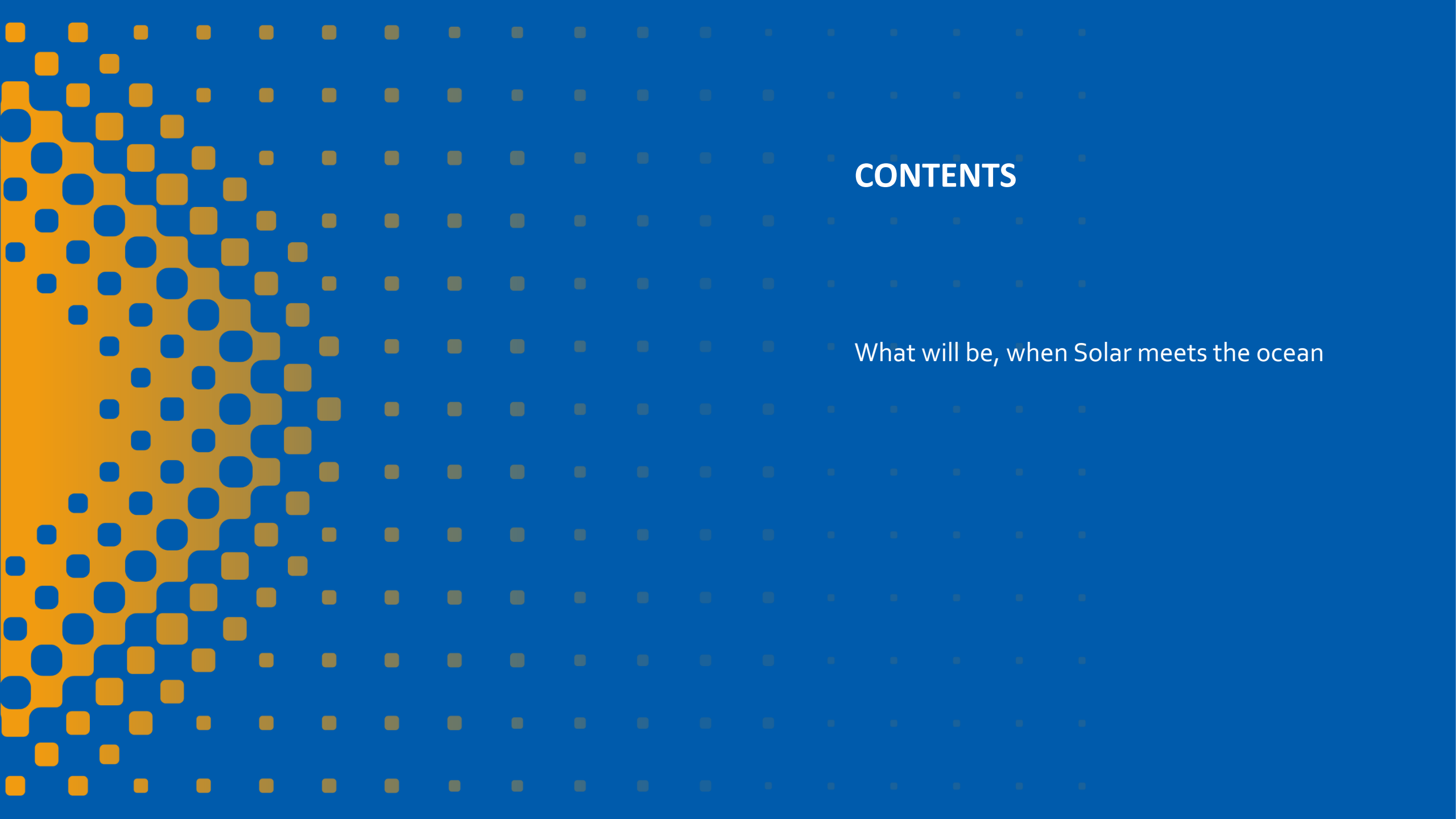




Where Solar Meets the Sea: Unveiling the Future of Offshore Solar.

英利能源发展有限公司

YINGLI ENERGY DEVELOPMENT CO., LTD.



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What will be, when Solar meets the ocean



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What will be, when Solar meets the ocean

1



High Salt Mist Environment

- **"Frame corrosion:** The metal frame undergoes electrochemical corrosion in a salt spray environment, leading to a decline in the mechanical performance of the frame."

2



High Humidity and Heat

- **Electrical component failures:** Salt spray and water vapor entering the internal connectors of junction boxes easily lead to insulation failure and conductor corrosion."

3



Strong Wind

- Due to frequent offshore typhoons, there's an increased risk of power station overturning, demanding higher load-bearing capabilities from the components

4



High UV Condition

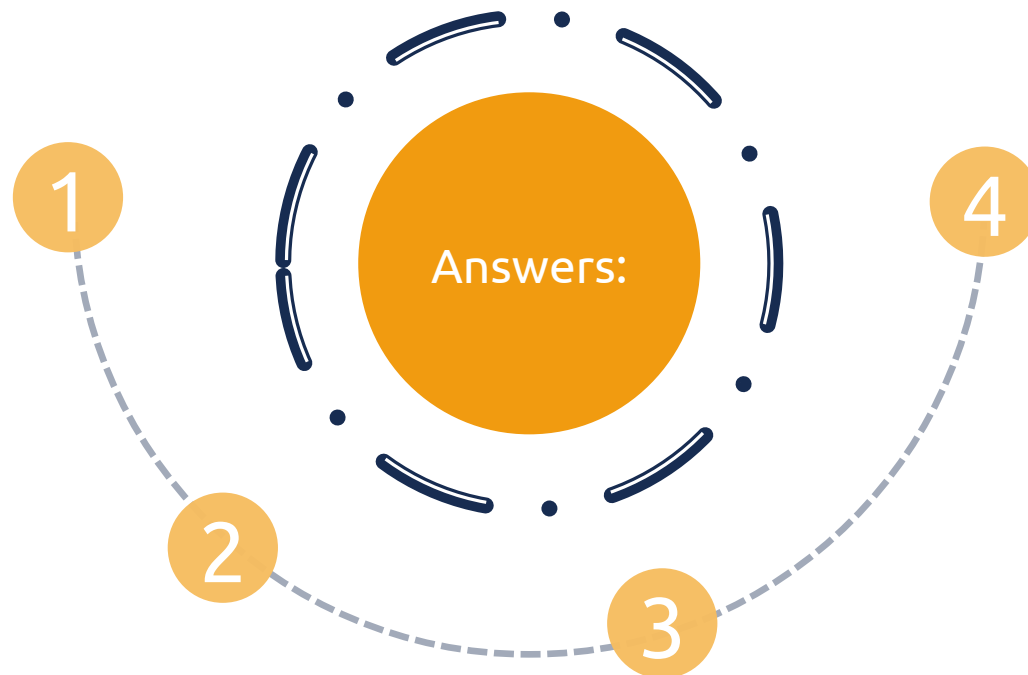
- **Yellowing of the adhesive film:** Under UV conditions, leading to yellowing and causing a decrease in the power output of the components

Corrosion-resistant material selection

Choose materials with strong corrosion resistance, such as stainless steel, special alloys, or coatings, to reduce the impact of salt spray corrosion in marine environments on the components.

Reinforced structural design

Design sturdier supports and frames to enhance the components' resistance to wind and ensure stability, defending against extreme weather conditions like strong winds and heavy rains.

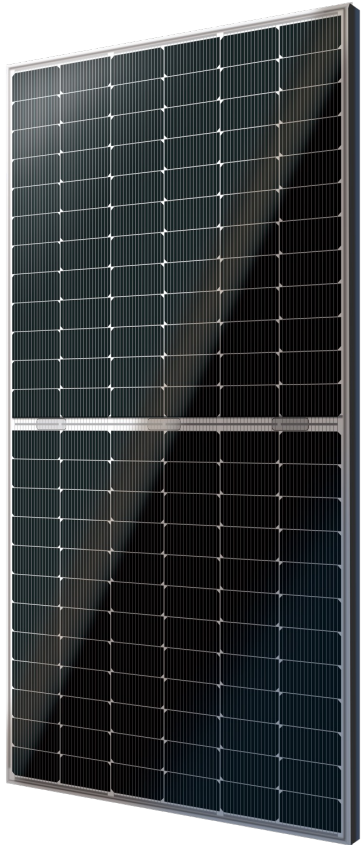


Regular maintenance checks

Establish a routine maintenance schedule, including cleaning the component surfaces, inspecting for corrosion and damage, and promptly repairing any issues, to extend the components' lifespan and ensure their proper functioning.

Use of weather-resistant encapsulation materials:

Opt for materials with excellent weather resistance, capable of withstanding high levels of ultraviolet radiation and humidity, to minimize yellowing and power degradation of components under such conditions.



A PV module capable of ocean conditions should include:

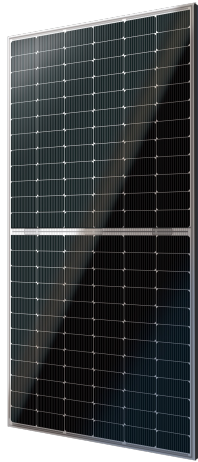
Corresponding to the highest corrosion environment level classified by ISO 9223 standard (CX level), the components pass the 8-level salt mist test in accordance with IEC 61701. Post-test, the components maintain a good appearance, and the power degradation of the components is within 2%.

Increased static load: The back of the component can withstand a 3600Pa wind load, while the front can withstand a 7000Pa snow load; Increased dynamic load: It passes the IEC dynamic load test at twice the standard load.

Utilizing high-resistance encapsulation films against water and UV, unafraid of high humidity, heat, and intense UV in offshore environments; Components pass all rigorous IEC tests, with degradation within 2% for all components.

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Ocean Star



Quadruple Protection: High Efficiency, Salt-Resistant, Load-Bearing, Perfectly Tailored for Various Nearshore and Offshore Photovoltaic Applications.

In 2015, Yingli supplied 400kW of solar modules for an island reef project in the South China Sea.

The operating environment included high salt spray (near the sea), high humidity (average annual temperature of 28-30°C), and severe typhoons (from November to March, with northeast monsoon winds reaching wind force 6 or higher). This demanded higher product specifications.

Yingli extensively optimized the design of solar modules specifically for this environment. After product grid integration, the performance of the modules has been excellent.





THANKS

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