

SOLAR PHOTOVOLTAIC ENERGY

Great potential for further growth

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• WITH a view toward seeking means to generate electricity with less dependence on fossil fuels (basically oil, coal and natural gas), to reduce environmental pollution and mitigate the effects of climate change, renewable energy resources are receiving greater attention worldwide.

One such resource being developed at an accelerated rate is solar photovoltaic energy, based on converting the sun's rays directly into electricity. While in 2011, installed around the world were facilities generating 70,500 megawatts of electrical power, by the end of 2016, the figure had increased to 300,000, of which 75,000 was added just last year.

Countries with the greatest portion of photovoltaic parks are, in this order, China, Germany, Japan, the United States, Italy, Britain, India, France, Spain, and Australia. Despite receiving plenty of sunshine, Latin America, the Caribbean, and Africa generate little solar energy, something that must change in the near future.

Daniel Stolik Novygrad PhD, University of Havana Physics professor, researcher, and director of consultation at the Materials Sciences Institute (IMRE) Photovoltaic Laboratory, told **Granma** that the fundamental reason solar power has expanded so rapidly is the greater efficiency of photovoltaic cells, along with the automation of solar parks and the lower cost of the initial investments.

He explained that four decades ago, a photovoltaic cell cost close to 70 dollars, while this month, the price of a crystalline silicon cell on the international market is less than 35 cents, meaning the cost has been reduced 200 times over.

"Today photovoltaic panels and inverters are easy to transport and can be installed quickly; they produce clean, renewable, instant energy - without making noise; with low operational and maintenance costs; little consumption of water; and at a low risk of technological accidents - and have a useful life of close to 25 years," Dr. Stolik stated.

In the opinion of the scientist - who also advises the Ministry of Energy and Mines, as well as the country's electric company, with respect to solar power - another advantage of photovoltaic energy is the fact that it has reached parity, in terms of cost per kilowatt/hour, with the conventional electric grid, making solar parks economically viable once they have been installed. The fuel used is provided by the sun, a stable source for billions of years, to more or less a similar degree around the world.

CHANGING THE COUNTRY'S ENERGY PROFILE

Professor Stolik explained that in Cuba, through 2012, existing solar power facilities generated less than three megawatts and were concentrated in some 9,000 small systems in remote areas, beyond the reach of the national electric grid, serving doctor's offices, rural schools, homes, and video centers.

The following year, reflecting the political decision to expand the development of renewable energy, the first one-megawatt solar park connected to the national grid



Solar energy can make a significant contribution to expanding the use of renewable resources to generate electricity in Cuba.

was erected in Cienfuegos, a process which has continued in other provinces.

A fundamental step toward achieving the objective of gradually changing the country's energy profile, currently very dependent on fossil fuels, was the Council of Ministers' approval, in 2014, of a policy on Renewable Resources and Efficient Use of Energy through 2030.

The purpose stated in the document, and reiterated on various occasions in reports to the National Assembly of People's Power and in comments by ministers and high-ranking government and Party leaders, is to have, by 2030, 24% of the electricity generated in the country with the use of renewable resources, including solar, biomass, eolic and hydroelectric - a figure which today stands at 4%.

Cuba, Dr. Stolik said, receives an average level of solar radiation above 1,800 kilowatts per square meter annually, which guarantees the ongoing availability of this natural resource in abundant quantities.

"It is worth noting that the lowest level of radiation in our country is much greater than the highest level one might

find in Germany, a nation which currently has more than 40,000mw installed, with 60% less solar radiation," he said.

The expert emphasized that one of the issues to be resolved is that of the intermittent level of the sun's rays, given the passing of clouds and, of course, nightfall.

Several alternatives exist, he said, such as using plants with a rapid start up, and improving means to store electricity to automatically cover gaps when generation slows.

Cuba has projected constructing, in the short term, 59 photovoltaic parks and connecting them to the national electric grid. Of these, 33 should be completed in 2017.

Beyond this immediate goal, Dr. Stolik reiterates that according to his studies, the potential for the use of solar energy in the country could be significantly greater than projected, to contribute even more to the nation's self-sufficiency in terms of electricity.

He emphasized that the country has the human resources and natural conditions needed to take on such a goal, given the sunshine the island has available. •

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