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While there have been significant gains in promoting accessible and clean energy in Asia and the Pacific, many communities still lack an adequate and reliable supply of electricity, especially in remote areas.

This is the case in the Philippines where there are rural areas that lag behind in electrification despite improvements in the energy sector. Several communities are not connected to the power grid. Energy insecurity has resulted in high electricity prices and inequality in distribution, which stifle economic growth. The frequent use of diesel generators also increases air pollution. This spells the need for an energy solution that is clean, affordable, and sustainable and that can be replicated in other rural areas in Asia and the Pacific.

HeliosAltas, one of the winners of the first Technology Innovation Challenge for the Energy Sector of the Asian Development Bank (ADB), is piloting the use of a micro-hydro wheel in the Daguitan Canal, an irrigation source near Tacloban City in the Philippines" Visayas region. The objective of the Helios PowerWheel project, which is supported by ADB"s High-Level Technology Fund, is to generate low-cost and reliable micro-hydropower even in shallow or low-speed water sources.

The High-Level Technology Fund is committed to promoting energy efficiency technologies, which are essential in achieving the Sustainable Development Goals and meeting Paris Agreement commitments.

The microgrid solution with Helios PowerWheel is designed for remote or weak grid area applications. The system integrates seamlessly with any microgrid configuration and other sources of renewable power, like solar or wind. Units are easy to install, modular, and scalable, with an environmental footprint that is only a fraction of wind and solar systems.

In the Daguitan Canal, a micro-hydro wheel will be deployed to produce 4.5 to 5 kilowatts (kW) of continuous power at given flow conditions. This technology will demonstrate how most of the existing irrigation canals can be utilized to generate power for the community. The solution is envisioned to become a practical, economical, and reliable source of power for microgrids.

Proof of concept has been demonstrated through installations under various conditions in different parts of the world, including Alaska, California, and Washington DC in the United States; Indonesia; the Philippines; and Mexico. Significant data was collected from each project. Several of these projects remain fully operational 24/7 after several years, including installations in Balingasag municipality in Misamis Oriental province in the Philippines (2.5 kW microgrid) and Nevada Irrigation District (4 units) and Utica Water District in California (400-watt unit) in the US.

The Balingasag project in the Philippines, in particular, showcases the technology"s impact in remote, tropical areas where solar/battery power alone is not sufficient and that cannot be reached by conventional grid-tied

power. Completed in only 2 weeks, this HeliosAltas-funded rural electrification project included streetlights, utility drops for each house, and power for a community water transfer pump and storage tank. The village residents, who maintain the system, now enjoy a significant improvement in health, safety, and overall quality of life.

The pilot in Tacloban, meanwhile, will include installing a larger 5-kW water wheel, featuring a unique wing blade design capable of producing energy efficiently from slow-moving water in a canal. This innovation is expected to expand the available market for this technology to 80% of the canals that have been considered unusable because the water is too slow. This will in turn increase the number of locations where this microgrid solution can be installed.

The Helios PowerWheel will not change or disrupt the canal or landscape in design, and it should not have a negative environmental impact to the project site. Its patented flow-through technology and remote suspension system can automatically raise the wheel during floods or when encountering large debris.

As part of the pilot-testing, the generated power will be used by a partner local resort where solar panels and lithium-ion batteries will also be installed, creating a simulated microgrid. The 6- to 7-kW solar panels will operate 6 to 7 hours per day and will be complemented by the micro-hydropower technology solution. Any excess generation supply will be discharged into the local electric cooperative"s grid. In case of a deficit, the cooperative will provide the needed supply.

The demonstration site will be eventually converted into a fully functional commercial project. Relevant stakeholders, such as the National Irrigation Administration, local government, and local utilities, will have unlimited and full access in perpetuity to observe and evaluate the project and use it as a showcase for promoting hybrid micro-hydro concepts in other parts of the Philippines and even in other member countries of ADB.