
Stanford ties education and sustainable food procurement seamlessly. Their community farm on campus encourages students and community members to learn about sustainable agriculture practices through classes and workshops, while produce from the gardens and farm is served in the dining halls and at the produce stand (The Collage Report Card 2009). In keeping with Stanford's commitment to the environment, the university encourages departments to adhere to green purchasing practices whenever possible, taking into account the environmental impact, including but not limited to the financial and environmental cost of manufacturing, transporting and disposing of the product (Stanford University 2007). As Stanford University (2011, P. 1) posit “minimizing waste contributes to a more sustainable Stanford in many ways. By using less, reusing more, recycling and composting, we can preserve land, save energy, conserve water, reduce greenhouse gas emissions and preserve natural resources”.

Yale University

Yale University, which was founded in 1701, is transitioning to become more sustainable through a number of methods. The University is also currently rated the best law school in the USA (Burnsed 2011).

Waste reduction

Currently, Yale University generates over 6,000 tons of solid waste annually (Yale Office of Sustainability 2011). It is endeavouring to reduce the amount of material it discards through source reduction, recycling, and repurposing. At present, mixed paper, cans, bottles, electronics, cardboard, and yard wastes are recycled, while office furniture and supplies are repurposed through a University Surplus program (Yale Office of Sustainability 2011). Additionally the university also offers students who are vacating their rooms to donate unwanted items. This annual ‘spring salvage’ ranges from clothes and furniture to school supplies and sporting equipment, for re-use. In 2008, this resulted in 60 tons of goods going to community groups rather than landfill, these combined efforts reduced Yale’s solid waste stream by approximately 25% (Yale Office of Sustainability 2011).
Energy savings and carbon reductions

The University has a specific energy department called ‘The Yale Climate and Energy Institute’. This institute promotes a multidisciplinary approach to learning, research, and the development of strategies that help societies contribute to solutions and adapt to the challenges of local and global climatic changes (Yale Office of Sustainability 2011B).

Yale University has recently signed up to cut its greenhouse gas emissions. In 2005, Yale University committed to reducing it by 43% by 2020 (figure 1) (Yale Office of Sustainability 2011).

![Greenhouse Gas Emissions](image)

**Figure 1.** Yale University estimated annual GHG output (Yale Office of Sustainability 2011C).

To achieve this ambitious target the University will increase the efficiency of on-campus energy production and distribution (Figure 2), implement a wide variety of energy conservation initiatives, test emerging renewable energy technologies, and require a ‘Leadership in Energy and Environmental Design’ (LEED) Gold minimum standard for new construction and large renovations (Yale Office of Sustainability 2011C).
Currently Yale emits large amounts of carbon dioxide (MTCO2e) each year. Roughly 240,000 metric tons of MTCO2e is emitted through their heating, cooling, and electricity demands. This provides utility services to over 11 million square feet of facilities, with varying energy needs from research laboratories and academic facilities to administrative and residential buildings (Yale Office of Sustainability 2011C). As reliance upon technology increases, so does the demand for electricity.

The University continues to be at the forefront of climate change research. Yale is home to faculty, researchers, and research centres that are seeking to augment their understanding of climate change and the actions it will require (Yale Office of Sustainability 2011C). This comprehensive scope of climate action, combining local implementation and the broader spectrum of research, will continue to make Yale a leader in the field of climate change among institutions of higher education (Yale Office of Sustainability, 2011E).

Yale University aim to do this through a number of steps:

- Make progress toward the University goal of reducing GHG emissions to 10% below 1990 levels by 2020, a 43% reduction from 2005 levels.
- Based on the 2005 benchmark, reduce energy consumption 15% by 2013.
- Increase the supply of energy from on-campus and off-campus renewable sources, with a target of Yale obtaining 25% of its energy from such sources by 2020; the

**Figure 2.** Yale University energy efficiency (Yale Office of Sustainability 2011D).
implementation of on-campus renewable energy projects would result in an annual reduction of 10,000 metric tons of CO2e emitted.

- Reduce workstation electricity consumption by 40% by June 2013.
- The reduction is the equivalent to approximately 2.5 million kW per year or 6.6 million pounds of CO2 (Yale Office of Sustainability, 2011 E).

The University also consumes large amounts of water annually. Yale’s campus currently consumes over 2,271,247,068 litres of potable water annually with the largest demands being for power plant cooling towers, sanitation, residences, laboratories, research, food preparation and serving, and irrigation (Yale Office of Sustainability, 2011 E). Yale, however has a strategy to reduce their enormous water usage. By focusing on the water inputs and internal uses, Yale can reduce its annual quantity used while helping provide a model for efficient use by developing a strategy for sustainable water use (Yale Office of Sustainability, 2011 E).

Food Policies

Yale provides strict guidelines for all aspects of food on its campus. Yale believe that each type of food product must be evaluated separately, in this context, sustainable food at the institutional scale requires significant effort to meet the demand for quality, quantity, regional, and seasonal limitations (Yale Office of Sustainability, 2010). Sourcing food has social, environmental and financial implications. This includes how food is grown or animals are raised, processed, transported, and prepared. Yale has the opportunity to advance sustainable sourcing in terms of the following elements:

- To the fullest extent possible, ensure that seafood purchased in bulk for use in Dining Halls meets sustainably harvested seafood criteria.
- Reduce the pre-consumer and post-consumer solid waste produced in each dining hall by 30% below 2009 levels by June 30, 2013.
- Increase use of food produced within 300 miles of the Yale campus.
Yale Dining

To be qualified as sustainable, food served in the Yale Dining Halls must meet at least one of four following criteria: local, eco-sensitive, humane, fair. Approximately 40% of the food currently served in the dining halls meets these standards. Over the next two years, this will shift to 45%. Yale Dining is also developing and implementing strategies to diminish the impact of how food is delivered to campus and then prepared, as well as minimizing waste from the kitchens and dining halls. (Yale Office of Sustainability 2011).

Yale is thriving in all aspects of sustainability and the results are beginning to show with massive financial and public relation benefits being associated with their shift. Yale has an aggressive sustainability strategy plan which can be viewed on their website (http://sustainability.yale.edu/sites/default/files/StrategicPlan%20Final_Web.pdf)
Brown university

Brown university in the USA has pledged to become more sustainable. On January 28, 2010, President Ruth Simmons signed the Sustainable Campus Charter. Signatories, of the Sustainable Campus Charter, become partners of the International Sustainable Campus Network, whose purpose, according to the network charter, is to enhance universities' commitments to construct, redesign, and organise their campuses in an exemplary and sustainable way and to include the experiences in their education (Brown University 2011). Brown University is also monitoring their sustainable change through their annual sustainability report. The aforementioned document defines the way in which Brown University has taken measures to promote and sustain environmental projects, change and behaviour on campus. Each report includes information on University commitments, energy reduction, green buildings, waste reduction and recycling efforts, student groups and projects, transportation, dining, graphic services, purchasing and green cleaning (Brown University 2011).

Waste reduction

Recycling and waste reduction is a big part of Brown. 2008 saw the elimination of plastic bags and the introduction cloth grocery bags which were sold at all retail locations. In a further effort to reduce plastic waste, an incentive to use reusable mugs, was launched where coffee and tea is discounted $1.00 at all retail stores on campus (Brown University 2010A). Brown has further reduced their plastic use. Their current to-go food containers are comprised of cornstarch, bamboo, and sugar, which are predicted to biodegrade (in the right conditions) in as little as two years (Brown University 2010A). The University’s commitment to waste reduction (figure 3) is evident through their increased recycling trends.

Through switching to tray free dining water, the university now saves over half a million litres of water a year, and tray-less dining has seen food waste reduced approximately as much as 25% (Brown University 2011). Furthermore 66% (81,818 kilograms) of pre-consumer food scraps and 100% of post-consumer food scraps is transported to a local livestock farmer to be used as nutritious food for local livestock (Brown University 2010A). Through these cost cutting measures, in 2010 alone the university avoided $35,244 in landfill
charges and received $32,374 in rebates from recycling, additionally saving $140,000 by using a single hauler for waste and recycling (Brown University 2010 B).

![Brown University 10 Year Solid Waste Trends and Percentage of Waste Recycled](image)

**Figure 4.** Brown University 10 year solid waste trend (Brown university 2010A).

**Energy savings and carbon reductions**

The university facility has called for Brown’s Greenhouse Gas Reduction goals to be achieved. They call for a 42% reduction below 2007 levels (equivalent to 15% below 1990 levels) by 2020. For the past three years Brown has dramatically exceeded its interim goals of 4% per year reduction in GHG emissions. By 2010 Brown had reduced its carbon footprint by 57,519 Metric Tons of Carbon Dioxide Equivalent, or 21.2% below 2007 levels. These energy and water savings have been achieved through retro-commissioning, lighting, heat recovery, free cooling and have has resulted in the university saving approximately $1,000,000 since 2008 (Brown University 2010B).
**Food policies**

Brown University is committed to sourcing local produce, fair-trade products and sustainably managed seafood. The University works closely with locals, with more than 30 farms sourcing various produce for Brown's residential dining, retail and catering needs (Brown Dining 2011). The University also has a student run and managed garden, one which educates and allows students to grow and harvest their own vegetables and fruit.

The University’s excess food is utilised in a number of ways. Surplus edible food is donated to the local community, in 2009-2010 alone over 1.5 tons was donated to 20 various food banks, shelters, organizations, and community groups (Brown University 2010A). Some non-edible waste remains on campus. Through a student lead initiative SCRAP (Student Composting to Rejuvenate Agriculture around Providence), the group plans to install five compost bins at Brown by 2012 to compliment the three existing bins around campus, further reducing Brown’s carbon footprint while helping save the university money on transportation costs (Brown University Dining Services 2011).

**Other Universities**

Other academically prestigious universities are also making sustainable change. In 2009, Harvard University, through the simple change of installing energy-efficient lighting in 10 parking garages, saved $400,000 annually for the university. Harvard has also established a ‘Green Loan Fund’. This fund is a $12 million revolving loan fund that provides up-front capital for projects that reduce Harvard’s environmental impact. Projects pay back the loan from their savings within five years (Sustainability at Harvard 2011). Through this fund, the implementation and installation of sustainable and energy efficient technologies has been achieved. The Green Campus Loan Fund total project costs have been approximately $5.85 million and while the annual cost savings is roughly $2.75 million, a major economic benefit was a total cost avoidance to date, of approximately $16.71 million (Sustainable Endowments Institute N.D.).

Since 2005 the Massachusetts Institute of Technology has committed over $4 million in new energy conservation measures focused on lighting retrofits, steam strap system renewal,
heating and air conditioning, and other measures (Massachusetts Institute of Technology 2010). These sustainable changes are forecasted to save over $3 million annually for the university helping provide additional strategic capital to reinvest in additional projects, while also reducing greenhouse gas emissions by over 22 million pounds annually (Massachusetts Institute of Technology 2010).

Loyola Marymount University (LMU), in the United States of America, has the largest solar roof system of any university in the world. By utilising on site solar radiation into its existing energy mix it has reduced purchase costs while reducing operational expenses. As the National Association of Independent Colleges and Universities (2011, p.1) notes, “additionally to generating electricity, this solar system provides thermal insulation and protects the roof from weather and UV radiation, resulting in decreased heating and cooling energy costs and extended roof life. On average, the solar roof system saves the university more than $150,000 a year.”

**Conclusion**

Academically prestigious universities have shown that through simple planning and the implementations of economically viable sustainability investments, a cornucopia of positive benefits has resulted. These ameliorations include improving the respective universities images, cost cutting, and long term stability through reduced environmental impact. These changes have also been achieved through assistance from sustainable research conducted at the explored universities. Measures in which sustainable change has been achieved are far reaching, highlighting the broad nature in which sustainability can be effectively and efficiently implemented at universities regardless of location, budget or endowment. Taking sustainably procured food as an example, universities have shown that through purchasing local and socially responsible food products, the local economy as well as maintaining resource levels, such as fish stocks, remains stable.
References:


