Green Roofs and Solar Panels: The Future of Renewable Energy

Adding a green roof to a building offers several benefits, including reducing harmful stormwater runoff, lessening the "heat island" effect, conserving energy and noise, containing air pollution and greenhouse gas emissions, and extending roof life. Green roofs have been shown to increase people's productivity and offer a new habitat for plants and animals. According to an EPA estimate, the "heat island" effect– when highly developed urban areas are significantly warmer than their less developed surroundings[1] – is responsible for 5 – 10% of community-wide electricity demand.[2] Building owners can save money through lower heating and air conditioning bills and decreased municipal sewer system fees via a green roof. A 2012 study revealed green roofs to be capable of cooling indoor air by 3.6° F in summer, reducing annual energy demand by 6%.[3] Green roofs contain 50 – 80% of annual precipitation, according to Green Roof Technology.

Another important benefit is emerging as green roof experts incorporate photovoltaic systems to generate clean, renewable solar energy by taking advantage of green roofs. By installing a solar panel with a green roof, owners can enjoy not only the cost savings and socio-environmental benefits of the living roof but also efficient, renewable solar power – lowering electricity bills by generating clean electricity and reducing demand.

A green roof, also known as a living roof, covers a building with soil and plants. The evaporation these plants facilitate makes the rooftop cooler.[4] This effect enables photovoltaic cells to operate at peak efficiency. Panels mounted on a green roof will produce significantly more energy – up to 16% more – than those mounted on a non-living roof, especially during summer's higher temperatures.[5] Additionally, green roof vegetation removes pollutants and dust from the air that might otherwise interfere with a cell's ability to produce electricity.[6]

American University's Mary Graydon Center features a 8,130-square foot green roof installed in March 2011.[7] The roof captures over 100,000 gallons of rainfall annually and incorporates 2,150 photovoltaic cells to generate electricity for the building

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[1] http://www.epa.gov/hiri/
[2] http://www.environmentalleader.com/2012/01/26/green-roof-product-cools-solar-panels/
[3] http://search.ebscohost.com/login.aspx?direct=true&db=8gh&AN=71510271&site=ehost-live
[4] http://www.zinco-greenroof.com/EN/greenroofsystems/solar_energy.php
[5] http://cleantechnica.com/2012/01/29/green-roofs-pave-the-way-to-cheap-solar-power/
[6] http://www.greenrooftechnology.com/Solar_PV_Greenroofs
[7] http://dcgreenworks.org/american-university-mary-graydon-center/

below.[8] The Graydon Center also uses 174 solar thermal energy panels to supply hot water for three nearby residence halls. AU avoids emitting over 550 tons of carbon with this innovative roof.

Green roofs and solar power make a difference even in small homes. A 540-square foot green roof at 14th & W Streets NW captures 8,640 gallons of rainfall. This homeowner takes further advantage of the roof by installing photovoltaic solar arrays from Groundworks Anacostia.[9]

Germany and Japan may lead the world in solar energy production[10], but American cities are pioneering in green roof-solar power technology. New York City's Department of Buildings launched a new Green Roof and Solar Tax Abatement Program to encourage solar green roofs. The Portland City Council updated regulatory improvement codes to better incentivize solar panel installations. Austin, Chicago, San Francisco, and Seattle are making green roofs important policy goals, while Washington, DC, is second behind Chicago in total area of green roofs per capita.[11]

While solar panels can take away rainfall and sunlight from green roof vegetation, the introduction of photovoltaic cells can actually strengthen the living roof by creating areas of biodiversity, where plants and animals adapted to less water and light can thrive.[12] A more diverse roof is a more stable roof.

According to Jorg Breuning of Green Roof Technology, "Heat is the enemy of energy production. Any time atmospheric temperatures on a roof begin to rise, PV [photovoltaic] elements lose their efficiency and can shut down if temperatures rise too high. We sought a way to counteract this negative phenomenon by combining solar modules with an extensive green roof."[13] Anacostia Watershed Society recently hosted Mr. Breuning for a lecture on his Sun Root Solar Living Roof System. Besides Green Roof Technology, Australian firm ZinCo has developed the Solar Base module[14] and solar energy companies around the world are adapting photovoltaic cells to green roofs.

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[8] http://www.theeagleonline.com/news/story/au-unveils-record-breaking-campus-solar-energy-plan/

[9] http://dcgreenworks.org/w-street-nw/

[10] http://solaroregon.org/news/portland-state-u-researchers-try-to-increase-solar-panel-production-with-green-roofs

[11] http://www.greenroofs.com/industry.htm

[12] http://cleantechnica.com/2012/01/29/green-roofs-pave-the-way-to-cheap-solar-power/

[13] http://www.earthtechling.com/2012/01/green-roof-plants-help-solar-panels-chill/

[14] http://www.zincoaustralia.com.au/greenroofsystems/hybrid_solutions/green_roofs_and_solar_energy.php

AWS's Green Roof Rebate Program, funded by District Department of the Environment, offers financial support for green roofs on residential, commercial, and institutional properties. To learn more about the program, visit our website or call us at (301) 699-6204.