Lights, solar power, action

The roof of Zhao Chunjiang's apartment in Shanghai is covered by 22 solar panels.

An ordinary roof on a 12-story apartment complex in Shanghai houses the tools of a revolution - a green-power revolution.

Nothing looks particularly special about this roof, but if you look closely, you will notice that it is covered by 22 solar panels, all assembled in neatly tiled rows.

The panels are connected by wire to a rectifier and ammeter inside the apartment. From this work station, "I can keep real-time records of the amount of electricity produced," says Zhao Chunjiang, the apartment's resident and a professor at the Shanghai University of Electric Power.

Zhao is also the inventor of his "rooftop solar power generator system", which is effectively the first domestic power plant in China.

The generator has a production capacity of 3,000 watts per hour. Since December 2006, it has produced enough electricity to fully meet the power needs of Zhao's entire family.

No one is more emphatic than the professor about the implications of his invention. In concrete terms, it means that the equivalent of 1.52 tons of coal has been saved from use, and 4.8 tons of carbon dioxide emissions have not been released. Perhaps more importantly, it could mean that household power plants will become a viable technology to help meet energy needs in China.

Zhao returned to China in 2000 after spending eight years researching solar energy in Japan. Now he believes his research is paying off. "It (the solar power generator) has been running smoothly for the past 500 days, without any problem," he says.

The 54-year-old speaks slowly, yet his excitement shows as soon as he starts to talk about solar energy. "Now I don't have to check its performance every day. I only read statistics from the computer once every ten days."

The successful operation of the solar generator has enthralled Zhao's family. Though there seems to be no obvious difference in their daily life, they all take great pride in the feeling that they are making history.

Adding to the excitement of his wife and two children is the enthusiasm of Zhao's father-in-law. The old man, now in his 80s, has even been energetically looking through newspapers to update his son-in-law with news stories related to the solar-power industry.

Zhao is keen to share his research and the conclusions he has drawn. "Contrary to common understandings, temperature alone does not determine how much electricity can be produced," says Zhao. "If it gets too hot, it will disrupt the electron flow within the solar cell and impair its performance."

That is why the highest figure was registered in April, a relatively mild-weathered month.

"The amount of electricity produced may not be that impressive, as it can only serve the needs of a single family," said Zhao. "But it can help ease power pressure during peak hours in the daytime, when there is excess from my generator - and then feed it back into the power grid, to be open for public use."

During daylight hours, the bulk of the electricity produced by Zhao's rooftop generator flows into the grid. At night, however, his household draws energy back from the grid to keep appliances running through the night.

"If more families in the city are equipped with generators, power shortage in the summertime peak hours can be relieved greatly."

Zhao receives letters from around the country asking for advice on how individual families can install similar equipment.

Zhao Chunjiang shows the rectifier and ammeter of his "rooftop solar power generator system". Photos courtesy of Zhao Chunjiang

Although the initial cost remains quite high, Zhao says he feels optimistic about the future of the solar-power industry, as so many people in China have become aware of the significance of developing alternative energy sources.

That is why he remains enthusiastic in the time he is asked to grant interviews, attend conferences, and participate in project studies to promote the utilization of solar energy in China.

He now receives five to ten phone calls every day, from journalists and admirers. However, gaining fame is not something he had ever expected. The modest man says his main goal now is to get first-hand statistics to prove the technical feasibility of household solar power generation in China.

For a man highly revered for his professional knowledge, it might seem surprising that Zhao's commitment to solar energy did not start until he was 38. His personal history is not a typical fast-track success story.

Like many of his peers who experienced the "cultural revolution" (1966-76), Zhao had only finished primary school when his formal education stopped and he left home to serve in the army in Yunnan province for seven years.

Without the benefit of extensive preparation, he took the national college entrance examination in 1978. Zhao studied thermal energy and power engineering in college.

He first heard about solar power in 1981, when he happened to take a hot shower powered by a solar heater. The

feeling, as Zhao recalled, was simply exulting, and he instantly fell in love with the newly discovered clean energy technology.

The assiduous man soon started to gather more information. While working as a thermal engineer at Baosteel, China's largest steel maker, he spent his free time scouring libraries and picking up scraps of information about solar energy.

His Japanese language skills helped (he had learned some Japanese while in the army), and most of the knowledge he accumulated during that period came from Japanese magazines.

In 1992, he went to Japan to earn master and doctor's degrees in solar energy.

Zhao's life in Japan was comfortable and easy, with a handsome income as well - he worked at Toyota and then at Kyocera, one of the largest solar cell producers in the world.

However, the prospect of bringing renewable energy to China kept haunting him, and finally prompted him to return in 2000.

"The market for solar power in China will become very big, even before you realize it," he said.

His prediction was right. Since his return, the rapid development of the solar industry in China has given him new confidence. In only three years, China's annual production capacity increased from less than 50 to 3,500 mega watts by the end of 2007.

While working as a teacher in the university, he continues his research and work on various solar projects around the country.

He is now working on a 6,000 sq m solar generator project for Zhejiang Electric Power Corporation. The government of Stone Forest county, Yunnan province, has also asked him to build a 66-mega-watt solar energy power plant to complement its present hydraulic system.

However, high costs remain a hurdle to the popularity of solar energy, Zhao says. His household generator costs 262,000 yuan ($23,800), which is a formidable investment for most residents in China. Provided the generator operated for 50 years, the price of solar-generated electricity would be twice of that electricity derived from fossil fuels.

"But if we want faster investment returns, say, within 15 years, the price would be higher, which is nearly six times more expensive," said Zhao.

"That's why favorable policies from the government are crucial. China should learn from Japan and Germany, both of which have tax incentives as well as subsidies for solar power producers."

China's government issued a renewable energy law in 2006, which encourages the development of renewable energy in the country. However, there is no specific regulation on subsidies for the introduction of renewable energy into the grid system. In other words, it is still unaffordable for most Chinese residents.

Asked about his plans for the future, Zhao smiled and reiterated his confidence in the prospect of the industry.

"I have already made the first step. If provided with support from the government, I am prepared to take the next."

(China Daily 07/31/2008 page20)