

## History of solar energy in ghana

Solar energy may seem like a modern development, but its story actually dates back nearly two centuries. The discovery of the photovoltaic effect in 1839 laid the groundwork for today's solar panels, but it would take many decades of innovation to transform this novel concept into the high-efficiency energy source we know today. From the earliest days of solar-powered satellites to modern rooftop arrays and utility-scale solar farms, this is the complete history of solar energy--and a look at its exciting potential in the years to come.

The story of solar energy begins in 1839 with the work of French physicist Edmond Becquerel. In experimenting with metal electrodes and electrolyte solutions, Becquerel discovered the photovoltaic effect--the creation of electric current in a material upon exposure to light. This groundbreaking finding showed that it was possible to convert sunlight into electrical energy.

Other scientists and inventors soon began experimenting with solar cells made of materials like selenium. In 1883, American inventor Charles Fritts designed and built the world's first rooftop solar array, installing it on a New York City rooftop. Fritts used selenium wafers to generate an electrical current. While this prototype achieved only around 1% efficiency, it provided an early demonstration of solar energy's potential for practical use.

Developments in solar energy technology continued at a slow pace in the early 20th century. A key breakthrough came in 1905 with Albert Einstein's paper explaining the photoelectric effect, for which he later won the Nobel Prize in Physics. Einstein's work focused on the particle nature of light and the idea that light contains packets of energy called photons. This improved scientific understanding of the mechanism behind the photovoltaic effect.

The first silicon-based solar cells emerged in the 1940s but remained prohibitively expensive for most applications. The technology got an important boost with the dawn of the Space Age. As the U.S. and Soviet Union raced to launch satellites and spacecraft, solar energy offered an attractive way to generate power far from Earth.

In 1958, the U.S. launched Vanguard 1, the first solar-powered satellite. Its radically new power system, made up of six solar panels, enabled it to remain in orbit for over six years. Other solar-powered satellites followed, including NASA's Nimbus and Soviet spacecraft like Sputnik 3.

As the Space Race accelerated in the 1960s, solar energy became an essential component of longer space missions. The compact, lightweight Ranger moon probes employed solar arrays with thousands of solar cells to power their systems and experiments. The Mariner 2 probe, the first successful interplanetary spacecraft, used solar cells to provide power during its flyby of Venus in 1962.



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These early applications demonstrated solar energy's unique advantages for space exploration. With no moving parts and ability to generate power indefinitely, solar arrays proved much more practical than batteries for long-duration missions. As NASA pushed further out into the solar system in the 1970s, photovoltaics became the standard power system for its spacecraft and remains so today.

Back on Earth, solar energy technology continued to advance gradually through the mid-20th century but remained uncompetitive with cheap, readily available fossil fuels. This began to change with the 1970s oil crisis, as skyrocketing oil prices and uncertainty in global energy markets highlighted the need for alternative energy sources.

The oil crisis spurred new government and private investment into solar energy around the world. In the United States, the federal Solar Energy Research Institute (now the National Renewable Energy Laboratory) was created in 1977 to drive innovation in photovoltaics. Germany and Japan also emerged as early leaders in solar technology and manufacturing during this period.

By 1980, the global solar industry had grown to over 500 megawatts of annual production. Costs were dropping rapidly, with the price per watt of solar modules falling from around \$100 in 1975 to under \$10 a decade later. While still a tiny fraction of overall energy generation, solar was becoming an increasingly viable technology. The stage was set for a solar energy revolution.

This exponential growth stems largely from two factors: steadily improving solar technology and economies of scale as the industry has matured. Solar cell efficiency has more than doubled since the 1970s while new materials and manufacturing techniques have brought costs down. Governments around the world have also provided subsidies, tax incentives, and other policies to accelerate solar adoption.

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