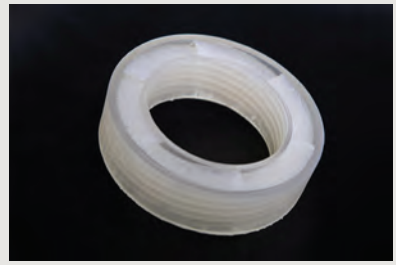
Researchers Say Metamaterial Can Block 94% of Sound

BOSTON–Mechanical engineers at Boston University have developed a 3-D printed ring that can catch certain frequencies passing through the air and reflect them back toward their source.

Researchers Xin Zhang, a professor at the College of Engineering, and Reza Ghaffarivardavagh, a Ph.D. student in the Department of Mechanical Engineering, released a paper in *Physical Review B* demonstrating it's possible to silence noise using an open, ringlike structure, created to mathematically perfect specifications, for cutting out sounds while maintaining airflow.

Researchers say that fans and HVAC systems could benefit from the acoustic metamaterial that renders them silent, but still allow air to flow.

"Sound is made by very tiny disturbances in the air. So, our goal is to silence those tiny vibrations," Ghaffarivardavagh and Zhang told Boston University's Research. "If we want the inside of a structure to be open air, then we have to keep in mind that this will be the pathway through which sound travels."



CREDIT: CYDNEY SCOTT

The mathematically designed, 3-D-printed acoustic metamaterial is shaped in such a way that it sends incoming sounds back to where they came from.

They calculated the dimensions and specifications that the metamaterial would need to have in order to interfere with the transmitted sound waves, preventing sound—but not air—from being radiated through the open structure. The basic premise is that the metamaterial needs to be shaped in such a way that it sends incoming sounds back to where they came from, they said. ■

ACREX India Opens Big

MUMBAI, INDIA–The 20th edition of ACREX India opened big with 500 exhibitors from 30 countries in 50,000 m^2 (538 195 ft^2) of exhibit space. The show, which took place over three days in Mumbai in February, is the largest HVAC&R show in Southeast Asia.

India is emerging as a manufacturing hub for the HVAC industry due to the growth of construction projects, government initiatives, and low cost of operations. India's growing infrastructure is expected to push its HVAC market to $3.97 billion in 2019, according to ISHRAE. Players in this market that exhibited at the show included Sanhua, Tridium, Ziehl Abegg, Caleffi and many others.

Technical workshops and seminars at the show covered topics such as energy simulations, underfloor air distribution, indoor air quality, *Legionella* control and more.

The next ACREX India will take place in Greater Noida, Delhi, on Feb. 27–29, 2020. ■

Energy Tool Helps Cities Set Framework for Performance Goals

WASHINGTON, D.C.–The National Institute of Building Sciences (NIBS) and New Buildings Institute (NBI) have developed a new tool, with support from the U.S. Department of Energy and the Northwest Energy Efficiency Alliance, to help jurisdictions tackle energy use in buildings. The *Life-Cycle Energy Performance Framework for Cities* is now available on the Whole Building Design Guide® web portal.

Buildings are responsible for a significant portion — often the largest portion — of energy use or greenhouse gas (GHG) emissions within city borders. Yet, the cities setting measurable objectives to reduce energy use or GHG emissions are finding policies focused only on new construction are not enough to achieve such goals. NIBS and NBI convened a team of energy thought leaders to identify strategies cities could implement to address the energy use of buildings in a holistic fashion.

Cities require comprehensive, long-term strategies that include policies, programs, administrative resources, tools and ongoing funding sources. A few jurisdictions have some of these pieces in place. However, up until now, no single resource has described how these pieces relate to each other or how to implement them as a coherent whole, NIBS said in an announcement.

More details at https://www.wbdg.org/additional-resources/tools/life-cyle-energy-performance-framework-cities. ■

K-CEP Announces Million Cool Roofs Challenge

PHOTO: K-CEP

The roof at Naga College in the Philippines before (left) and after (right) becoming a cool roof, which reduces the absorption of external heat and the need for air conditioning in buildings.

The Million Cool Roofs Challenge is a $2 million global competition to rapidly scale up the deployment of highly solar-reflective "cool" roofs in developing countries. The Challenge will award $100,000 grants to up to 10 teams this year to deploy solar reflective coating and/or materials in an eligible country between August 2019 and December 2020.

From there, $1 million will be awarded in 2021 to the team demonstrating the best sustainable and transferable model for rapid deployment of cool roofs. Apply by May 20.

The Challenge is a project of the Kigali Cooling Efficiency Program (K-CEP) in collaboration with the Global Cool Cities Alliance, Sustainable Energy for All and Nesta's Challenge Prize Centre. ASHRAE members are among the judges. More details at https://www.coolroofschallenge.org.

The Kigali Cooling Efficiency Program (K-CEP) is a philanthropic program to support the Kigali Amendment to the Montreal Protocol by focusing on improving the energy efficiency of cooling in tandem with the F-gas transition.

The Kigali Amendment outlines a timetable to phase down production and consumption of HFCs—coolant gases that have replaced CFCs in cooling systems as they are less harmful for the ozone layer, but which are powerful greenhouse gases. The amendment also opened the door to improving the energy efficiency of cooling, an increasingly urgent issue as global temperatures increase and heat waves become more common. ■

Cooling as a Service Named a 'Top Idea' for 2019

LONDON—The Global Innovation Lab for Climate Finance, an investor-led initiative that identifies, develops and launches promising solutions to drive critical investment to action on climate change in developing countries, has selected its top six ideas for 2019. The Cooling as a Service (CaaS) Initiative was selected as the most innovative, actionable and scalable financial mechanism out of the ideas submitted by leading finance institutions, NGOs, and entrepreneurs.

Cooling as a Service aims to decrease energy consumption and potent greenhouse HFC gas emissions from cooling systems in cities around the world by increasing competitiveness of state-of-the-art technologies. The model uses an innovative pay-per-service model, with integrated financial tools to recapitalize technology providers who own, maintain, and operate the equipment, thus aligning incentives to support climate change mitigation and the circular economy.

Lab members, who include over 60 institutions in government, development finance, philanthropy and the private sector, chose the six new ideas out of a highly competitive shortlist of 12 finalists, narrowed from a record high number of 250 proposals submitted by leading development finance institutions, global NGOs, and entrepreneurs. The new ideas target four areas where accelerated investment for climate adaptation and mitigation is urgent: sustainable cities, energy access, blue carbon in coastal and marine ecosystems, and sustainable agriculture for smallholder farmers in West and Central Africa. ■

Google: Machine Learning Can Boost 'Value' of Wind Energy

CREDIT: GOOGLE

Google says it can now schedule set deliveries of wind energy output.

LONDON—Google says it has developed a means to make energy produced by wind farms more viable using the artificial intelligence software of its London-based subsidiary DeepMind. Using DeepMind's machine learning algorithms, Google says it can now schedule set deliveries of energy output, which improves the "value" of the wind energy these farms provide by 20%.

DeepMind and Google started applying machine learning algorithms last year to 700 megawatts of wind power capacity in the central United States. These wind farms—part of Google's global fleet of renewable energy projects—collectively generate as much electricity as is needed by a medium-sized city.

DeepMind and Google configured the DeepMind system to predict wind power output 36 hours ahead of actual generation. Based on these predictions, the model recommends how to make optimal hourly delivery commitments to the power grid a full day in advance. This is important, because energy sources that can be scheduled (i.e., can deliver a set amount of electricity at a set time) are often more valuable to the grid.

More details at https://blog.google/technology/ai/machine-learning-can-boost-value-wind-energy/. ■

U.S. DOE Makes Big Investment in Hydrogen Generation Technologies

WASHINGTON, D.C.—The U.S. Department of Energy announced up to $31 million in funding to advance the H2@Scale concept. The focus of H2@Scale is to enable affordable and reliable large-scale hydrogen generation, transport, storage, and utilization in the United States across multiple sectors.

"Hydrogen is an energy carrier that can unite our nation's abundant energy resources," said U.S. Secretary of Energy Rick Perry. "This funding opportunity and the H2@Scale Initiative will help the Department achieve our goals of strengthening energy security, resiliency, and a strong domestic economy."

By producing hydrogen when power generation exceeds load, electrolyzers can reduce curtailment of renewables and contribute to grid stability. Hydrogen produced from existing baseload (e.g., nuclear power) assets can also be stored, distributed, and used as a fuel for multiple applications. Such applications include transportation, stationary power, process or building heat, and industrial sectors such as steel manufacturing, ammonia production and petroleum refining. Key challenges to the H2@Scale concept include affordability, reliability, and performance of emerging hydrogen and fuel cell technologies. ■

Fannie Mae: Green Buildings Saved Renters $72M

WASHINGTON, D.C.—Fannie Mae, the government-controlled mortgage giant, recently published the first results from an eight-year-old program that encourages landlords to make energy improvements, for the sake of both the planet and renters' finances, Bloomberg News reported. Using energy-efficient lightbulbs, low-flow toilets and environmentally friendly heating and cooling systems cut the utility bills of some 550,000 renters over the last six years, adding as much as $72 million in annual savings, according to the new report. On average, renters saved about $145 per year. Across 200,000 buildings, landlords saved $33 million on utility costs. ■

AHRI Releases January 2019 U.S. Heating And Cooling Equipment Shipment Data

ARLINGTON, VA.–**Residential Storage Water Heaters:** U.S. shipments of residential gas storage water heaters for January 2019 increased 11.7% to 433,264 units, up from 387,945 units shipped in January 2018. Residential electric storage water heater shipments saw a 13.6% increase in January 2019 to 405,928 units, up from 357,365 units shipped in January 2018.

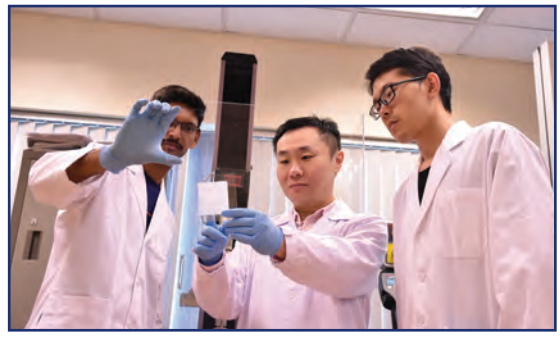
Commercial Storage Water Heaters: Shipments decreased 12.3% in January 2019 to 6,742 units, down from 7,685 units shipped in January 2018. Commercial electric storage water heater shipments increased 10.7% in January 2019 to 11,991 units, up from 10,829 units shipped in January 2018.

Warm Air Furnaces: U.S. shipments of gas warm air furnaces for January 2019 decreased 11.6% to 232,321 units, down from 262,744 units shipped in January 2018. Oil warm air furnace shipments increased 10.6% to 3,568 units in January 2019, up from 3,226 units shipped in January 2018.

Central Air Conditioners and Air-Source Heat Pumps: U.S. shipments totaled 518,988 units in January 2019, up 7.5% from 482,671 units shipped in January 2018. U.S. shipments of air conditioners increased 6.2% to 283,498 units, up from 266,857 units shipped in January 2018. U.S. shipments of air-source heat pumps increased 9.1% to 235,490 units, up from 215,814 units shipped in January 2018. ■

Experimental Coating Keeps Buildings Cool

SINGAPORE–Researchers at the National University of Singapore have created a coating that absorbs moisture, which reduces relative humidity by 20% in seven minutes, leading to a decrease in perceived temperature of 7°C to 9°C (12.6°F to 16.2°F).



CREDIT: TEMASEK

The National University of Singapore research team examining the effects of hydrogel absorbing moisture.

The coating is based on zinc oxide and consists of two layers: a moisture-absorbing hydrogel and a water-digesting material, which allows the hydrogel to continue absorbing water vapor from the air indefinitely. Applying the coating on at least one wall will be enough to keep a room cool without the use of air conditioning and without requiring any energy input.

The new material is being piloted at indoor locations in Singapore before entering production, with the support of Temasek Foundation Ecosperity.

More details at https://www.temasek.com.sg/en/our-community/temasek-gives/community/how-to-keep-cool-without-air-con.html. ■

INDUSTRY IN BRIEF

Chemours Launches $300 Million Refrigerant Facility in Texas

INGLESIDE, TEXAS–Chemours Co. has brought online a new $300 million low-global-warming-potential refrigerant production facility at its manufacturing plant on the Texas Gulf Coast. The new facility, reportedly the largest of its kind in the world, allows Chemours to triple its global capacity for hydrofluoroolefin products. ■

Delta Electronics Acquires Amerlux

FREMONT, CALIF.–Delta Electronics, Inc. global provider of power and thermal management solutions, and Amerlux, LLC, a U.S.-based LED architectural lighting solutions company, announced the signing of a definitive agreement in which Delta will acquire 100% of Amerlux's interests for $90 million. The transaction is expected to close during the second quarter of 2019. Building automation has become a major focus for Delta's long-term growth strategy, according to company officials. ■

CoolSys Acquires ABC Refrigeration & HVAC

BREA, CALIF.–CoolSys, a parent of refrigeration and HVAC companies nationwide, has acquired ABC Refrigeration & HVAC. Headquartered in Syracuse, New York, ABC Refrigeration is a leading commercial refrigeration and air-conditioning services provider in the Northeast that also has in-house metal fabrication capabilities. With this acquisition, CoolSys establishes a strategic position in the highly desirable Northeast market. ■