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Building a Green Dorm: How Colleges and Universities Across America have Embraced Sustainable Communal Living

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Abstract

Building a dorm is hard work. Building a green, sustainable dorm is doubly so. With their extensive lighting, appliances, heating and cooling needs, fans, and laundry machines, traditional college residence halls are notorious for their large energy footprints. Particularly for colleges such as Gettysburg where dorm living is mandatory for some or all four years, the environmental impact of residence halls is particularly large. As leaders with long histories of inspiring change, colleges and universities in the United States have an obligation to promote sustainable practices. Gettysburg College has announced that in the next few years, it is planning to build a new freshman dorm. Looking towards the example of other institutions that have already started down the path towards sustainable living, such as Pitzer College, Vanderbilt, Rice University, and the College of the Atlantic, will best help Gettysburg create its own environmentally friendly residence hall.

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Disciplines

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Comments

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Building a dorm is hard work. Building a green, sustainable dorm is doubly so. It requires, among other things, careful, conscientious planning and research, creativity, knowledge of environmental complexities, and extensive cooperation and support. The rewards, however, are unmistakable. These sustainable buildings are kinder to the environment, as they emit fewer pollutants, have a reduced waste output volume, and use fewer natural resources. In addition to these many environmental benefits, sustainable dorm buildings also act as environmental mascots for the colleges they reside in. They are big selling points for prospective college students interested in sustainability. They also demonstrate concretely the steps that a particular college is taking to be more sustainable. Colleges can then capitalize on this increased visibility to advance their sustainability pursuits.

With their extensive lighting, appliances, heating and cooling needs, fans, and laundry machines, traditional college residence halls are notorious for their large energy footprints. Particularly for colleges such as Gettysburg where dorm living is mandatory for some or all four years, the environmental impact of residence halls is particularly large. As leaders with long histories of inspiring change, colleges and universities in the United States have an obligation to promote sustainable practices. As identified by the 2008 U.S. Green Building Council's Green Campus Campaign, a crucial part of a college's commitment to acting as a global leader in the sustainability movement is embracing the living laboratory that is its own residence halls (Humblet et al.). Gettysburg College has announced that in the next few years, it is planning to build a new freshman dorm. Given the college's somewhat weak track record in promoting sustainable practices, it seems like a fortuitous moment to propose ideas for making the dorm a green building. As is often the case, the best way to understand such a complicated undertaking as building a green dorm is to look to the successful examples provided by other institutions.

Located in Claremont, California, Pitzer College is a small liberal arts and sciences college with a student body of approximately one thousand. For this college, sustainable living and sustainably built dorm buildings are a cornerstone of residence life ("Sustainable Living"). The college made its first foray into the world of sustainable residence halls in 2003 after it had been determined that it would be more cost-effective to completely replace, rather than renovate, the college's outdated residence buildings (Guan). The residence halls boast more than forty features that target sustainability. In terms of energy efficiency, the buildings feature solar panels, and one hundred percent of the electrical energy used is offset with wind energy certificates. Heating and cooling are provided by high-efficiency chillers, boilers, and pumps. The buildings also take advantage of natural vegetation. They incorporate green roofs that feature vegetative coverage that provides insulation. There are also "living walls" made of greenery that provide beauty in addition to absorbing rainwater, providing insulation, creating natural habitats, and providing natural stress relief for students. Furthermore, drought-resistant forms of vegetation including cacti and succulents that minimize water used in landscaping are planted around the buildings ("Sustainable Living").

Regarding water management, the residence halls use a graywater system that collects and treats water from showers and sinks, effectively recycling it for reuse in irrigating the surrounding landscape. Within the dorm bathrooms, low-flow shower heads, faucets, and toilets are used. Buildings also feature storm water retention basins that sequester rain runoff and allow it to gradually percolate into the aquifer. Sidewalks are constructed with porous concrete, which offers numerous environmental benefits ("Sustainable Living"). It allows rainwater to move though the concrete and into the soil, helping prevent drought and maintain the integrity of local water systems. Additionally, it prevents polluted water from entering into the local water systems

through rainwater. Finally, it can help prevent the heat island effect, which results when traditional concrete collects, holds, and releases excessive amounts of heat derived from the sun, causing local temperatures to rise ("Pervious Concrete Pavement Environmental Benefits").

The buildings themselves are constructed using recycled local materials, including carpeting, insulation, concrete, and structural steel. Additionally, low-emitting adhesives, sealants, paints, and carpets were used when the buildings were being constructed to reduce the amount of volatile organic compounds released into the atmosphere ("Sustainable Living"). The college also indicated its commitment to managing construction waste in environmentally friendly ways (Guan). In their completed forms, the halls feature sleek, modern designs. Moreover, the commonality of sustainability has been credited with creating close-knit college communities dedicated to environmental causes (Guan).

Another university that has taken great strides to advance its sustainability by constructing green dorm buildings is Vanderbilt. Situated in Nashville, Tennessee, Vanderbilt University is a private research university with an undergraduate student population exceeding six thousand ("Quick Facts"). The campus' sustainability efforts are headed by SustainVU, which was created in 2007 in order to consolidate cross-campus sustainability efforts ("History"). According to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Design Rating System, the university currently has twenty-one buildings, including residence halls, that meet the design, construction, and operation sustainability requirements for the LEED certification ("Green Building").

Many of the university's current dorm buildings were recently built and feature historically-derived architectural features. In building the residence halls, Vanderbilt strove to use local manufacturers to provide building materials. The university was also conscious of using

recycled materials that would be long-lasting and durable ("Living in a 'Green' Residence Hall."). They reduced building energy usage by approximately twenty percent by implementing highly energy-efficient mechanical systems. They maximized natural temperature controls and shading by using specialized roofing, paving, and strategic tree plantings. These measures have reduced the overall amount of heat the dorm buildings absorb and then re-emit into the environment, thereby lessening the heat island effect.

Inside, the dorm buildings feature bamboo floorings, a more environmentally friendly alternative to hardwood. As a building material, bamboo is preferable due to the fact that it grows exceptionally fast, requires minimal care, releases roughly thirty-five percent more oxygen into the air than a comparable collection of trees, and matures within a span of seven years, thereby allowing for quick replanting and helping to minimize the harmful effects of soil erosion ("Is Bamboo Flooring Better for the Planet Than Traditional Hardwood?"). The halls also contain low-flow fixtures that help minimize water use, paperless hand drying stations, and energy star fridges, microwaves, dishwashers, dryers, and washers. Vanderbilt also uses pervious forms of pavement that promote the re-charging of groundwater and lessen the university's negative impacts on local water streams and sources ("Living in a 'Green' Residence Hall"). Additionally, all buildings feature large amounts of natural lighting, recycling bins and battery collection baskets are prominently available, and there is cohesion between building interiors and the abundant natural spaces outdoors.

A third university that has taken a prominent role in the country's march towards sustainable college campuses is Rice University. Stationed in Houston, Texas, Rice University is a private research institution with close to four thousand undergraduate students ("Rice at a Glance"). The university is a member of the U.S. Green Building Council (USGBC), which

administers LEED certifications. The university's green dorm building efforts began in 2006 when the university committed itself to constructing all new buildings according to LEED guidelines. In the thirteen intervening years since then, Rice University has constructed eleven new LEED certified buildings ("Buildings"). As part of these efforts, the university has implemented a Green Dorm Initiative (GDI), a yearly competition that inspires students, faculty, staff, and administrators at the university to adopt sustainable living practices and implement them on campus ("Buildings").

Regarding energy use, the university's dorm buildings feature smart controls that automatically turn air-conditions off when windows and doors to the outside are opened. Rooms are equipped with motion detectors that shut off lights in unoccupied rooms. The windows are constructed in an energy-efficient manner that allows abundant natural light to enter while dampening the amount of heat transferred inside. The exterior walls of the dorm are made of two layers of brick, reducing energy consumption and providing what is known as a high thermal mass ("McMurtry College, LEED Gold"). Having a high thermal mass minimizes the large vacillations in the buildings' temperature, thereby reducing heating and cooling energy requirements (Building Solutions).

Similar to other universities, the dorms at Rice University also feature green roofs with abundant, low-maintenance vegetation that provides insulation and reduce the overall need for energy-driven heating and cooling. The vegetative roofs also help keep stormwater runoff levels more manageable, act as habitats for indigenous wildlife, and weaken the heat island effect. Inside, the bathrooms contain toilets with dual-flush settings that can help minimize water use. The bathrooms were prefabricated, meaning that the on-site construction waste when the buildings were being constructed was minimized. Air quality has been improved by using low-

emission paints and finishes. Washing machines are front-loading and high-efficiency, allowing for a reduction in detergent, water, and energy use with each load. The buildings provide large, high-capacity covered bike racks that encourage students to bike to their destinations. Recycling was used throughout every step of the building process, allowing for a diversion of approximately ninety percent of construction waste away from landfills ("McMurtry College, LEED Gold").

A fourth college that has an established track record in building green dorms is the College of the Atlantic in Maine. A small liberal arts college that has been ranked as the greenest college in the US by the Princeton Review, the College of the Atlantic is uniquely committed to environmental issues: all its students create their own majors centered around the topic of human ecology ("COA Is Nation's #1 Green College"). Since its founding in 1969, the college has been devoted to sustainability in all aspects of campus life, particularly in the realm of residence halls. All the college's new buildings are made to be sustainable, and the old buildings are retrofitted with sustainable technologies ("Sustainable Buildings"). The college contains a green housing complex consisting of multiple buildings. In terms of energy usage, the residence halls draw from the college's ample solar panels. Electricity is provided through renewable hydropower. Each building has viewable meters that can be used to track and set goals for energy usage.

Heating for the halls is provided by a locally sourced biomass wood pellet boiler system. It uses hydroponic, in-floor radiant heating and hydronic wall-mounted heaters. The energy requirements for heating water have been significantly reduced by tempering incoming cold water with warm grey water collected from showers ("Sustainable Buildings"). The residence halls also take advantage of natural lighting by having strategically positioned windows. In addition, LED lightbulbs are also used in all light fixtures. Furthermore, motion sensors have

been installed to automatically turn off lights when no motion has been detected in a room or hallway ("Sustainable Buildings").

The buildings also feature composting toilets, which recycle human waste and reduce water use. The compost collected by these toilets is used to feed surrounding landscapes. Composting bins are also found in every kitchen, as are built-in recycling bins. The buildings also use non-emitting cellulose insulation made from shredded newspapers. The double-stud walls minimize heat loss, as do the triple-glazed windows. Finally, the buildings were all constructed using local, durable, sustainably-sourced building materials ("Sustainable Buildings").

From these examples, it is clear that colleges and universities across the US have recognized the importance of and elected to incorporate sustainable living practices into their own residence hall buildings. In choosing to stand among these peer institutions, Gettysburg College would benefit from the examples they provide. There are several key steps involved in making a sustainable dorm that Gettysburg College could adopt in constructing its new dorm building: it could contract with local construction companies that use sustainable, recycled materials; ensure that the building has many windows that maximize natural lighting; install prominent energy meters that students can view; create a green roof with vegetation that students could maintain and the dining hall could use in its food; place compost bins and recycling bins in every kitchen; install LED lights; invest in solar panels; use porous concrete around the building; use low-flow, energy efficient appliances and fixtures in bathrooms and kitchens; and work to use low-emitting adhesives, sealants, and paints. Should Gettysburg College choose to adopt an environmentally conscious attitude in constructing its new residence hall, these measures can serve as time-tested and fellow college-approved guidelines.

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