

Here Comes the Sun

USF Professor has decades-long collaboration with sunlight.

FOR YOGI GOSWAMI, John and Naida Ramil professor in the USF College of Engineering, there is always something new under the sun. Whether he is enlisting the power of the sun to clean air or discovering new and better ways to harness solar power to heat and cool homes—when the morning sun rises, so does Goswami’s curiosity about how to better use its power.

“We are always looking for ways to reduce the cost of solar energy,” says Goswami, who works with other USF scientists in the USF Clean Energy Research Center (CERC) discovering new and better alternative forms of energy. “One road to success in solving the looming energy crisis is to make solar energy more efficient and making it cheaper. The expense currently associated with solar power comes with the cost of solar collectors. If we can use cheaper solar collectors, we can reduce the cost of solar energy by one-third.”

Accordingly, he’s trying to come up with better ways to collect solar energy and use it in innovative ways. That means going back to basics. Back to simplicity.

“All of my inventions are simple,” he says with a smile. “It just takes a while to come up with something simple.”

One of his “simple” inventions found a way to use light to oxidize and destroy hazardous molecules and microbes in the air, thereby disinfecting air. In a current project that could make a big difference in our ability to harness solar energy

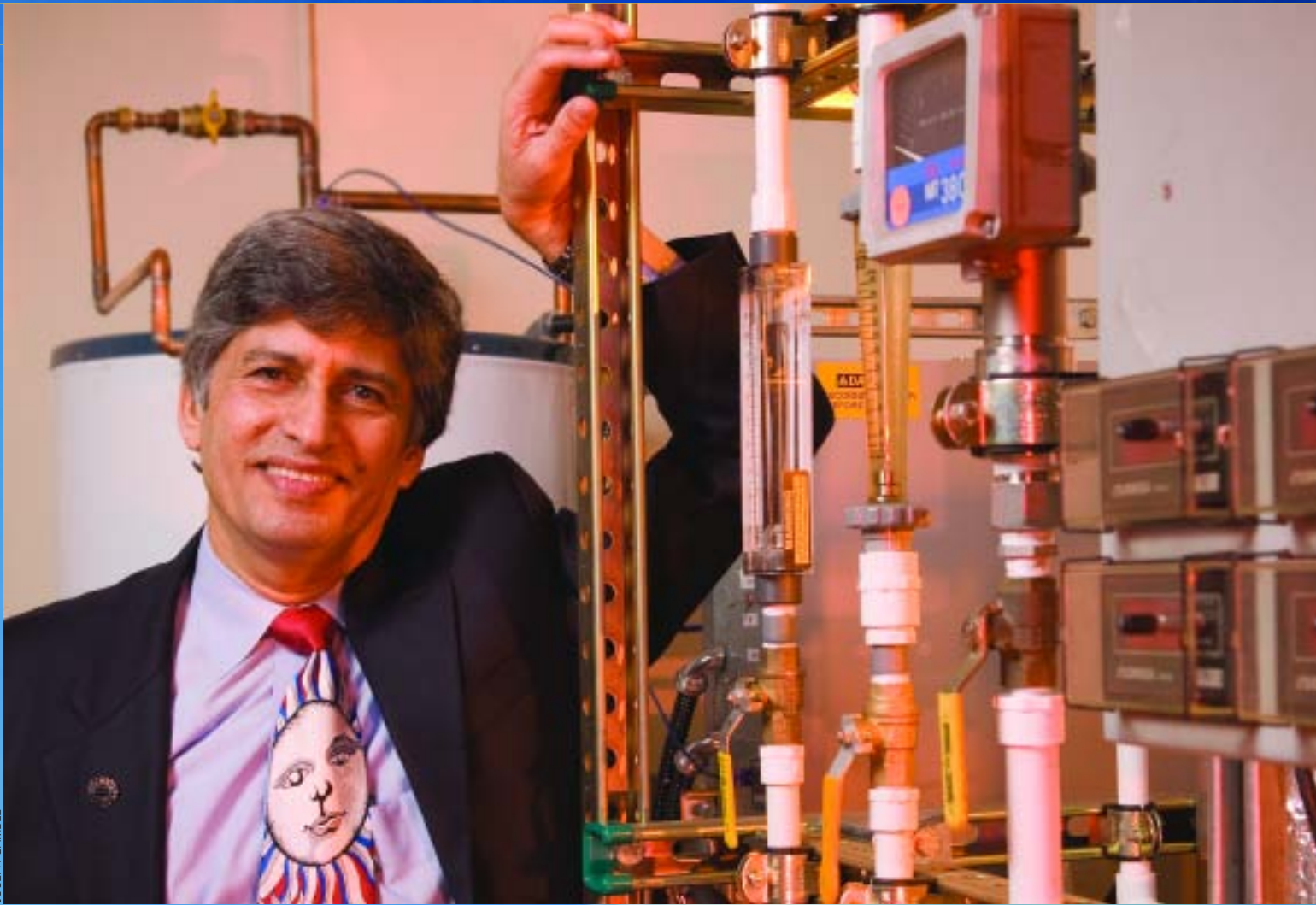
more efficiently, Goswami and colleagues have invented a new thermodynamic cycle to produce electric power and both heat and cool air. While generating heat has been the normally desirable output of solar energy, coming up with a way to generate cool air as a by-product of solar energy has been a challenge.

According to Goswami, the secret to this project’s success lies in two innovations—developing a turbine unlike those in current use and finding the right liquid to absorb the gas coming out of the turbine after energy production. The experimental turbine being developed works at a low—rather than high—temperature cycle. Developing one that works at a low temperature has been crucial.

So that students can learn from it and improve it, the experimental turbine (and its associated parts) now have a home in the classroom where Goswami teaches “Principles of Solar Energy.”

Goswami—who has met with and advised many world leaders on energy issues, particularly in China and India—wonders that government officials worldwide don’t appreciate the depth and immediacy of the energy problem.

He also worries about the worldwide growth in the rate of energy consumption and its polluting consequences and is equally concerned about a lack of attention to finding renewable energy sources. He expresses that and other worries regularly to his students, but recently also voiced the same con-



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cerns to delegates at the International Solar Energy Society (ISES) World Congress 2007 held in Beijing, China, in September. A plenary speaker, Goswami spoke about the future of solar energy and also gave a running evaluation of the prospects for using nuclear power, wind power and biomass (ethanol and biodiesel) fuels as well.

“World oil production may have already peaked,” says Goswami. “With energy costs skyrocketing, alternative fuels must be made available. The last five years have shown a resurgence of interest in solar energy and a number of solar thermal power plants are under construction around the world.”

The vast majority of the world’s solar photovoltaic collectors are now used in Germany and other European countries, explains Goswami, and 70 percent of the world’s solar thermal collectors are being manufactured in China. But, as China and India are experiencing record growth, and coal is still the fuel of choice in China, even more effort in developing renewable energy sources is necessary.

“There is a movement toward renewable energy in

China and India,” he says. “But neither country recognizes the depth of the problem.”

Goswami is also suspicious of the excitement surrounding ethanol being made from corn in the U.S.

“We should not have solutions that make us choose between food and fuel,” he says.

At the 2007 ISES World Congress, Goswami was awarded the society’s Farrington Daniels Award for outstanding contributions in science, technology or engineering of social energy applications leading toward ameliorating the conditions of humanity. Last year he received the American Society of Mechanical Engineering’s Frank Kreith Energy Award for significant contributions to a secure energy future through research, education and societal contributions in the field of solar energy. He also published four text books in 2007.

“It was a very busy year,” says Goswami.

—Randolph Fillmore