Republic of china photovoltaic pv systems

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Pioneering projects in China are demonstrating how the potential of solar power can be harnessed across a wide range of new settings. Carrie Xiao explores the many applications for PV beyond traditional power plants.

The evolving sophistication and falling costs of photovoltaic technology are helping drive solar power generation towards an unprecedented "PV+" era. This allows clean energy to access every aspect of the social economy, painting a future of diversified symbiosis and harmonious development.

The PV+ concept goes beyond merely expanding PV technology applications. It represents a deep integration of the PV industry with various sectors. In this model, PV technology is no longer confined to traditional power plants but is integrated with agriculture, construction, transportation, communication and industrial manufacturing, creating a comprehensive, efficient clean energy network.

In recent years, the PV+ model in China has been developing with a particularly strong momentum. This innovative model has not only promoted the transformation and upgrading of the PV industry but also facilitated the greening process of many traditional industries. By deeply integrating PV with other industries, diverse application scenarios and solutions have been created. Let"s explore three representative PV+ projects in real-life scenarios.

In the Ou Fei Wei District within the Zhejiang South Industrial Cluster in Wenzhou, Zhejiang, China, a PV power station spans approximately 4.7 square kilometers. Comprising 1,396,000 modules arranged into 24 blocks, this facility is nestled on a mudflat where occasionally, fish can be seen leaping from the water, while fishermen navigate the waters in small boats. This scene belongs to the Wenzhou Taihan 550MW Fishery-Solar Complementary Power Generation Project, the largest mudflat fishery-solar project of its type.

Covering approximately 493 hectares of sea area, this complex maritime technical project was developed and constructed by Chint Green Energy. Astronergy supplied the modules and it interconnected to the grid on 16 December 2021. By integrating aquaculture and PV power generation, the project pioneers a new model where power is generated above while fish are farmed below.

The project generates approximately 650 million kilowatt-hours annually. Compared to coal-fired power plants of similar output, it saves about 235,000 tons of standard coal and reduces carbon dioxide emissions by approximately 648,000 tons per year, generating an average annual output value of RMB335 million (US$46.2 million).

Chint Green Energy faced numerous challenges during construction. Given the complexities of building

foundations on the sea mudflat, the construction environment was particularly demanding. The builders employed a container ship piling method, enhancing piling efficiency and accuracy, and significantly shortening the construction period. Permeable structures were used for the booster station platform to meet marine requirements.

According to the project development head at Chint Green Energy, around 160,000 precast piles were used. To ensure a smooth grid connection, over 1,000 piles were driven daily, with a workforce of over 1,000 people per day during peak construction.

Due to the saline and humid air conditions typical of the mudflat area, along with frequent typhoons and the hot and rainy weather of summer, there were elevated requirements for environmental adaptability and reliability in the photovoltaic equipment selection.

The station utilises Astronergy"s ASTRO 450Wp monocrystalline silicon modules and some dual-glass modules. These ASTRO PV modules not only endure daily sunlight and wind but also face the challenge of moisture transpiration. Moisture intrusion can cause corrosion of the solar cells and electrical connections within the modules, significantly degrading their power generation capacity and causing visible damage.

The ASTRO modules use a high-density encapsulation process to tightly prevent moisture ingress, ensuring their durability in high humidity, high saline mist, high wave and high thermal spot environments.