For Immediate Release

Findings of AUB studies on energy efficient building design reveal cost savings, eco-friendliness, and health benefits

Beirut, Lebanon- 03/09/2014 - Researchers from the American University of Beirut (AUB) have released findings from a series of research studies at the first international efficient building design conference held October 2-3 at AUB by ASHRAE, a global building technology society formerly known the American Society of Heating, Refrigerating and Air Conditioning Engineers. Some 30 research papers and 10 industrial presentations were unveiled at the conference where 15 countries were represented.

Efficiency in the home

Among the research that was unveiled at the conference is a cost-efficiency study which aims to provide practical solutions to households in Lebanon that suffer from rolling power cuts and that use energy-intense and polluting diesel generators.

Co-authored by AUB students Raghid Farhat and Ghaith Tibi as well as professors Nesreen Ghaddar and Kamel Ghali, the study uses a combination of locally available construction materials and solar energy as a substitute for imported materials and diesel generators. Relatively expensive building insulation material from outside Lebanon is first substituted with locally available resources such as natural stone, rammed earth hemp and straw. The materials are then modelled on a typical rural Lebanese two-story home.

Researchers found that using local materials reduced annual electric energy consumption by around half, saving homeowners $41 per m2. The study's author's then transferred the cost savings to substitute diesel generation with solar energy systems for power generation and water heating. Finally, excess energy was fed back into the electricity grid.

When diesel generation was partially substituted by solar power at a total cost of $9,400, savings to homeowners came in at $2,933 a year, representing 47 percent of residential energy consumption. When solar power completely replaced diesel generation at a cost of $32,600, yearly homeowner savings totalled $4,472 a year, equal to a whopping 135 percent of residential energy consumption.

"Many people cannot afford renewable energy systems when they build their houses," says Raghid Farhat, co-author of the study. "But if we employ the methods we developed we not only save people money over the medium-to-long term, we also develop local industries over foreign ones, not to mention the environmental benefits related to slowing climate change and reducing pollution from generators in residential areas," she says, adding that the cost saving estimates of the study are highly conservative, and real savings could indeed be larger.

Lighting up cleaner spaces

Another study conducted by AUB students Mohamad Kanaan and professors Ghaddar, Ghali and Georges Araj looked at how local air conditioning units can employ ultraviolet (UV) light

to kill common infectious bacteria in the upper sections of living spaces before the air circulates into lower zones occupied by humans. Since UV light is hazardous to humans, AUB researchers used ventilation tools and louvered UV lamps in the upper sections of rooms. The adjustable louvers, which can be directed at an angle, ensure that no UV light reaches human levels in the liveable space. Meanwhile, they subject the upper sections of the room's air space to UV light. .

In the process, AUB researchers also replaced the common duct system where energy is used to move air to another part of the ventilation system and subjected it to UV light. By doing so, AUB researchers have decreased the amount of energy needed for ventilation, which makes the method cost efficient and killed up to 70 percent of the bacteria used in the experiment. According to Kanaan, this method also saves energy because it reduces the amount of power needed to clean air from 20 percent to 11 percent.

Reusing indoor air

AUB master's student Khoudor Keniar and professors Ghali and Ghaddar have also been looking at how to absorb humidity directly from an indoor space, dehumidify it and bring it back into a room. This method was used as a substitute for the more conventional energy intensive method of dehumidifying outdoor air before bringing it indoors or using cooling for dehumidification.

Indoor air is dehumidified through the use of strong liquid desiccants made of a salt solution which dries out the air. Using a novel vapor-permeable membrane material placed between the desiccant and the air, indoor air moisture passes through the membrane which dehumidifies the indoor space..

In order for the system to stay effective, the moisture absorbed by the liquid desiccant needs to be continually removed. Heating the liquid desiccant allows the absorbed moisture to dry up, but conventional heating consumes a lot of energy. That's why researchers came up with an energy-efficient solution: They resorted to solar energy to heat the desiccant and remove the moisture.

The dehumidified air is reused indoors and energy savings from the whole process reaches up to 35 percent compared to conventional air conditioners in a typical office space.

"You are reducing energy consumption because traditionally you need to cool to dehumidify and now we are relying on the desiccant which is regenerated through solar power," says Ghali. "The membrane also has further health and efficiency benefits because it separates the salt solution [the desiccant] from the air which can be otherwise hazardous to humans if the air comes back into the room. This is especially the case with effective desiccants which are more hazardous to humans."

The ASHRAE International Conference on Efficient Building Design took place at AUB from October 2-3, 2014.

ENDS

PHOTO Captions: (L-R) Energy Minister Arthur Nazarian, AUB Trustee Munib Masri and AUB President Peter Dorman cutting ribbon, to mark the official opening of the exhibition; Minister Nazarian and President Dorman touring the exhibit

For more information please contact:

Maha Al-Azar, Director of News and Information, ma110@aub.edu.lb,
01-75 96 85

Note to Editors

About AUB

Founded in 1866, the American University of Beirut bases its educational philosophy, standards, and practices on the American liberal arts model of higher education. A teaching-centered research university, AUB has more than 700 full-time faculty members and a student body of about 8,500 students. AUB currently offers more than 100 programs leading to the bachelor's, master's, MD, and PhD degrees. It provides medical education and training to students from throughout the region at its Medical Center that includes a full service 420-bed hospital.

Stay up to date on AUB news and events. Follow us on:

Website: www.aub.edu.lb
Facebook: http://www.facebook.com/aub.edu.lb
Twitter: http://twitter.com/AUB_Lebanon