Building Technologies Research and Integration Center

Science Research Seminar Series

Using the Ground's Energy to Condition the Built Environment

Ground source emulator for the distributed heat pump systems in ORNL's two-story flexible research platform

Tuesday
May 5, 2–3 p.m.
Building 4500N, Wigner Auditorium

Abstract

Ground source heat pumps (GSHPs) use the near constant temperatures in the shallow subsurface of the ground to provide space cooling, space heating, and water heating to buildings. Compared with conventional technologies, GSHPs typically use 30%–40% less energy to provide the same space conditioning and water heating services. Recent studies predict that 3.4 to 3.9 quads of primary energy could be saved annually through aggressive deployment of GSHPs. However, the current market adoption rate of the GSHP is far below its potential, mainly because of a lack of public awareness and high initial costs. In this presentation, Dr. Liu will describe efforts to break down these barriers and enable wider adoption of GSHPs, including projects sponsored by the American Recovery and Reinvestment Act (ARRA). The presentation will also include discussions of ongoing research to expand the use of low-temperature geothermal resources and efforts needed to spur economical and sustainable use of geothermal energy to condition the built environment.

Dr. Xiaobing Liu

is an R&D staff member in the Building Equipment Research Group at Oak Ridge National Laboratory (ORNL). A recognized leader in GSHP technology, Liu formerly worked for ClimateMaster, a world leader in residential and commercial GSHPs. He has participated in more than 30 high-profile GSHP design projects for residential, commercial, and institutional buildings in the United States and other countries. Since joining ORNL in 2009, Dr. Liu has been the principal investigator for several GSHP-related R&D projects, including software tool development to facilitate integrated GSHP system design and optimization, field testing and characterization of new ground-coupling technologies, and technical and economic analyses of large-scale GSHP deployment programs such as the ARRA–funded GSHP demonstration projects. He was a major contributor to the development of the first national certification standard for professionals involved in the design and installation of GSHP systems. Liu currently serves as the research chair for both ASHRAE TC 6.8 (Geothermal Heat Pump and Energy Recovery Applications) and the International Ground Source Heat Pump Association. Dr. Liu received his PhD from Oklahoma State University in 2005.

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