

NDSU and COMSATS TO DEVELOP SOLAR WATER HEATING SYSTEM FOR HARSH CLIMATES

DRS. SUMATHY KRISHNAN AND SAMEE KHAN, MECHANICAL AND ELECTRICAL ENGINEERING, NOV., 2011

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Researchers to Design Hybrid Solar Water Heating System for Harsh Winters
Posted on November 4, 2011 at 2:12 PM

By Cameron Chao

Scientists from North Dakota State University, Fargo, are working along with the scientists of COMSATS Institute of Information Technology, Islamabad, Pakistan, to develop a new solar water heating system that can operate in difficult climates.

The new project, planned by both universities, will include development of an environment-friendly heating and cooling system intended for progress in the backward area of Gilgit-Baltistan, situated in northern Pakistan. Since with 200 less low winter temperatures in the Gilgit-Baltistan region, generation of carbon dioxide and energy technology, the researchers from both universities have planned to design a solar water heating system in harsh environments.

Sammy U. Khan and Sumathy Krishnan are leading the NDSU group of the project, while Waqar H. Bhattar and Nasrullah Khan Khan are leading the COMSATS Institute of Information Technology. They are working together to generate solar energy efficiently by utilizing carbon dioxide as an antifreezing fluid to act as a direct-expansion heat pump for efficient and seasonal operation. One of the goals of this project is to design a compressor lasting below \$300 that will be tested over the next few winters in Gilgit-Baltistan.

Researchers from North Dakota State University, Fargo, and COMSATS Institute of Information Technology, Islamabad, Pakistan, are working together to design a solar water heating system for harsh climates.

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NDSU, COMSATS to Develop Solar Water Heating System
North Dakota Ag Connection - 11/03/2011

Researchers from North Dakota State University, Fargo, and COMSATS Institute of Information Technology, Islamabad, Pakistan, are working together to design a solar water heating system for harsh climates.

The project between the two universities involves developing an eco-friendly heating and cooling system for citizens in the underdeveloped region of Gilgit-Baltistan in northern Pakistan, where winter temperatures and wind chill prevent using existing solar energy technology.

Sumathy Krishnan, associate professor of mechanical engineering, and Samee U. Khan, assistant professor of electrical and computer engineering, are leading the NDSU group, while Nasrullah Khan Kular and Waqar H. Bhattar are leading the effort for COMSATS Institute of Information Technology. Together, they are working to harness solar energy efficiently, even in harsh subfreezing conditions, using carbon dioxide as its working fluid and a direct-expansion heat pump to ensure continuous and efficient operation. One of the project's goals is to create an affordable prototype costing less than \$300 that will be ready for field tests in Gilgit-Baltistan over the next few winters.

The collaboration is part of a larger Pakistan-U.S. Science and Technology Cooperation Program that awarded NDSU and COMSATS research teams a two-year grant for the project. The Pakistan-U.S. Science and Technology Cooperation Program was established in 2005 to increase scientific collaboration between researchers of both countries for mutually beneficial, practical and applicable projects. It was developed by the U.S. Department of State, the U.S. Agency for International Development, the Higher Education Commission of Pakistan, and Ministry of Science and Technology of the Government of Pakistan. In the U.S., the project is managed by the National Academies.

According to Killy Robbins, manager of the Pakistan-U.S. Science and Technology program at the National Academies, the project was one of 25 selected out of 270 proposals for the competitive program, which is jointly funded by the governments of both countries.

"Our Pakistan and U.S. science panels and program sponsors noted that the project will not only help build Pakistan research capabilities but also develop a product that would directly benefit people living in Gilgit-Baltistan," Robbins said. "The new system could also be deployed in other countries with harsh winters, including the northern United States."

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NDSU and COMSATS to Develop Solar Water Heating System for Harsh Climates
November 11, 2011 1:56 PM EDT
Source: North Dakota State University

NewsWire - Researchers from North Dakota State University, Fargo, and COMSATS Institute of Information Technology, Islamabad, Pakistan, are working together to design a solar water heating system for harsh climates.

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NDSU and COMSATS to Develop Solar Water Heating System for Harsh Climates

Friday, November 4, 2011, 11:52 AM in [Astronomy & Space](#)

Researchers from North Dakota State University, Fargo, and COMSATS Institute of Information Technology, Islamabad, Pakistan, are working together to design a solar water heating system for harsh climates, using carbon dioxide and a direct expansion heat pump for operation in subfreezing conditions.

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Nov 11, 2011

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NDSU and COMSATS Institute to develop solar water heating system for harsh climates

Nov. 4, 2011, Fargo, N.D. — Researchers from North Dakota State University, Fargo, and COMSATS Institute of Information Technology, Islamabad, Pakistan, are working together to design a solar water heating system for harsh climates.

The project between the two universities involves developing an eco-friendly heating and cooling system for citizens in the underdeveloped region of Gilgit-Baltistan in northern Pakistan, where low winter temperatures and wind chill prevent using existing solar energy technology.

Sumathy Krishnan, associate professor of mechanical engineering, and Samee U. Khan, assistant professor of electrical and computer engineering, are leading the NDSU group, while Nasrullah Khan Kalair and Waqar H. Bokhari are leading the effort for COMSATS Institute of Information Technology. Together, they are working to harness solar energy efficiently, even in harsh subfreezing conditions, using carbon dioxide as its working fluid and a direct-expansion heat pump to ensure continuous and efficient operation. One of the project's goals is to create an affordable prototype costing less than \$300 that will be ready for field tests in Gilgit-Baltistan over the next two winters.

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“Our Pakistani and U.S. review panels and program sponsors noted that the project will not only help build Pakistani research capabilities but also develop a product that would directly benefit people living in Gilgit-Baltistan,” Robbins said. “The new system could also be deployed in other countries with harsh winters, including the northern United States, and if the project is successful, it could result in a commercializable product that could create new opportunities for manufacturers and installers in both countries.”

For more information on the hybrid solar water heating system joint project, visit sites.nationalacademies.org/PGA/dsc/pakistan/PGA_058762

For more information about the program, visit <http://sites.nationalacademies.org/PGA/dsc/pakistan/index.htm>

COMSATS Institute of Information Technology was established in 1999 and since has expanded from 350 students to more than 17,000 with seven campuses throughout Pakistan.

North Dakota State University, Fargo, is notably listed among the top 108 public and private universities in the U.S. in the Carnegie Commission on Higher Education's elite category of “*Research Universities/Very High Research Activity*.” As a student-focused, land grant, research institution with more than 14,000 students, NDSU is listed in the top 40 research universities in the U.S. without a medical school, based on research expenditures reported to the National Science Foundation.

www.ndsu.edu/research

NDSU RESEARCH CONTACT

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