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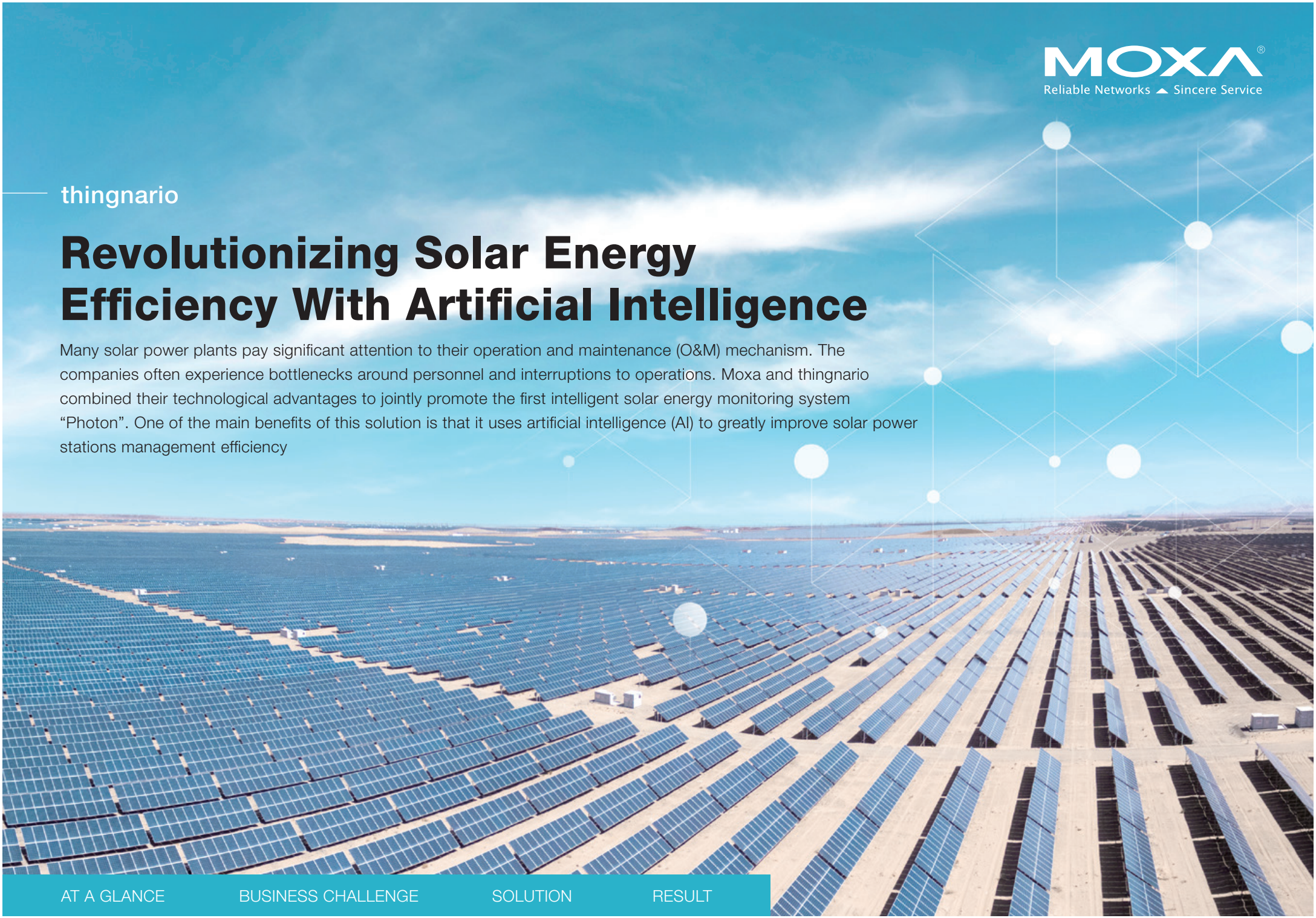
thingnario

Revolutionizing Solar Energy Efficiency With Artificial Intelligence

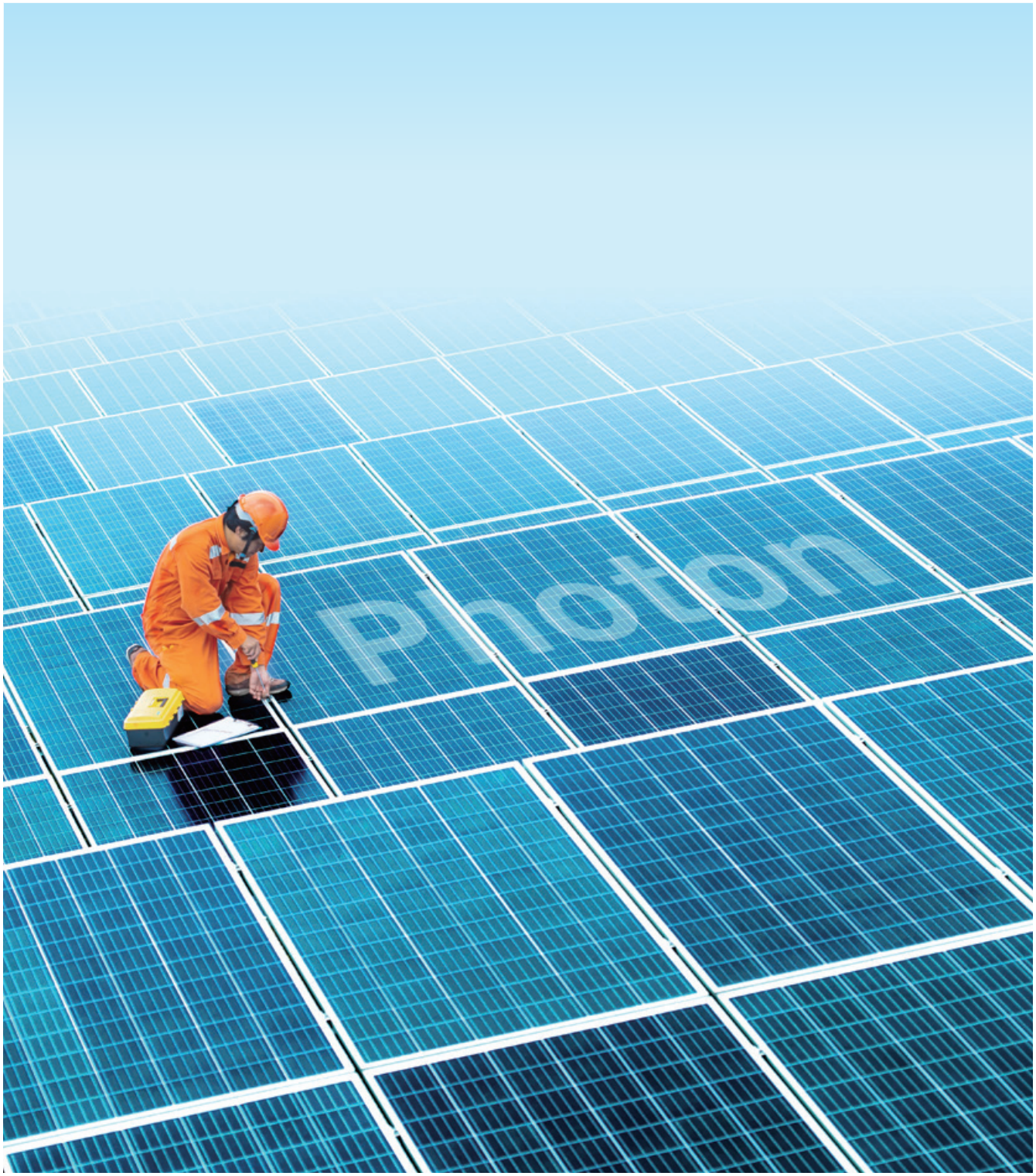
Many solar power plants pay significant attention to their operation and maintenance (O&M) mechanism. The companies often experience bottlenecks around personnel and interruptions to operations. Moxa and thingnario combined their technological advantages to jointly promote the first intelligent solar energy monitoring system “Photon”. One of the main benefits of this solution is that it uses artificial intelligence (AI) to greatly improve solar power stations management efficiency



AT A GLANCE

The Taiwanese government has set a goal for its renewable energy policy, that by 2025, 20% of power generated will be by renewable energy resources. It is predicted that solar energy will supply 20 GW annually to help meet this target, which will be fifteen times more than the 1.3 GW that is currently produced. However, before the Taiwanese government reaches their target, there are many obstacles that need to be overcome.

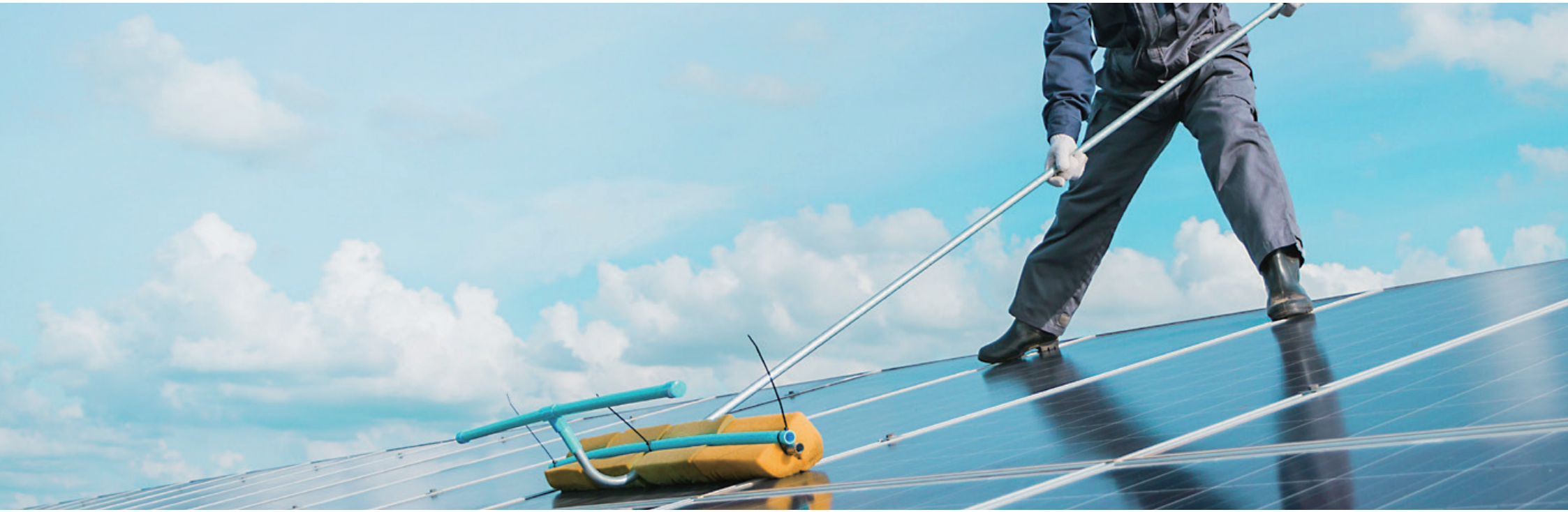
In reality, many solar power plants lack a good operation and maintenance (O&M) mechanism, which often results in losing power that has been generated. Furthermore, when operations are interrupted, companies have to fork out significant amounts of money to dispatch personnel to fix machines. It is in response to these issues that Moxa and thingnario combined their technological advantages to jointly promote the first intelligent solar energy monitoring system “Photon”. One of the main benefits of this solution is that it uses artificial intelligence (AI) to greatly improve the management efficiency of solar power stations.



The Bottlenecks in O&M

The owner of the plant shared some of the complex operations that take place when generating solar energy across large areas. Each solar station transmits between 20,000 and 50,000 pieces of field data per minute. It was too time consuming to use the traditional operating system to manage these vast quantities of data, and data loss was a serious problem. In addition, the previous maintenance system was hardware-based and relied heavily on the capability of the inverter. Operating under these circumstances, the operators did not have a holistic view of the entire solar power operation status through one single platform. Furthermore, there were other system integration issues, and it was difficult to determine whether the power being generated was being lost. In fact, even when it was determined that power was being lost, it was almost impossible to determine the root cause of the loss.

When abnormalities occurred, the solar plant owners had to dispatch maintenance personnel to perform troubleshooting. This problem was magnified as the owners have a large number of sites around Taiwan. As personnel resources were limited, it resulted in problems being identified and rectified too late. In fact, there were sites where 20% of power was lost due to bird droppings covering the panels. In order to solve this issue, the maintenance personnel had to travel to the remote area where the problem occurred to determine what went wrong, return to pick up the necessary equipment and parts to fix the problem, and then return to make the necessary repairs. All in all, the process from discovery to rectification took six months. Mr. Zhang, the chairman of thingnario, realized this was a significant pain point for the customer and took steps to make the owners feel at ease.



Design Thinking to Optimize Power Generation Efficiency

Mr. Zhang said that thingnario identified all of the problems and worked out how to find a solution utilizing AI technologies. Conceived by design thinking, the Photon system incorporates intelligent monitoring functions and intelligent operational mechanisms to ensure that equipment is monitored effectively. By providing maintenance personnel with more information earlier, they were able to increase the overall operational efficiency of the solar station.

Photon has five key benefits:

(1) Artificial Intelligence (AI) Capabilities: The AI engine analyzes large volumes of historical and real-time sensor data to recognize patterns and predicts how much power will be generated in the next 5 to 30 minutes. When there is a large discrepancy between how much power was predicted to be generated and the actual amount generated, the system will send an alert to notify the solar plant operators to allow them to perform preventative maintenance.

(2) Highly Scalable: Photon handles timestamp data and business data separately in the backend database. This ensures that for every solar plant, irrespective of size, all the data is processed quickly.

(3) O&M Task Management System: Manage all records including maintenance, attendance, and expenses. The digitalization of operational costs along with the AI system are helping new operators get started quicker and reduces the amount of time, and therefore the cost of, troubleshooting.

(4) Easy Setup in Three Steps for Data Acquisition: First, set the solar station information on the software page, second, configure the network settings, and third, conduct field deployments.

(5) Dashboard for Instant Data Analysis: The single-line diagram, system configuration map, and real-time data make the operational status clear.

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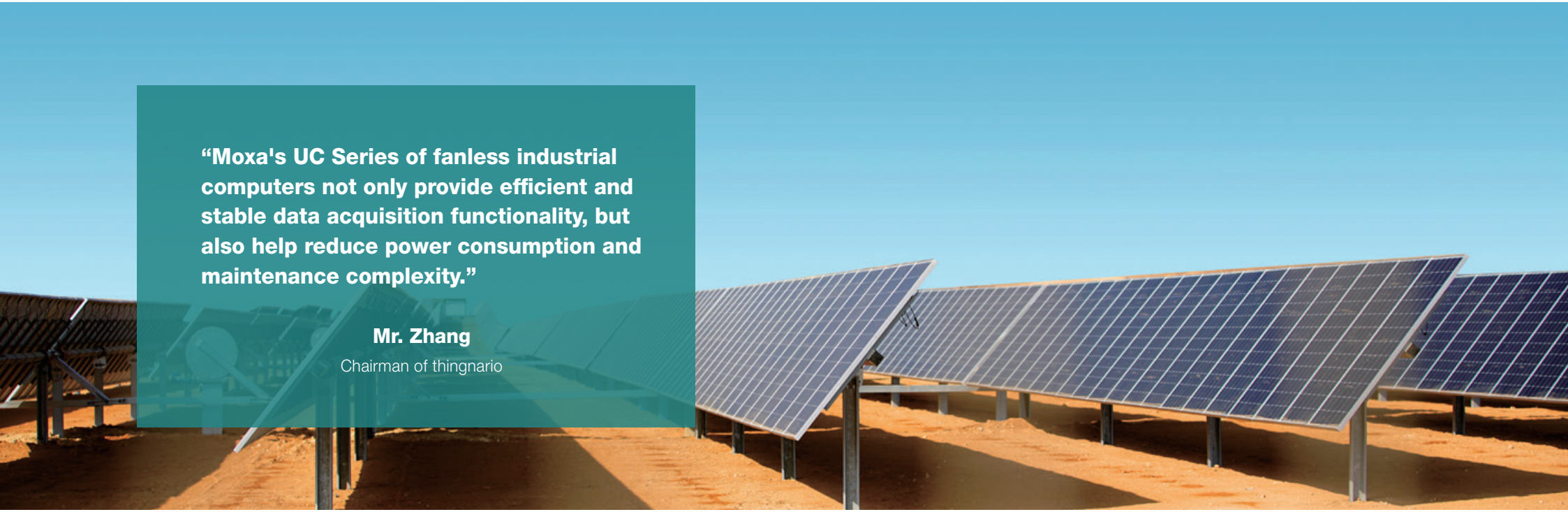
The technology produced by thingnario was designed to capture all of the data from the inverter as well as weather data from their self-developed Sky Camera, which provides information about cloud coverage and how the solar panels will be affected.

SOLUTION

Enabling Sustainable Edge Computing

Before the company was able to accurately acquire huge amounts of data, they had to ensure the industrial computer they selected met all of the project requirements. After careful analysis, Moxa's UC Series Arm-based industrial computers were deemed the most appropriate. Mr. Zhang required that the computers were capable of withstanding harsh environments, maintain stable operation for many years, and have a good brand reputation in order to win the trust of customers. Moxa's UC Series of fanless industrial computers not only provide efficient and stable data acquisition functionality, but also help reduce power consumption and maintenance complexity. Furthermore, they can withstand temperatures from -40 to 70°C and meet all of thingnario's expectations.

Moxa has opened multiple offices around the world and has distributors in over 70 countries. This localized expertise is expected to greatly contribute to the expansion of overseas operations and facilitate RMA policies in multiple countries for the solution being offered by thingnario and Moxa. Furthermore, Moxa's five-year product warranty allowed thingnario to sign a five-year contract with their customers making it possible for thingnario to accurately calculate the initial acquisition cost, which is a key factor in the partnership.



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Mr. Zhang

Chairman of thingnario

Results

In addition to the AI analysis that was used to predict the amount of power that would be generated by the solar plant, the real-time alerts (that were not available in the previous system) helped the operator to increase the power generated by 10% and reduce labor costs by almost 30%. The EPC (engineering, procurement, and construction) contractor who was responsible for maintenance of the plant, also saw the benefits of a good monitoring and operation system that presented useable information on a one-page dashboard.