

Climate & Energy

One of the most pressing global challenges that Wellesley students will face in the twenty-first century is global climate change. The college believes that addressing climate change is a social and moral imperative that intersects with issues that are of pressing concern to the Wellesley College community, including issues of international equity, international governance, human rights, environmental protection, and economic development.¹ Wellesley has long educated its students to be leaders on such issues. The college acknowledges that to fully address climate change requires changing campus operations by reducing consumption of fossil fuels, curbing greenhouse gas emissions, and improving energy efficiency. Making those changes requires that the college establish goals for reducing greenhouse gas emissions, improving energy efficiency, and promoting energy conservation that will guide institutional decision-making at all levels.²

Main Issues/Primary Goals

1. Reduce greenhouse gas emissions from on-campus activities, including operations of the central energy plant, transportation, and other operations, from 2010 levels by 37% by 2026 and 44% by 2036.
2. Develop an energy masterplan for the campus that reflects the college's commitment to environmental sustainability, including long-term plans for achieving carbon neutrality.
3. Engage the community in a sustained effort to conserve energy on campus.

How We're Doing

Wellesley College has a history of taking substantive steps to promote energy efficiency and reduce environmental impacts.

The college's most significant effort to advance energy efficiency and environmental stewardship occurred in 1994, when the college built a \$7.5 million on-campus co-generation facility. Compared to a traditional power plant, which operated at 30% efficiency, the co-generation facility was designed to operate at 85+% efficiency by generating electricity and capturing waste heat for heating, cooling, and other uses. For more than 20 years, the co-generation facility has performed at or near expectations. Between 1994 and 2014, it is estimated that the co-generation facility resulted in a total savings of \$37.2 million in utility costs and reduced annual GHG emissions by approximately 25% (compared to purchasing electricity from the grid), while providing the college with reliable electricity, heating, and cooling generation.³

The college has also made strides in reducing energy consumption. Between 2003 and 2014, the college reduced electricity consumption by 19%, with corresponding reductions in greenhouse gas

¹ Wellesley College, "Wellesley College Statement on Divestment."

² Advisory Committee on Environmental Sustainability to Academic Council, "Proposed Resolution on Greenhouse Gas Emissions & Climate Change."

³ Energy General, "Wellesley College Central Utility Plant: Cogeneration Analysis, Efficiency & Recommissioning Options, Energy, CO2 & CUP Planning, 2025, 2035 & 2050."

emissions.⁴ Since 2012, the college has purchased 5% green electricity from the municipal light district.⁵ In 2014, it adopted green building standards, which prioritize energy conservation and efficiency in new buildings and major renovations.⁶ The college has also piloted a \$500,000 Green Revolving Fund since 2014.⁷ To date, that fund has supported improved insulation at the central energy plant and energy efficient lighting projects in the Distribution Center, Dower, Motor Pool, Central Energy Plant, and Jewett auditorium. These projects cost \$179,000, have an average payback of 4.7 years, and will result in an annual reduction of 265 metric tons of CO₂.⁸

Despite these commitments, there are significant opportunities for the college to advance its commitment to energy efficiency and sustainability. The college has limited and/or outdated metering of utilities (whether at the scale of buildings or at the central energy plant) and none of that information is easily available to the facilities staff or the college community to support operations, behavioral change, or academic research on a regular basis. The college's central energy plant is facing increasing reliability issues and maintenance costs as it approaches the end of its useful life. As of January 2016, one of the five generators in the plant is off-line and beyond cost-effective repair; two additional generators require major maintenance.⁹ Investments in the co-generation plant could yield cost savings, increases in energy efficiency, and reductions in greenhouse gas emissions. And the college faces significant challenges in addressing deferred maintenance in buildings and infrastructure that are not scheduled for major renovations under the campus renewal plan. Addressing those deferred maintenance issues could also yield costs savings, increases in energy efficiency, and reductions in greenhouse gas emissions.¹⁰

Related Policy Issues

Since the college owns and operates a power plant, it is likely that the college will have to reduce greenhouse gas emissions to meet state and/or federal regulations in the future. The state and federal government have recently begun requiring the college to report greenhouse gas emissions annually. The state of Massachusetts adopted long-term greenhouse gas reductions goals in 2008 to achieve a 20% reduction below 1990 levels by 2020 and an 80% reduction by 2050.¹¹ The federal government finalized the Clean Power Plan in 2015. It mandates that the state of Massachusetts reduce greenhouse gas emissions from the electric power sector by 18% below a 2012 baseline by 2030.¹² In addition to reporting requirements and pending regulations on greenhouse gas emissions, the state and federal government also provide numerous incentives that could support projects outlined in this sector. Such incentives include tax-credits for renewable energy projections, co-generation facilities, microgrid

⁴ Willoughby and Bort, "Wellesley College Sustainability Progress Report 2014," 13.

⁵ US EPA, "Town of Wellesley Designated First Green Power Partner Community in Massachusetts."

⁶ Advisory Committee on Environmental Sustainability, "Wellesley College Green Building Standards."

⁷ Office of Sustainability, Wellesley College, "Green Revolving Fund."

⁸ Sustainable Endowments Institute, "Green Revolving Investment Tracking System (GRITS)."

⁹ Energy General, "Wellesley College Central Utility Plant: Cogeneration Analysis, Efficiency & Recommissioning Options, Energy, CO₂ & CUP Planning, 2025, 2035 & 2050."

¹⁰ Ibid.; Competitive Energy Services, "Wellesley College: Climate Action Plan Investigative Report (Draft)."

¹¹ Competitive Energy Services, "Wellesley College: Climate Action Plan Investigative Report (Draft)."

¹² US EPA, "Clean Power Plan: State at a Glance - Massachusetts."

projects, etc. Taking advantage of some of these incentives may require partnership with private developers and/or the Town of Wellesley.¹³

Recommended Strategies

Phase 1 = Within 2 years of plan being adopted

Phase 2 = Within 5 years of plan being adopted

Phase 3 = Within 10 years of plan being adopted

*FPM = Office of Facilities and Planning

** SUST = Office of Sustainability

*** ES = Environmental Studies Program

Issue	Strategy	Responsible Party	Status	Phase
CE1.1	Reduce Wellesley's scope 1 and scope 2 greenhouse gas emissions by 37% by 2026 and 44% by 2036.	FPM, Office of Sustainability, SUST, College		1, 2, 3

There are a variety of options that the college can pursue to reduce greenhouse gas emissions from on-campus activities (scope 1) and purchases of electricity (scope 2) including improvements to the central energy plant, behavioral change, improvements to new, existing, and to-be renovated buildings, and expansion of renewable energy generation. By pursuing such projects systematically, the college can affect substantial reductions in greenhouse gas emissions, lower energy consumption on campus, and reduce operating costs.

CE1.2	Update the college's greenhouse gas inventory.	ES, Office of Sustainability, FPM	Planned	1
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The capstone Environmental Studies course, ES300, undertook comprehensive greenhouse gas inventory (including scope 1, 2, and 3 emissions) in 2002 and 2008. Producing an updated inventory during the 2015-16 academic year would inform a long-term commitment to reducing institutional greenhouse gas emissions. Such an inventory is planned for spring 2015.

CE1.3	Review of the Central Energy Plant and development of a comprehensive energy plan for campus, including an	ES, Office of Sustainability, FPM		1
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¹³ DSIRE, "Database of State Incentives for Renewables & Efficiency, Massachusetts."

	assessment of long-term strategies for achieving carbon neutrality.			
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A comprehensive energy master plan for campus would allow the college to assess opportunities for improving the performance at the central energy plant, to ensure that infrastructure is best able to meet the demands of existing and upcoming campus renovations, and to assess opportunities for improving efficiency and reducing operating costs campuswide. Such an energy plan is necessary to reach the proposed greenhouse gas reduction goals. In advancing those goals, such an energy plan should also give attention to potential strategies for achieving carbon neutrality in the long term.

CE1.4	Review how energy management and efficiency is managed and staffed in the Office of Facilities Planning and Management.	ES, Office of Sustainability, FPM		1
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Realizing the improvements in energy efficiency, reductions in greenhouse gas emissions, and related savings in operational expenses requires reviewing how energy management and efficiency projects are staffed. Many institutions have hired energy efficiency specialists to implement such projects. Wellesley should consider creating such a position, or fulfilling such a position through existing staff positions, in the Office of Facilities and Planning.

CE1.5	Install solar arrays, and other renewable energy technologies. Sell RECs to finance such projects.	Office of Sustainability, FPM, SUST	In Planning	1, 2, 3
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The college worked with three outside firms to assess the potential for roof-top solar arrays on campus buildings during 2014 and 2015, considering both purchased and power purchase agreements. It is estimated that roof-top solar arrays could generate up to 1.25 million kWh a year, or approximately 5% of the college's energy needs.

It is important to note that the fiscal return and investment in solar on campus are somewhat unique. As a non-profit institution, the college is unable to take advantage of the 30% federal tax credit in place through 2020. The college also enjoys a relatively low-cost to generate electricity through the on-campus co-generation plant.

To ensure such projects are cost-efficient (whether the college purchases the systems or enters into a power-purchase agreement), the college should sell Solar Renewable Electricity Credits or avail itself of other similar market-based incentives. During the time the college sells SRECs, it cannot claim the greenhouse gas emissions reductions associated with these projects. The length of time that the college sells SRECs or allows a third party to sell SRECs on its behalf (in the case of a leased system) should be

determined on a case-by-case basis, but should generally not be more than one-third the anticipated life of the installation.

CE1.6	Expand energy metering on campus, such that energy consumption is monitored on at least a building by building basis.	FPM, Office of Sustainability		1, 2, 3
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Expanding metering of electricity, heat, steam, and other utilities in existing buildings on campus will allow for better facilities management, support behavioral change, and support long-term decision making. 33% of campus square footage should be metered within 2 years (including the central energy plant), 80% within 5 years, and 95% within ten years.

CE1.7	Deploy a publicly accessible campus dashboard.	FPM, Office of Sustainability		1, 2, 3
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Data on energy and utility consumption on campus can support behavioral change, sustainability planning, student projects, and scholarly research. Other schools have deployed such dashboards, including [Smith](#), [Colgate](#), and [U-Mass Amherst](#). Such a dashboard would draw on the metering infrastructure outlined in the previous strategy and be accessible both at kiosks on campus and via the web. Deployment of the dashboard should match the expansion of metering on campus in CE1.6.

CE1.8	Expand the Green Revolving Fund.	FPM, Office of Sustainability, Office of Finance and Budget		1, 2, 3
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Since 2014, the college has piloted a \$500,000 Green Revolving Fund. To accomplish its long-term goals for greenhouse gas reductions, several steps are necessary: the size of the Green Revolving Fund needs to be increased to \$2,000,000; the scope of GRF projects should be revisited (and the payback period extended from 7 to 10 years); accounting procedures related to the GRF projects need to be formalized; and management of these projects needs to be consolidated within the Office of Facilities and Management.

CE1.9	Undertake a behavioral campaign to promote energy conservation on campus.	Office of Sustainability, SUST, FPM, College		1, 2, 3
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The college projects that it can reduce greenhouse gas emissions on campus by .5% each year through behavioral changes, including outreach to the campus community, encouraging conservation, mandating

high-efficiency lighting, incentivizing the removal of personal refrigerators and heaters, and working better with building occupants to improve building management (including set points for temperature and more energy efficient settings for heating and cooling in off hours or days).

Financial Implications

While an investment in energy efficiency and infrastructure improvements on this scale is not currently included in the college's capital budget, such investments could be financed through reductions in operating costs, cost avoidance, and additional revenue streams (in the case of the central energy plant) and generate long-term financial savings for the college. For instance, improvements to the central energy plant are estimated to cost between \$10 and \$20 million (based on preliminary analyses) and a fully-funded Green Revolving Fund would be a commitment of \$2 million. If the college pursued all available strategies for improving energy use and reducing greenhouse gas emissions, preliminary estimates indicate the college could realize cumulative operating cost savings of \$16 - \$34 million between 2016 and 2026 and a cumulative \$37 - \$73 million between 2016 and 2036. Some additional expenses necessary to undertake such a large-scale energy program, such as metering, a campus dashboard, and changes in staffing necessary are not included in these estimates. If carefully planned, Wellesley has the opportunity to both reduce both its impact on the environment in a manner that will also benefit the college fiscally.

Climate Implications

The greenhouse gas reductions recommended in this sustainability plan would represent a substantial reduction in the college's greenhouse gas emissions through 2036, on top of the approximately 25% reduction already achieved by running the co-generation plant since 1994. But to address climate change as fully as possible, further reductions are likely to be necessary in the future. The greenhouse gas reduction commitments outlined here will be revisited at least every five years and revised as necessary. As part of this sustainability plan, the college will also begin planning for a long-term commitment to achieving carbon neutrality.

Potential Student Involvement

Student involvement will be central to advancing these energy conservation and greenhouse gas reduction goals. Students have the opportunity to help inventory the college's greenhouse gas emissions through the Environmental Studies Capstone course. Students will be involved in affecting behavioral change through internships with the Office of Sustainability and program such as the Eco-Reps in the dormitories. Students will be able to undertake research projects to assess the effectiveness of different campaigns or other mitigation strategies using data available from the campus dashboard.

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