Vegetated Roofs (Green Roofs) Combined with Photovoltaic Panels

Solar Garden Roof and Sun-Root System

SESSION DESRIPTION

Discover a new system in which solar panels are integrated into an extensive green roof with living plants. Energy output is increased through plant evapotranspiration and the green roof also acts as ballast for the solar panels, negating the need to penetrate the roof membrane.

LEARNING OBJECTIVES

1) Learn about an integrated technology that combines renewable energy with vegetated roofs, multiplies benefits and significantly reduces cost.
2) Understand the key elements and flow chart evaluation of whether this technology fits a project.
3) Acquire extensive product knowledge including weight, size, potential power output, maintenance, and warranties.
4) Understand the Return of Investment (ROI), challenges with Third Party investments and Power Purchase Agreements (PPA).

Robert Tilson, FASLA President at Tilson Group

Will ask the following question / parallel slides:

1. Fifteen-years ago, a vast majority of people were not considering their roof tops as a location for enhanced functioning systems – people were simply happy that their roofs were not leaking. Today, numerous enhanced systems are available for rooftops that improve building and environmental performance; these include but are not limited to: green roofs, solar panels, leak detection systems, white roofs, blue roofs, etc.

   Why do you think people have become so much more aware of their rooftop spaces?

2. You have been in the green roofing industry for over 30 years, working in multiple countries and continents, and seen thousands of rooftops. Where have the largest improvements in rooftops occurred? What factors are most important when considering building the best rooftop possible?

3. What is the concept behind the Solar Garden Roof System?

4. Many people know of the benefits of green roofs and solar panels individually; can you tell us about the benefits of the Solar Garden Roof System when the two technologies are integrated?

5. You have an unusual product in the Sun-Root Support Module. Could you tell us about the importance of this component in the Solar Garden Roof System?

6. This solution you've come up with seems so logical — a natural fit. Why hasn't anyone come up with something like this before? Could you tell us a bit about the history of green roofs combined with solar panels?

7. How has the Solar Garden Roof System been received in the market?

8. Financially speaking, the combination of green roofs and solar panels in the Solar Garden Roof allows for a much more interesting and accessible investment options. Who can benefit from this the most?

INTRODUCTION

Green or vegetated roofs reduce the environmental footprint of buildings by re-introducing nature to a place where it existed prior to the structure being built. Living green can substantially reduce a number of urban issues and concerns like heat island consequences, stormwater maintenance, reduction/destruction of natural habitat for beneficial wildlife, and reduction/elimination of native habitat, to name a few. Private corporations and government agencies are actively seeking environmentally responsible solutions to address these issues – many times utilizing non-traditional solutions that strike a balance with nature.

Perhaps one of the most effective solutions to be increasingly utilized has been the introduction of green roofs into the urban environment. Long popular in European countries, this technology is essentially in its infancy in the United States, but increased demand for 'green' solutions is bringing this concept to fore of the urban conversation. While simple in concept, green roofs offer myriad benefits that significantly address the most complex of urban concerns (e.g. stormwater management, the heat island effect, etc.) and we can expect to see this market continue to grow and blossom.

One of the most recent introductions to this market is one that offers perhaps the most integrated approach to addressing multiple urban, environmental, and alternative energy concerns: the Solar Garden Roof, which integrates solar panel technology with an extensive green roof solution – offering all of the benefits of both alternative technologies.

Traditionally, solar panel or photovoltaic systems (a.k.a. PV systems) have typically been ground-mounted and installed in rural areas on agricultural land. Rural areas offer ample and inexpensive space for PV and power-producing factories, while allowing the agricultural industry to boost their income. And, since the output of PV systems is significantly related to consistent low ambient temperatures, rural areas have been preferred given the significant cooling effect of the vegetation surrounding the solar panels. However, if clear-cutting of a fully functional forest for installation of super large PV systems is practiced – the environmental value is questionable. As well, large amounts of chemicals, like growth-inhibitors or growth-regulators, applied under rural PV systems may produce a less favorable outcome, because the practice creates dependencies and other environmental issues.

Consequently, there is enough evidence – and it is the strong opinion of Jörg Breuning – that the best management practice for the installation of solar solutions is where the power demand is the greatest: Within urban environments. Increasingly around the world, expanses of flat, heat-absorbent or reflective structures, like roof surfaces, parking lots, walls of buildings, and streets have been replaced by natural settings (green roofs, green walls, street trees, green railroad tracks, etc.), to reduce the negative impact of dense and man-made structures. While the comprehensive application of a green (roof) strategy certainly addresses many urban concerns, in some cases, it may create a situation where there is not enough space left for alternative, renewable power within city confines. This paper demonstrates a smart solution that combines technologies and increases the environmental effect and payback.

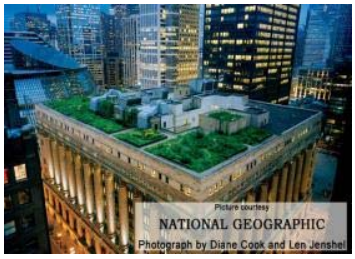
SOLAR GARDEN ROOF HISTORY

In 2007, Optigreen International AG (Optigreen) introduced a patented Sun-Root™ roof system in Germany as the heart of a Solar Garden Roof. Since then, the technology has been adopted throughout Europe and has been installed across more than 100,000 sq. ft. across Europe.
As such, the Solar Garden Roof is new to North America, where it is represented via a joint venture. In November 2011, Optigreen and Jörg Breuning GRS/GRT began a strategic outreach within this critical market, where the demand for advanced stormwater solutions and solar technology has increased dramatically – particularly within urban communities (warehouses, universities, schools, public buildings).

Bio Presenters

Jörg Breuning, Principal GRS/GRT, GBT University Hohenheim

Jörg is the leader in providing integrated architectural design, State-of-the-Art engineering, installation and maintenance solutions of living green on any impervious area throughout the world.



His green roof career started in 1980 in Stuttgart, Germany and he was the first expert green roof consultant in the United States who helped Americans to create some of the most landmark and award winning projects in North American green roof history. His work in the United States began in 1998 when he provided design solutions and construction advice for the Chicago City Hall green roof project, the first project according modern green roof technology in the US.

Jörg also designed and engineered the first green roof on a New York City municipal building, the Bronx County Court House. Over 15,000 sf of real grass on five Celebrity Cruise Ships sailing around the world and with millions of visitors every year are further highlights in his lifelong work of successful projects.

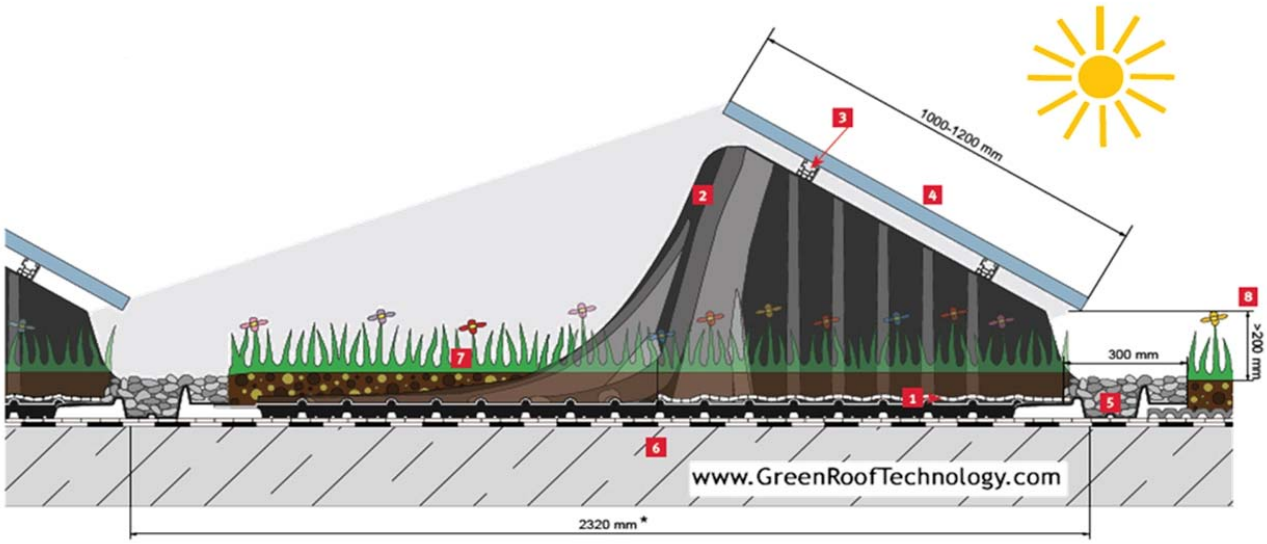
Many green roof professionals in North America call him the Godfather of green roofs.

Robert Tilson, FASLA President at Tilson Group

Honors & Awards

Inc 500 (2002)
Vice President, American Society of Landscape Architects (2003-2005)
Fellow, American Society of Landscape Architects (2005)

SPECIFICATION



1 Suction and capillary fleece type 600 K
2 "Sun Root" by Green Roof Technology
3 Module support
4 Solar power module
5 Gravel strip
6 Suitable substructure, roof membrane (root proof pursuant to EN 13948), Optigreen protective storage fleece type RMS 500
7 Green roof build-up: Optigreen System Solution "Economy Roof"**
8 Adequate clearance: > 200 mm; prevention of shadows.

* 2320 mm (1000 mm module) or 2740 mm (1200 mm module).
** Build-up height depends on the height of the building, the wind zone and the terrain category.

System Weight*:	25 – 40 lbs/ft²
Layer Height:	From 4 – 6 in. (100 – 150 mm)
Roof Pitch:	0 - 3° (0 – 5 %)
Water Retention:	50 – 80 % of annual precipitation
Discharge Coefficient:	0 %: C ≤ 0.17** 2 – 8 %: C ≤ 0.45
Water Storage:	Approx. 0.61 gal/ft² (25 l/m²)
Vegetation Form:	Sedum Varieties & Herbeceous Perennials