

# From Sunlight to Energy: How Power-Generating Glass is Revolutionizing Green Technology

*In March 2023, CNBM (Chengdu) Optoelectronic Materials Co., Ltd. received the China Industry Award for their innovative glass power generation technology.*

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/EINPresswire.com/ -- In March 2023, CNBM (Chengdu) Optoelectronic Materials Co., Ltd. was awarded the [China Industry Award](#) for its remarkable achievement in independently innovating a set of power generation technology. This technology has the capability to convert a piece of ordinary insulated glass into a conductive material, thereby producing electricity. This breakthrough innovation paves a new way for green energy development by enabling power generation from sunlight. Today, let ZMS take you on a journey to explore the marvelous world of power-generating glass.

## How Does Glass Generate Electricity?

The ability of glass to generate electricity primarily relies on a 4-micrometer-thick layer of cadmium telluride (CdTe) photovoltaic film placed in the middle. CdTe is considered one of the materials with the highest theoretical conversion efficiency. More than 90% of visible light absorption can be achieved with 1  $\mu\text{m}$  CdTe.



Roof installation of power generation glass



Pan JinGong with Power Generation Glass

However, the laboratory photoelectric conversion efficiency of CdTe solar cells was once very low and did not see significant breakthroughs for a decade, leading the industry to believe that the material had no potential.

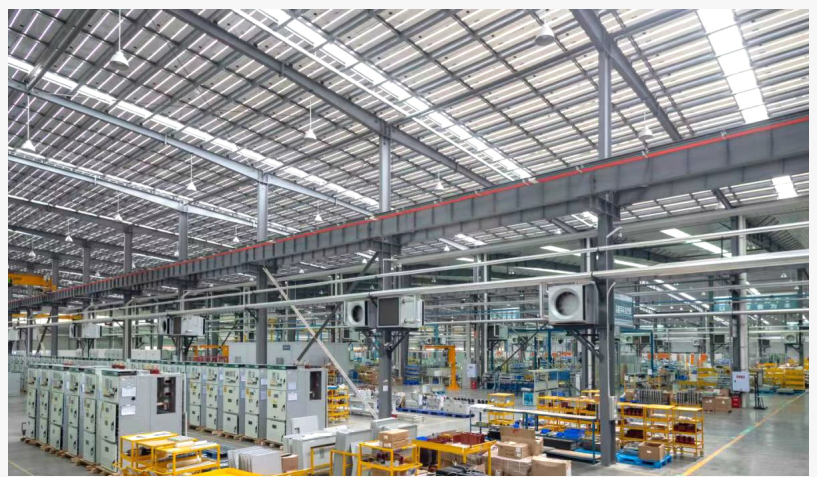
Nonetheless, Pan Jingong, the general manager of CNBM, believed that this research held significant scientific value. After years of dedicated research, his team successfully overcame a series of challenges, including high-efficiency purification of tellurium, preparation of CdTe semiconductor alloys, large-scale production of power-generating glass, dynamic coating technology, and development of complete sets of equipment.

After 8 years of hard work, his team successfully developed CdTe photovoltaic film power-generating glass and increased its photoelectric conversion efficiency from the initial 8.72% to 20.24% in the laboratory and 16.18% on the production line.

Besides, the addition of CdTe significantly improves the strength of the glass. And CdTe has a highly stable crystal structure, which can be safely encapsulated within the power-generating glass for many years.

In August 2017, CNBM successfully produced the world's first large-area (1.92 square meters) CdTe power-generating glass. In that year alone, the project led by Pan Jingong received orders worth 170 million yuan.

It is reported that a piece of power-generating glass measuring approximately 2 square meters



Chuankai Tgood Industrial Park



CNBM



Power Generation Glass in State Grid UHV Guangshui Transformer Station

can generate 270 kWh per year, which is sufficient to meet a family's annual electricity demand with only two or three pieces of glass.

### Large-scale Application of Power-generating Glass

The development of CdTe thin film glass with photovoltaic properties has obtained 34 patents. Its products have been widely used in public buildings such as government, schools, hospitals, as well as curtain walls of commercial buildings and factories.

Nowadays, large-area power-generating glass has been installed in Chengdu Shuangliu International Airport and Chengdu Smart City Center. The installed capacity of Chengdu Smart City Center alone has reached 240kw.

In the construction of the Beijing Winter Olympics in 2022, CdTe power-generating glass was also applied to the National Speed Skating Pavilion and the BIPV building-integrated project of Zhangjiakou Winter Olympics venues.

### Actual Power Generation Efficiency

The factory building of Chuan Kai Electric Industrial Park in Shuangliu District, Chengdu, is equipped with this type of power generation glass. The entire roof of the factory building is designed in a zigzag and wave shape, and power generation glass is used to construct the three south-facing roofs.

According to the data from the smart energy management system, the power generation glass starts to generate electricity at 6:40 a.m. and continues to generate electricity until 7:30 p.m. Even under weak sunlight conditions in the morning and evening, it can still generate a small amount of electricity.

According to Liu Shixu, the dean of the Smart Energy Research Institute of Chuan Kai Electric Co., Ltd., the park has installed 6,880 pieces of power generation glass that are 1.6 meters long and 1.2 meters wide. The total area of these glasses is about 15,000 square meters, and the peak power generation reaches 5,555 kWh.

When the park is running normally, the daily power consumption is about 20,000 to 30,000 kWh. And the daily power generation of power generation glass accounts for 20% of the park's electricity consumption. According to calculations, the power generation glass in the park can generate 1.4 million kWh of electricity per year, and can save about 800,000 yuan in electricity bills annually based on the current electricity price.

It is estimated that the design life of power-generating glass is 30 years, and the cost can be recovered in the first 6 years through power generation. In the following 24 years, not only can electricity be used for free, but also profit can be generated with the promotion of photovoltaic

power generation grid connection.

## Can Power-generating Glass Be Realized for Home Use?

With the rapid development of photovoltaic energy, building-integrated photovoltaics (BIPV) has become a highly anticipated field. In the household sector, Tesla has launched the Powerwall product, which charges electric vehicles through a rooftop solar system. So, can power-generating glass be also used in homes?

From the current situation, the conditions for household use of power-generating glass are already in place, but cost is a factor that must be considered. According to Pan Jingong, the company's power-generating glass costs about 1,000 yuan per square meter. An average household typically requires about 5 square meters, meaning it would take around 8-10 years to break even.

However, as the CdTe thin film solar cell industry scales up and production technology continues to improve, the cost reduction potential of CdTe components is far greater than that of crystalline silicon components.

In fact, in addition to cost, there are many other factors to consider. There are many regulations and standards for building construction, but photovoltaic construction is still a relatively new field. Issues such as electrical safety, [electric cable layout](#), maintenance and inspection all require ongoing research and development.

## New potential in the PV industry

According to reports, the photovoltaic industry is mainly divided into two technology camps: crystalline silicon and thin-film solar cells. Cadmium telluride thin-film solar glass is a type of thin-film solar cell that is widely used in the industry.

Compared to other types of solar cells, CdTe thin-film solar glass has a lower manufacturing cost and a higher conversion efficiency than crystalline silicon, gallium arsenide, and other solar cells.

In contrast to the need for large-scale construction sites for [photovoltaic solar panels](#), solar glass can be more widely used in cities.

In addition, CdTe thin-film solar modules have a good weak light effect. They can generate electricity in weak light environments such as in the morning, evening, cloudy, and rainy days. Therefore, this type of solar glass is also suitable for areas with short lighting hours.

## Environmental Benefits of Power-generating Glass

Power-generating glass has low reflectivity and does not cause light pollution. It can be used not only in large-scale solar power plants but also as a replacement for traditional building materials in various buildings, providing clean energy from the sun.

According to Pan Jingong, their cadmium telluride is extracted from waste and is a sustainable material. Only 20 grams of cadmium telluride is needed to produce a square meter of power-generating glass, which can generate an average of 270 kWh per year for at least 50 years. Furthermore, for each kilowatt-hour produced, only 11 grams of carbon dioxide are emitted.

Currently, the annual production capacity of CdTe power-generating glass at CNBM is about 100 megawatts. It is estimated that these glasses can generate 113.77 million kWh of electricity per year, saving 39,138 tons of standard coal and reducing carbon dioxide emissions by 118,967 tons per year.

If power-generating glass becomes widely used, it could significantly reduce our dependence on other non-renewable resources, achieving the goal of environmental protection and carbon reduction. This could be a solid step forward for humanity in the field of renewable energy.

### Future of Power-generating Glass

The future of power-generating glass looks promising, as it can be used not only in building-integrated photovoltaics (BIPV) but also in more innovative applications. For example, due to its strong load-bearing capacity, power-generating glass can be directly laid on road surfaces. Once this is integrated with mobile charging technology for electric vehicles, it can enable charging through roads.

Currently, production lines for CdTe power-generating glass have been put into commercial operation on a large scale. As an important emerging force in photovoltaic power generation, the market for CdTe power-generating glass is facing tremendous opportunities for development.

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