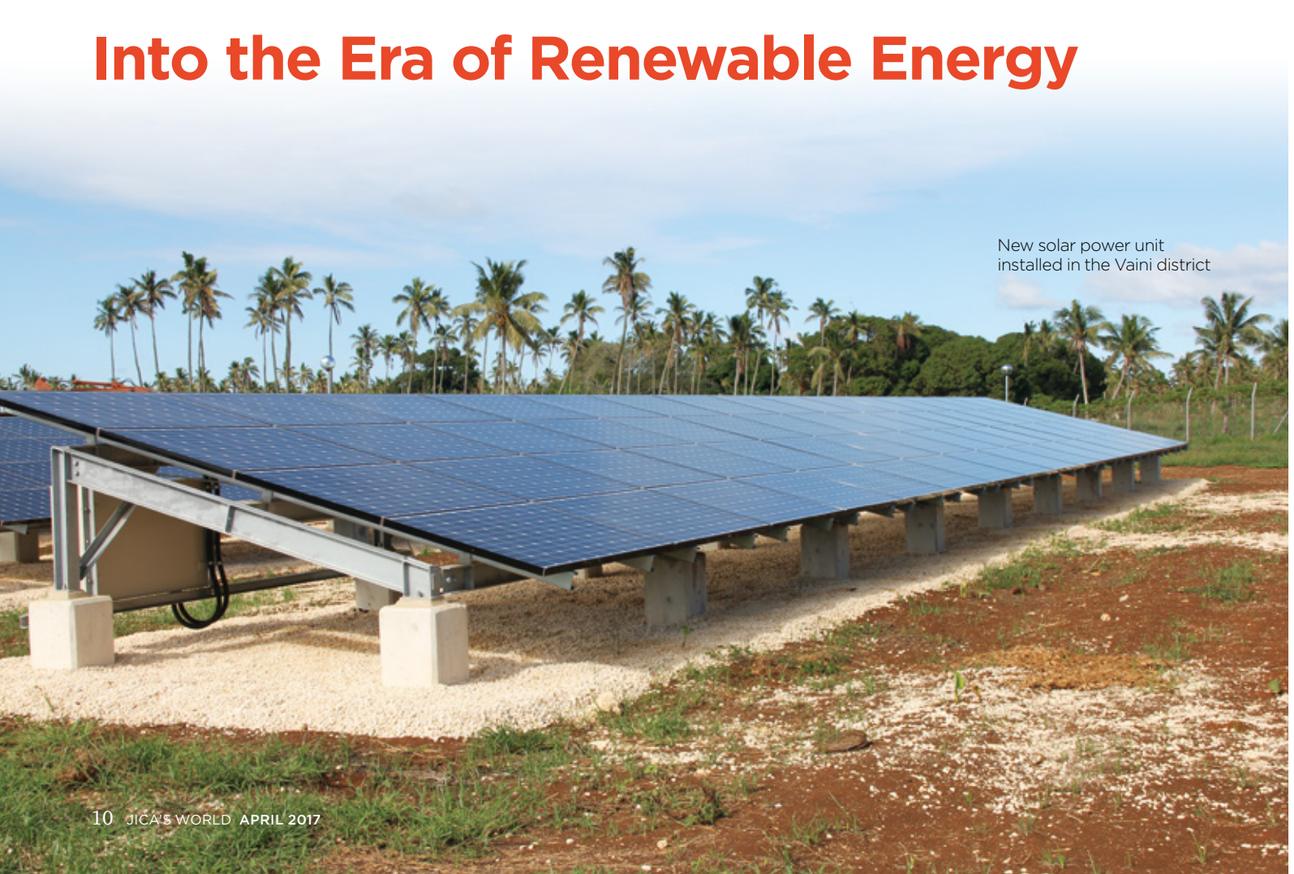
Into the Era of Renewable Energy



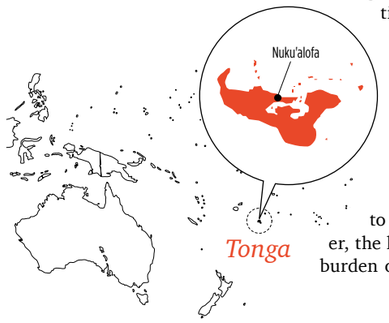
New solar power unit installed in the Vaini district

Island nations today share a common goal: to provide a stable supply of energy to all people. Tonga is one of these countries striving to use renewable energy sources to create a steady supply of electricity.

ENERGY TROUBLE IN PARADISE

On an island nation in the South Pacific, a brand-new power generation facility was powered up for the first time. A palpable feeling of relief spread among the workers as they confirmed that it was operating smoothly. In January of 2015, Tonga was about to start operation of a completely new system for supplying electricity, developed on its own island.

Most of Tonga's 100,000 citizens make their living in farming and fishery. The country's beautiful coral reefs and yacht harbors attract many tourists. Yet, in contrast to the external stereotype of a slow, pleasant, and carefree Oceania lifestyle surrounded by lush natural beauty and idyllic charm, countries in the region have been suffering from a common problem: energy shortage. Many of them rely on diesel power and fossil fuel to generate most of their electricity. However, the high shipping cost of fossil fuel is a heavy burden on these countries' finances; additionally, the fuel's high CO_2 emissions are a cause for concern over the environment—a problem to which island nations are particularly vulnerable.



Tonga is now actively pursuing the development of renewable energy, such as solar power and wind energy. The government hopes, by the year 2020, to have half of the power used in the country come from renewable energy sources. As part of this initiative, Tonga began working with Japan in 2013 to introduce a micro-grid power system.

Micro-grid systems use battery equipment and combine several power-generating facilities that produce less CO_2 to generate a steady supply of electricity while adjusting to fluctuations in supply and demand. These systems represent a network of interconnected small-scale power units and as such, they are particularly suitable for small island nations, where constructing large power plants is difficult. In Japan, micro-grids are being used on some remote islands in the Kyushu area. In Tonga, the system is now being installed on Tongatapu Island, which is home to 70% of all Tongan citizens.

Diesel fuel tank at the Popua power plant. Electricity is delivered everywhere on the island from here.

SUPPORT IN THE FIELD

Hidekazu Sato from Yachiyo Engineering, a consulting company in the construction business, has been supporting Tonga's efforts in the field. As an electricity expert, he has worked in Sri Lanka and Peru to assist in the introduction of systems for photovoltaic power generation. In Tonga, Sato conducted surveys with local energy staff and installed a 1-MW photovoltaic unit as well as units to control and adjust power supply output fluctuations. He also helped establish a power supply network incorporating a 1.32-MW photovoltaic unit developed with assistance from New Zealand.

When providing technical guidance, Sato goes beyond words and written materials and explains operation procedures using hands-on demonstrations of the actual facilities at the site. He puts special emphasis on teaching troubleshooting and maintenance so that local people can manage the facilities on their own after the operation has been launched. Sato says that through this hands-on experience, local people are gradually beginning to understand why they need the system in order to maintain high-quality power generation. According to Sato, local staff respond to his own enthusiasm and are always willing to help him.

Such efforts finally bore fruit in January 2015, when the test-run of the micro-grid system was successfully finished. The following March, the system was officially handed over to Tonga. The system is now operating smoothly, generating more power than was initially forecast. However, the country's goal—to cover half of its total electricity demand with renewable energy—is yet to be met. To help the nation achieve its goal, Japan is planning to build a wind-power plant in Tonga, which will be the first Japanese grant aid project of this kind.

Although renewable energy is increasingly used in many island countries, there are also challenges, Sato says. "Because renewable energy is dependent on natural conditions, it is inevitably difficult to ensure a stable supply of power. Moreover, when this energy is used on a larger scale, power output fluctuations become greater, so you must be careful about controlling the power." Could the micro-grid system be a major solution for the types of energy problems that many countries face? The international community is watching to see if this solution proves successful.

All around the world, awareness of the need to prevent global warming is increasing. In the midst of it, Oceanian nations are facing a turning point in the development of new energy sources. Ahead of everyone else, the people of Tonga are about to experience the benefits of the future of clean power.

Sato (second from left) attending a test-run of the micro-grid system.

Sato checking wiring of solar panels with local workers for the test-run.

Workers install transformer panels, which function as electric transformers to supply power to all regions.