



Jianfeng Yan

Players from various industries turn to cross-border convergence to accelerate the construction of “Internet+ photovoltaics.” >>

Achieving Grid Parity with Photovoltaics

By Jianfeng Yan, Senior Product Manager, Solar Inverter Marketing Support, Energy Solution Department, Huawei Enterprise Business Group

The Yellow River Hydropower Development Co., Ltd. (YRC) is an early adopter of smart Photovoltaic (PV) power generation. Further encouraged by China’s Internet+ initiative, the YRC move to an intelligent grid aims to transform traditional industries into economic drivers.

The economic goal is to reach “grid parity,” which is the ability to generate electrical power at a cost that is less than or equal to the price of power to the grid using conventional sources, such as coal, gas turbine, or nuclear.

In March 2015, Xiaoping Xie, YRC’s Chairman and General Manager, outlined the company’s vision for intelligent PV in a press conference showcasing the company’s achievements. He said, “By combining digital information technologies, Internet technologies, and the operational systems of photovoltaic power plants, we expect to achieve intelligence in PV power generation and significantly improve the yield of our PV power plants by improving the efficiency of our management and operations. We have organized ourselves to



Smart ground PV plant project in Laxiwa, Qinghai Province, China

achieve grid parity as quickly as possible.”

China’s PV industry embarked on an Internet+ business model with the launch of a Big Data center in conjunction with the commission of a Phase III, 200 MW smart PV plant in Golmud, and the 12 MW smart PV plant in Laxiwa, both in Qinghai Province.

Building Intelligence for PV Power Plants

YRC owns twenty-five PV power plants with a total installed capacity of 1,620.1 MW. Among the factors that handicap the industry in China are solar farms that are in the most remote and harshest of all possible environments. Combined with non-urban living conditions, it is a tough sell to find Operations and Maintenance (O&M) staff willing to relocate.

To accelerate large-scale development of its PV power plants and resolve its O&M and power plant construction problems, the YRC worked with Huawei to integrate new digital information, Internet, and PV power generation technologies. The collaboration has succeeded to build smart PV power plants with significantly increased yield and O&M efficiency.

Huawei Industry-leading LTE wireless systems specially developed for PV systems were deployed in Golmud and Laxiwa to provide broadband wireless coverage for each entire plant. These systems helped YRC construct broadband infrastructures that support intelligent monitoring, remote diagnosis, and real-time maintenance of large-scale PV power plants, with performance metrics well above what had been the previous O&M baseline.

The Huawei Smart PV system uses an integrated combination of LTE, Bluetooth, and Power-Line Communication (PLC) technologies to seamlessly integrate intelligent handheld terminals, mobile applications, and intelligent unmanned aerial inspection vehicles with PV systems. “Smart PV power plants integrate monitoring, security, production, operation, and prediction systems into an intelligent monitoring system,” according to Ying-tong Xu, Huawei General Manager of Intelligent Photovoltaic Power Plant Solutions. “The Huawei solution saves money by supporting the implemen-

tation of an intelligent management mode that requires few, if any, on-site personnel.”

Scattered across four provinces — Shanxi, Gansu, Ningxia, and Qinghai — YRC’s PV power plants are a potential troubleshooting and maintenance headache. For example, technical specifications for the power plants cannot be analyzed accurately on a timely basis, making it difficult to achieve production safety and effective management.

“PV power plants have huge numbers of devices, so it is impossible to perform manual monitoring on them. The Huawei Smart PV Solution uses LTE to transmit data and identify faults at the level of each PV string,” says Xiaoping Xie. “Huawei has simplified on-site fault diagnosis, production management, and preventive maintenance. The remote expert assistance service can be directed to capture photos of on-site conditions. The photos are forwarded to technical experts who are able to troubleshoot remotely to locate faults as quickly as possible. The Huawei solution also supports automated troubleshooting for quick fault remediation — which reduces the overall workload of technicians, and improves the efficiency of their jobs.”

At the press conference, Huawei engineers and YRC O&M personnel participating remotely from the Laxiwa plant demonstrated the following networked control functionality:

- Mobile O&M.
- Remote diagnosis.
- Preventive inspection by unmanned aerial vehicles.
- Big Data analysis.

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service using real-time audio and video communication, local and remote personnel also demonstrated real-time data collection, cloud storage, Big Data mining, and an online, automated system for maintenance analysis that generates recommendations for optimal cleaning cycles and component replacements. "If a 500 KW inverter stops working for one week, the electricity loss will amount to USD 3,000," added Yingtong Xu. "The intelligent monitoring and remote diagnosis functions help implement real-time maintenance and minimize the wait time. Such maintenance is easier to perform and can effectively reduce electricity losses caused by faults. The Huawei smart PV Solution has attracted the attention of the global PV industry. More than 50 industry professionals from Japan, Germany, and the United States have visited our smart PV power plants."

Internet+ PV = Smart PV

The YRC has plans to install another 46.5 GW between 2016 and 2020, including 40 GW of hydraulic tracking PV capacity.

ICT technologies have changed from support systems to production systems that drive value creation. This trend creates more strategic choices for enterprise leaders, making it easier for enterprises to break from traditional business limitations. Xiaoping Xie said, "Smart PV power plants have higher electricity conversion rates and lower construction and operation costs. They also interwork with grids better than conventional power plants, promoting

- Intelligent security.

The demonstration allowed the guests at the conference to experience first-hand the sophistication of a modern, smart PV power plant.

In addition to remote expert assistance



healthy development of the industry."

"While there is still plenty of room for further integration of Internet and solar PV technologies, the YRC's Laxiwa PV power plant is a good example of the benefits that occur when the two technologies are combined," concluded Dinghuan Shi, Chairman of the Chinese Renewable Energy Society, in his closing remarks. "The Laxiwa project is a success due to the joint efforts of the Qinghai Province, YRC, and Huawei, who achieved synergistic advantages beyond Internet+ PV construction."

Huawei provides a variety of advanced products for the energy industry, including intelligent inverters, wireless broadband trunking systems, industry-grade switching routers, multi-functional telepresence systems, and high-end servers and storage products. These products have been widely deployed by enterprises in the energy industry, helping to build Huawei's brand recognition in energy products. ▲