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PU engineering students aim to help cut fuel bills for area homeowners

By Katie Wagner, Staff Writer

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Princeton University students are trying to make getting through the winter cheaper and healthier for members of the community.

One of the university's Engineering Projects In Community Service (EPICS) teams is conducting free assessments of ventilation — the rate at which heat escapes from a building, which is a key measure of energy efficiency — in homes in the Princeton area. The students are conducting the tests as part of a larger project they've named "Greentrofit."

In partnership with the Stony Brook-Millstone Watershed Association, the team is hoping to assist in cost-effective green retrofitting to cut energy consumption and ultimately lower energy bills.

They are also striving to create awareness about the unfavorable links between some retrofitting strategies and air exchange, by emphasizing that while energy efficiency is important, it should not compromise a family's health.

"The Stony Brook-Millstone Watershed Association essentially wanted their facilities to be retrofitted in a sustainable green manner," Sam Borchard, team leader and sophomore at the university, said of the Hopewell Township-based nonprofit organization. "It was though working with them that we kind of realized that there was this gap of information on how to successfully retrofit residential buildings to be sustainable and knowledge about what specific practices can compromise air quality, like weather-stripping."

He added, "Becoming energy efficient and retrofitting your house saves you money definitely, but it's also important to acknowledge the value of conserving energy in today's society."

The team decided to work with houses because there's been very little residential retrofitting done for sustainability purposes, Mr. Borchard said.

Princeton University students in the Greentrofit project with some of the equipment they use for testing. At left is Eugene Franco, in back, and Doba Parushev. At right is Doro Chua, in back, and Emily Weissinger.

Staff photo by Mark Czajkowski

"There've been huge strides in new buildings and new architecture on how to design green buildings, but there's been a huge gap between commercial and old residential buildings and the majority of buildings in the nation are residential," Mr. Borchard added.

The students' ultimate goal is to use their data collected through the ventilation tests and other research to create a Web tool that would help homeowners prevent heat loss.

They will begin their assessments through performing a common industry ventilation test called the blower door test, following the American Society for Testing and Materials standard procedures. The test uses a variable speed fan that will be fitted into the opening of a home's front door to create a slight depressurization inside. The resulting pressure difference between the interior and exterior will provide information to quantify the air exchange rate.

Homeowners signing up to receive a ventilation test should expect a visit from two members of the team. Prior to beginning a blower door test the students will record housing features, make physical measurements and interview homeowners about the characteristics of their home environment. In preparation for a test, the students will install a blower door in the home's front door frame, adjusting it to prevent air from getting through it; close all exterior doors, windows and vents; open all interior doors; and adjust all combustion devices, such as furnaces, water heaters and pilot lights to make sure they don't turn on during the test. While a test is being conducted, the students will use a heat-sensing infrared camera to help determine the locations of leaks in a home.

The blower door tests should take a few minutes, but students will probably need to spend two to three hours in each home to complete other aspects of their assessments.

The team will also need access to a homeowner's energy utility bills for the past 12 months.

After a blow door test is conducted, the homeowner will receive a report, which will include the air exchange rate for the house and

the estimated cost of air leakage, along with an explanation of how the data compares to U.S. standards for health and energy efficiency. The homeowner will also receive copies of any thermal photographs taken that show areas of significant energy leakage and recommendations consistent with the team's "Greentrofit" holistic view, which aims to reduce energy costs while maintaining indoor air quality.

If a homeowner chooses to implement any changes that might affect ventilation, the students will perform a second blower door test to evaluate the actual impact of the changes.

Testing in homes, to begin this weekend, will continue through February. Most tests will take place on either a Saturday or a Sunday between 10 a.m. and 4 p.m.

Anyone interested in scheduling an assessment should e-mail Mr. Borchard at greenfit@princeton.edu.

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