

Here comes the sun: New solutions for world's energy woes

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The number is staggering: Approximately 2 billion of the world's people -- nearly one-third of the human population -- have no access to electricity. Consequently, they do without many of the amenities that people in the developed world take for granted -- everything from air conditioning and refrigeration to television, indoor lighting, and pumps that supply drinking water. And without electricity to power factory operations or other commercial endeavors, those 2 billion people remain mired in an endless cycle of poverty.

One Florida State University researcher is working to break that cycle through the development of new energy technologies that are easy to install, environmentally sound and -- perhaps most importantly -- inexpensive to produce. Anjane'yulu' Krothapalli holds the Don Fuqua Eminent Scholar Chair of Engineering at FSU. He has established a new research center at FSU, the Sustainable Energy Science & Engineering Center, which is developing technologies that have the potential to transform much of the developing world. Such technologies also could help the United States and other developed nations deal with ever-rising energy costs and combat the spread of global warming.

"The principles really are very simple," said Krothapalli, a professor of mechanical engineering at the Florida A&M University-FSU College of Engineering since 1983. "At SESEC, we are exploring ways to combine existing technologies to convert solar radiation to heat; to use that heat to produce steam to run a low-cost, highly efficient turbine; and then to use the power generated by that turbine to run a small electric generator.

Individual homes could be equipped with these technologies. So, rather than being connected to a vast power transmission system, which is prohibitively expensive in much of the world, individual homeowners would be able to generate the energy they need."

What SESEC brings to the energy table, Krothapalli said, is the ability to take existing technologies and find ways to make them simple to install and operate, much cheaper to produce, and more sensitive to the environment.

"For such a system to work in a rural village in India, for example, it has to meet those criteria," he said. "It must be easy enough for the average person to maintain, inexpensive enough for that person to afford or his government to subsidize, and clean enough that it won't exacerbate global warming."

To demonstrate the various technologies, plans are under way to build a small, completely self-sustaining demonstration house in a parking lot outside Krothapalli's office at the FSU Fluid Mechanics Research Laboratory. The 800-square-foot facility, which will include both living space and an office, will be constructed entirely out of "green," or environmentally sensitive, materials, will produce zero greenhouse-gas emissions, and will feature low-energy LED lighting and other innovations.

The house's 5-kilowatt solar energy facility will even produce hydrogen fuel to run a specially equipped automobile. The house will serve as a precursor to the biannual "Solar Decathlon" competition sponsored by the U.S. Department of Energy.

Already, Krothapalli's work has generated considerable interest around the world. Governmental officials from India, Brazil and a number of other countries have contacted him to find out more, and he travels

regularly to conferences throughout the world to share his ideas with fellow scientists and others.

His research also is bearing fruit in other ways. A patent for one of his technological innovations was approved in 2005, and four others now are under review. With a colleague, Brenton Greska, Krothapalli recently formed an outside business, Sustainable Technology LLC, to help bring some of the energy systems he is developing at FSU to the marketplace. And his research has netted a \$100,000 grant from FSU's Cornerstone Program, as well as a second \$100,000 award funded jointly by the FSU Research Foundation and the FAMU-FSU College of Engineering.

Although his research keeps him more than busy, Krothapalli still keeps his eye on the bigger picture.

"The challenge is to fuel worldwide economic growth and a reliable energy supply without despoiling our environment," he said. "At SESEC, we're focusing on technologies that will ease some of the burden that humanity places on our planet."

Source: Florida State University

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