

## Green Roofs



### About the Series

Coming up with better ways to get where we need to go and power the lives we live requires development of new technologies, along with research to help us minimize the impact of these technologies on our environment. The overall goal of this series is to encourage people to ask questions and look beyond fossil fuels for innovative solutions to our ever-growing energy needs. Interest in science and technology provides the necessary foundation for our future in a world powered by clean energy. The series also provides insight into what careers in science, engineering and other topics related to clean energy technologies are really like.

### In this Episode

A green roof can certainly make a building look nicer, but can it measurably lower energy requirements and improve water management? At Penn State University, engineer Jelena Srebric and horticulturist Rob Berghage are working together on a project to measure and model how a green roof affects the way buildings use energy and water.

In Jelena's lab, undergraduate student Tyler Meek does weather experiments indoors to determine the effects of light, wind and water on the roof. Graduate student Paulo Tabares Velasco works with Tyler to make a mathematical model to explain the experimental data and predict what will happen in the real world.

The researchers hope that architects will someday use their model to make building designs even greener.

### Concepts

- The entire Earth system and its various cycles are driven by energy. Earth has both internal and external sources of energy.
- Heat is energy that is transferred by the processes of convection, conduction and radiation between objects or regions that are at different temperatures.
- Thermal systems involve transfer of energy through conduction, convection and radiation, and are used to control the environment.

### Content Standards

Earth and Space Science/Physical Science  
Grades 6-8\*

3. Differentiate among radiation, conduction and convection, the three mechanisms by which heat is transferred through the Earth's system.
14. Recognize that heat is a form of energy and that temperature change results from adding or taking away heat from a system.
16. Give examples of how heat moves in predictable ways, moving from warmer objects to cooler ones until they reach equilibrium.