

Lamont-Doherty Earth Observatory Energy Efficiency Initiative Workshop for Sustainable Development, Fall 2012



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Background

A team of Barnard and Columbia undergraduate students in the fall 2012 course, EESC BC 3300, Workshop in Sustainable Development, led by professor Martin Stute, studied energy consumption on the Lamont-Doherty campus. Based on their analysis, they made several recommendations for improving Lamont's energy performance, among them, switching to more energy-efficiency light bulbs, installing additional motion-detection sensors, converting to "cool" or "white" roofs, installing a solar farm, and changing behavior through targeted posters and an energy efficiency contest among buildings. The main findings and recommendations are summarized below:

Executive Summary

Identify Obstacles to Energy Efficiency. By analyzing Lamont Doherty's Energy Star Portfolio, observing the campus facilities during site visits, and conducting outside research over the course of the semester, we have been able to identify several key barriers to efficient energy consumption. In addition, we have worked to understand Lamont's energy use in the large scope by comparing it to similar institutions.

- Energy Star Portfolio- Based on energy star ratings for each building, we found out Lamont has been doing relatively well on energy use for an enterprise of its size. However, there are still certain buildings that have increased in energy consumption over the past years and should be further examined. Also by comparing Lamont's usage to those of similar institutions, we were able to understand the monetary benefits of on-campus energy and other sustainability tools to these outside institutions and from there, suggest ways in which Lamont may also implement these measures.
- Comparison to Similar Institutions- Relevant institutions were selected based on similarities in climatological region, presence of high-tech laboratories, and availability in data included the following: Black Rock Forest in New York, the Pennsylvania Department of Environmental Protection, Yale University Wet Labs, and the Woods Hole Research Center in Massachusetts were selected for study based on similarity in region.

Near Term Solutions. After understanding Lamont campus' energy consumption and observing the building for specific needs up close, we suggest that the institute install the following devices based on urgency, ease of installation, and cost:

- Light Bulbs- Upgrading light bulbs to T5 light bulbs due to greater lifespan and brightness.
- Motion-Activated Sensors- Installing sensors will reduce electricity use from lights that have been unnecessarily left on. For Lamont, we have suggested installing the sensors in the Oceanography building and away from lab spaces.
- Cool Roofs- By painting the roofs of some buildings white, Lamont can save greatly on HVAC costs
- Window insulation- Installing double-pane windows such as iWindows will reduce the costs of cooling and heating buildings.

Principal Action Items. While the tools above may provide a quick and low-cost solution to reduce campus energy consumption, an even greater reduction in energy use would be possible should additional resources become available. The following long-term measures have been suggested based on greatest return on investment:

- Ground Source Heat Pump- Installing a hybrid, vertical loop ground source heat pump will decrease electricity lost during transmission, dramatically decreasing energy costs over time
- Solar Farm- Through comparing amount of carbon dioxide prevented and the amount created through the elimination of forest trees, we have found that the installation of a solar farm on Lamont campus is both environmentally and economically efficient.

Igniting Behavioral Change. Implementing energy-saving mechanisms must be implemented with conservation efforts to achieve significant results. Motivating and educating campus faculty to adopt energy-saving practices is the easiest and quickest way to reduce energy costs

- Poster Campaign- A campus-wide postering campaign will encourage Lamont members to conserve energy on a day-to-day basis.
- Battle of the Labs Energy Challenge- An energy challenge between each department will encourage campus members to conserve energy while bringing together the community through friendly competition.